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Patent Owner's Demonstrative Exhibit - Not Evidence

PATENT OWNER'S DEMONSTRATIVES

MAY 9, 2025 ORAL ARGUMENT

VALVE CORP., PETITIONER,
V.
IMMERSION CORP., PATENT OWNER

CASE No. IPR2024-00557 | US PATENT 10,665,067

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Roadmap

1. Background of the Invention
2. Claim Construction and Plain Meaning
3. No Anticipation or Obviousness:
 - a) Banerjee: **No Proxy Object**
 - b) Meglan: **No Proxy Object**
 - c) Rogers: **No Haptics Based on Position Data**

Background of the Invention

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Background of the Invention: General Field

- '067 Patent enhances user interaction within AR/VR by **integrating** haptics and visual effects via **proxy object** (POR, 3-4)

SUMMARY

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FIELD OF THE INVENTION

The present application relates to the field of user interface devices. More specifically, the present application relates to integrating haptics overlay in augmented reality.

Ex. 1001, 1:8-9

Embodiments of the present disclosure comprise systems and methods for integrating haptics overlay in augmented reality. In one embodiment, a system comprises a haptic output device. The system also comprises a display configured to output a visual effect. The system also comprises a sensor for tracking a position of a proxy object. The system also comprises a processor configured to: determine a modified visual effect based in part on data received from the sensor, determine a haptic effect based in part on data received from the sensor, transmit a display signal associated with the modified visual effect to the display, transmit a haptic signal associated with the haptic effect to the haptic output device; and output the haptic effect using the haptic output device.

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Ex. 1001, 1:27-40

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Background of the Invention: Proxy Object

- Proxy object's **position sensor** allows users to **see** and feel in AR/VR (POR, 4-5)

SUMMARY

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Embodiments of the present disclosure comprise systems and methods for integrating haptics overlay in augmented reality. In one embodiment, a system comprises a haptic output device. The system also comprises a display configured to output a visual effect. The system also comprises a sensor for tracking a position of a proxy object. The system also comprises a processor configured to: determine a modified visual effect based in part on data received from the sensor, determine a haptic effect based in part on data received from the sensor, transmit a display signal associated with the modified visual effect to the display, transmit a haptic signal associated with the haptic effect to the haptic output device; and output the haptic effect using the haptic output device.

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Ex. 1001, 1:27-40

In one illustrative embodiment, a user is wearing an AR headset and is looking at a proxy object, e.g., a shoe, in real space. The user may choose a material from a library of materials (e.g., materials such as one or more of leather, plastic, rubber, metal, burlap, suede, denim, wood, cloth, ceramic, foamed material, or glass). This material will then be displayed on the proxy object via the AR headset by saying a voice command out loud (e.g., apply leather material) or inputting instructions via a visual menu in a VR or AR headset, a hand controller, a wearable device, or gesture recognition. The illustrative AR display of the AR headset is modified based on the command so that the appearance of the proxy object is modified through the AR display to show the proxy object made of the selected material.

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Ex. 1001, 2:39-52

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Background of the Invention: Proxy Object

- Proxy object's **position sensor** allows users to see and **feel** in AR/VR (POR, 4-5)

SUMMARY

25

Embodiments of the present disclosure comprise systems and methods for integrating haptics overlay in augmented reality. In one embodiment, a system comprises a haptic output device. The system also comprises a display configured to output a visual effect. The system also comprises a sensor for tracking a position of a proxy object. The system also comprises a processor configured to: determine a modified visual effect based in part on data received from the sensor, determine a haptic effect based in part on data received from the sensor, transmit a display signal associated with the modified visual effect to the display, transmit a haptic signal associated with the haptic effect to the haptic output device; and output the haptic effect using the haptic output device.

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Ex. 1001, 1:27-40

ciated with a texture. The modified image of the proxy object through the AR display, and the texture output by the haptic output device, can then be modified in real-time to reflect any movement of the proxy object. In addition, or alternatively, the processor can use information from a sensor(s) to tell when a wearable peripheral device comes into “contact” with an AR object. These sensors may further detect movement of the user associated with the proxy object and modify visual and haptic effects based on the user’s movement.

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Ex. 1001, 3:1-4

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Background of the Invention: Proxy Object

- Per claim 1, '067 Patent includes proxy object that:
 - 1) comprises haptic output device(s);
 - 2) has visual effects displayed onto its surface;
 - 3) has sensor for tracking position of proxy object, and processor that determines and outputs modified visual and haptic effects based on position data from sensor (POR, 3-4)

Background of the Invention: Claim 1

40 What is claimed:

1. A system comprising:

a proxy object comprising one or more haptic output devices;

a display configured to output a visual effect onto a surface of the proxy object;

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a sensor for tracking a position of the proxy object; and
a processor configured to:

determine a modified visual effect based in part on data received from the sensor;

50 determine a haptic effect based in part on data received from the sensor;

transmit a display signal associated with the modified visual effect to the display, the modified visual effect to be displayed on the proxy object via the display;

55 transmit a haptic signal associated with the haptic effect to the one or more haptic output devices; and

output the haptic effect using the one or more haptic output devices.

Ex. 1001, 10:40-58

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Claim Construction: “a proxy object comprising one or more haptic output devices”

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Claim Construction: “a proxy object comprising one or more haptic output devices”

Term	Proposed Construction
a proxy object comprising one or more haptic output devices	a physical object that acts as a proxy for a virtual object and that itself contains inside a haptic output device, e.g., an actuator

POR, 10; Sur-Reply, 1

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Claim Construction: “a proxy object comprising one or more haptic output devices”

- Proxy object is proxy for virtual object (POR, 11)

In one illustrative embodiment, a user is wearing an AR headset and is looking at a proxy object, e.g., a shoe, in real space. The user may choose a material from a library of materials (e.g., materials such as one or more of leather, plastic, rubber, metal, burlap, suede, denim, wood, cloth, ceramic, foamed material, or glass). This material will then be displayed on the proxy object via the AR headset by saying a voice command out loud (e.g., apply leather material) or inputting instructions via a visual menu in a VR or AR headset, a hand controller, a wearable device, or gesture recognition. The illustrative AR display of the AR headset is modified based on the command so that the appearance of the proxy object is modified through the AR display to show the proxy object made of the selected material.

Ex. 1001, 2:39-52

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Claim Construction: “a proxy object comprising one or more haptic output devices”

- Haptic output device
“contains inside a haptic output device” (POR, 12-13)

Although a single haptic output device **118** is shown here, embodiments may use multiple haptic output devices of the same or different type to output haptic effects. For example, haptic output device **118** may comprise one or more of, for example, a piezoelectric actuator, an electric motor, an electro-magnetic actuator, a voice coil, a shape memory alloy, an electroactive polymer, a solenoid, an eccentric rotating mass motor (ERM), or a linear resonant actuator (LRA), a low profile haptic actuator, a haptic tape, or a haptic output device configured to output an electrostatic effect, such as an Electrostatic Friction (ESF) actuator. In some embodiments, haptic output device **118** may comprise a plurality of actuators, for example a low profile haptic actuator, a piezoelectric actuator, and an LRA. Further, haptic output device **118** may be integrated into a proxy object or into the user's clothing or a wearable device.

Ex. 1001, 4:37-38

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Claim Construction: “a proxy object comprising one or more haptic output devices”

- Haptic output device
“contains inside a haptic output device” (POR, 12-13)

In some embodiments, once the display signal is transmitted, the visual effect will be output through wearable AR device 204. So, the user 206 will be able to view the proxy object with the chosen texture through the wearable AR device 204. For example, if the user 206 chooses a red leather, then the user 206 will see the proxy object 202 made of that same red leather through the wearable AR device 204. 60 65

As the AR visual effect is changed through the choice of texture, a haptic signal is transmitted to the haptic output

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device(s) 118 contained in proxy object 202. These haptic output devices output a haptic effect associated with the selected texture, which enables user 206 to feel the chosen texture through the haptic effect produced in proxy object 5 202 as the user touches proxy object 202.

Ex. 1001, 5:67 – 6:1

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Claim Construction: “a proxy object comprising one or more haptic output devices”

- Haptic output device
“contains inside a haptic output device” (POR, 12-13)

40 What is claimed:
1. A system comprising:
a proxy object comprising one or more haptic output
devices;
a display configured to output a visual effect onto a
45 surface of the proxy object;
a sensor for tracking a position of the proxy object; and
a processor configured to:
determine a modified visual effect based in part on data
received from the sensor;
50 determine a haptic effect based in part on data received
from the sensor;
transmit a display signal associated with the modified
visual effect to the display, the modified visual effect
to be displayed on the proxy object via the display;
55 transmit a haptic signal associated with the haptic effect
to the one or more haptic output devices; and
output the haptic effect using the one or more haptic
output devices.

Ex. 1001, 10:42-43

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Claim Construction: “a proxy object comprising one or more haptic output devices”

- Prosecution history supports Immersion’s proposed construction
- **Distinguished** Gonzalez because haptic output device was **not integrated** into proxy object

(POR, 13-14; Sur-Reply, 2-3)

Gonzalez does not disclose a proxy object comprising one or more haptic output devices and a modified visual effect to be displayed on the proxy object as claimed in the amended claims. Instead, the “AR system and the AR manager can be used to provide other types of vehicle function[s] to a vehicle such as modifying the appearance of the vehicle when viewed through the AR headset.” *Id.*, [0043]. “The AR glove 196 is a haptic feedback glove which is configured so that the driver of the vehicle 123 can **touch, grasp, and feel virtual objects as if they were real** (see, for example, the virtual object 410 depicted in FIG. 4). . . . and the AR glove 196 is operable to provide feedback to the driver so that virtual object feels firm” *Id.*, [0079]. The AR glove 196 is the only device described as providing haptic feedback, but the virtual objects and/or visible alterations to the vehicle are not overlaid on the AR glove 196 because the purpose of the AR glove 196 is to interact with the virtual objects as if they were real. Displaying the virtual objects on the AR glove 196 would prevent the AR glove 196 from being able to interact with the virtual objects as if they were real. And the physical portions of the vehicle where visible alterations are overlaid do not include any feedback devices. Therefore, Gonzalez does not disclose “a proxy object comprising one or more haptic output devices” with “the modified visual effect to be displayed on the proxy object.”

Ex. 1002, 287

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Claim Construction: “a proxy object comprising one or more haptic output devices”

- Valve accepts that proxy object includes haptic output device

(Sur-Reply, 3-4)

Although ultimately immaterial (*see infra* Section III), Immersion’s proposed construction is inconsistent with the intrinsic evidence and Federal Circuit precedent. If an express construction is needed, limitation [1A] should be afforded its plain meaning, *e.g.*, a proxy object including or having one or more haptic output devices.

Reply, 5

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Claim Construction: “a proxy object comprising one or more haptic output devices”

- But Valve incorrectly argues haptic output device can be on exterior of proxy object by citing “haptic tape” embodiment
- Valve **misrepresents** both intrinsic and extrinsic evidence

(Reply, 4; Sur-Reply, 1-2)

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Immersion’s proposed construction limits the location of the claimed “*haptic output devices*” to being “*inside*” the “*proxy object*.” To support its construction,

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Immersion cherry-picks two *exemplary* embodiments in the specification (POR, 12), but Immersion conveniently ignores an embodiment in which the haptic device is not “inside” the proxy object. Specifically, Immersion ignores an embodiment in which “haptic tape” is used. EX1001, 4:23-38. Haptic tape adheres to the proxy object’s *exterior* and is thus not inside the proxy object. See, e.g., EX1039, 5:16-34 (describing haptic tape “coupled to” a device by “adhesive”). Immersion’s narrow construction would improperly exclude the “haptic tape” embodiment. *Google LLC*

Claim Construction: “a proxy object comprising one or more haptic output devices”

- '067 Patent teaches haptic tape is “integrated into a proxy object” (Sur-Reply, 1)

Although a single haptic output device **118** is shown here, embodiments may use multiple haptic output devices of the same or different type to output haptic effects. For example, haptic output device **118** may comprise one or more of, for example, a piezoelectric actuator, an electric motor, an electro-magnetic actuator, a voice coil, a shape memory alloy, an electroactive polymer, a solenoid, an eccentric rotating mass motor (ERM), or a linear resonant actuator (LRA), a low profile haptic actuator, a haptic tape, or a haptic output device configured to output an electrostatic effect, such as an Electrostatic Friction (ESF) actuator. In some embodiments, haptic output device **118** may comprise a plurality of actuators, for example a low profile haptic actuator, a piezoelectric actuator, and an LRA. Further, haptic output device **118** may be integrated into a proxy object or into the user's clothing or a wearable device.

Ex. 1001, 4:31-38

Patent Owner's Demonstrative Exhibit - Not Evidence

Claim Construction: “a proxy object comprising one or more haptic output devices”

- Unrelated patent cited by Valve further confirms haptic tape is **embedded between** touch-sensitive input device and display
- Reference cited by Valve says **opposite** of what Valve claims

(Sur-Reply, 1-2)

The embodiment shown in FIG. 3 also comprises a piezoelectric actuator 308. The piezoelectric actuator 308 is substantially completely embedded in a polymer matrix 310, such as silicone. The embedded actuator, 308 is coupled to the display 306, such as to a frame of the display 306, by a layer of adhesive 312. When assembled, the embedded actuator 308 in combination with the adhesive layer 312 forms a seal between the touch-sensitive input device 304 and display 306. The adhesive layer 312 may be bonded along substantially an entire surface (e.g., the surface of polymer matrix 310 which is bonded to display 306) or along multiple surfaces of the embedded actuator 308 (e.g., along one surface of polymer matrix 310 and a surface opposite that surface). Such an embodiment might be referred to as a “haptic tape.” In some embodiments, a haptic tape may comprise a pre-applied adhesive covered by a protective layer, such as paper. When the haptic tape is installed, the protective layer removed, the haptic tape put into position, and thereafter held in place by the pre-applied adhesive.

Ex. 1039, 5:19-29

Patent Owner's Demonstrative Exhibit - Not Evidence

Claim Construction: “a proxy object comprising one or more haptic output devices”

- Contrary to Valve’s argument, “haptic tape” embodiment is integrated into proxy object—not on proxy object’s exterior
- Valve identifies no example of haptic output device on exterior of proxy object in intrinsic or extrinsic evidence

(Reply, 4; Sur-Reply, 1-2)

Plain Meaning: “proxy object”

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Plain Meaning: “proxy object”

Term	Plain Meaning
proxy object	Limitation [1A]: “a proxy object comprising one or more haptic output devices” <i>Proxy object must comprise—i.e., contain or otherwise include—haptic output device</i> Limitation [1C]: “a sensor for tracking the position of the proxy object” <i>Proxy object must have position tracked by sensor</i> Limitation [1D-3]: “the modified visual effect to be displayed on the proxy object.” <i>Proxy object must include visual overlay</i>

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Plain Meaning: “proxy object”

- Claim 1 establishes plain meaning of **proxy object**

Apple Inc. v. MPH Techs. Oy, 28 F.4th 254 (Fed. Cir. 2022) (applying plain meaning considering surrounding claim language)

- Alleged “proxy object” that does not meet this criteria cannot anticipate

Raytheon Co. v. Sony Corp., 727 Fed. Appx. 662, 672 (Fed. Cir. 2018) (“The signal ‘comprising’ does not render a claim anticipated by a device that contains less ... than what is claimed.”)

(POR, 1-3; 10-17 Sur-Reply, 9-10)

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40 What is claimed:

1. A system comprising:

→ a proxy object comprising one or more haptic output devices;

→ a display configured to output a visual effect onto a surface of the proxy object;

45 → a sensor for tracking a position of the proxy object; and a processor configured to:

determine a modified visual effect based in part on data received from the sensor;

50 determine a haptic effect based in part on data received from the sensor;

transmit a display signal associated with the modified visual effect to the display, the modified visual effect to be displayed on the proxy object via the display;

55 transmit a haptic signal associated with the haptic effect to the one or more haptic output devices; and output the haptic effect using the one or more haptic output devices.

Ex. 1001, 10:42-46

Plain Meaning: “proxy object”

- Proxy object must comprise—
i.e., contain or otherwise
include—haptic output device

Willis Elec. Co. v. Polygroup Macau Ltd. (BVI), 777
Fed. Appx. 495, 499 (Fed. Cir. 2019) (“comprising”
synonymous with “containing”)

(POR, 1-3; 10-17; Sur-Reply, 8-9)

40 What is claimed:

1. A system comprising:

a proxy object comprising one or more haptic output
devices;

45 a display configured to output a visual effect onto a
surface of the proxy object;

a sensor for tracking a position of the proxy object; and
a processor configured to:

determine a modified visual effect based in part on data
received from the sensor;

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from the sensor;

transmit a display signal associated with the modified
visual effect to the display, the modified visual effect
to be displayed on the proxy object via the display;

55 transmit a haptic signal associated with the haptic effect
to the one or more haptic output devices; and
output the haptic effect using the one or more haptic
output devices.

Patent Owner's Demonstrative Exhibit - Not Evidence

Ex. 1001, 10:42-43

Plain Meaning: “proxy object”

- “Comprising” is open-ended in sense that it “does not exclude additional, unrecited elements.”

MagSil Corp. v. Hitachi Global Storage Techs., Inc., 687 F.3d 1377, 1383 (Fed. Cir. 2012)

- **When used in non-limiting preamble**, such as “[a] system comprising,” it does not limit claimed structure beyond requiring “system”

(Sur-Reply, 11)

Plain Meaning: “proxy object”

- But here, “comprising” is used in limitation to indicate that one component (proxy object) comprises another component (haptic output device) **dictating relationship between them**
- Federal Circuit has found that A “comprising” B means A “includes” B and does not cover inverse where B includes A

Smith & Nephew, Inc. v. Arthrex, Inc., 453 Fed. Appx. 977, 980-81 (Fed. Cir. 2011)

(Sur-Reply, 11-12)

Plain Meaning: “proxy object”

- Valve accepts that proxy object **includes** haptic output device

(Sur-Reply, 3-4)

Although ultimately immaterial (*see infra* Section III), Immersion’s proposed construction is inconsistent with the intrinsic evidence and Federal Circuit precedent. If an express construction is needed, limitation [1A] should be afforded its plain meaning, *e.g.*, a proxy object including or having one or more haptic output devices.

Reply, 5

Patent Owner's Demonstrative Exhibit - Not Evidence

Plain Meaning: “proxy object”

- But Valve incorrectly argues haptic output device can be on exterior of proxy object by citing “haptic tape” embodiment
- Valve **misrepresents** both intrinsic and extrinsic evidence

(Reply, 4; Sur-Reply, 1-2)

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Immersion’s proposed construction limits the location of the claimed “*haptic output devices*” to being “*inside*” the “*proxy object*.” To support its construction,

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Immersion cherry-picks two *exemplary* embodiments in the specification (POR, 12), but Immersion conveniently ignores an embodiment in which the haptic device is not “inside” the proxy object. Specifically, Immersion ignores an embodiment in which “haptic tape” is used. EX1001, 4:23-38. Haptic tape adheres to the proxy object’s *exterior* and is thus not inside the proxy object. See, e.g., EX1039, 5:16-34 (describing haptic tape “coupled to” a device by “adhesive”). Immersion’s narrow construction would improperly exclude the “haptic tape” embodiment. *Google LLC*

Plain Meaning: “proxy object”

- '067 Patent teaches haptic tape is “integrated into a proxy object” (Sur-Reply, 1)

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Ex. 1001, 4:31-38

Patent Owner's Demonstrative Exhibit - Not Evidence

Plain Meaning: “proxy object”

- Unrelated patent cited by Valve further confirms haptic tape is **embedded between** touch-sensitive input device and display
- Reference cited by Valve says **opposite** of what Valve claims

(Sur-Reply, 1-2)

The embodiment shown in FIG. 3 also comprises a piezoelectric actuator 308. The piezoelectric actuator 308 is substantially completely embedded in a polymer matrix 310, such as silicone. The embedded actuator, 308 is coupled to the display 306, such as to a frame of the display 306, by a layer of adhesive 312. When assembled, the embedded actuator 308 in combination with the adhesive layer 312 forms a seal between the touch-sensitive input device 304 and display 306. The adhesive layer 312 may be bonded along substantially an entire surface (e.g., the surface of polymer matrix 310 which is bonded to display 306) or along multiple surfaces of the embedded actuator 308 (e.g., along one surface of polymer matrix 310 and a surface opposite that surface). Such an embodiment might be referred to as a “haptic tape.” In some embodiments, a haptic tape may comprise a pre-applied adhesive covered by a protective layer, such as paper. When the haptic tape is installed, the protective layer removed, the haptic tape put into position, and thereafter held in place by the pre-applied adhesive.

Ex. 1039, 5:19-29

Patent Owner's Demonstrative Exhibit - Not Evidence

Plain Meaning: “proxy object”

- Contrary to Valve’s argument, “haptic tape” embodiment is integrated into proxy object—not on proxy object’s exterior
- Valve identifies no example of haptic output device on exterior of proxy object in intrinsic or extrinsic evidence

(Reply, 4; Sur-Reply, 1-2)

Plain Meaning: “proxy object”

- Proxy object must include visual overlay

(POR, 1-3; 10-17; Sur-Reply, 8-9)

40 What is claimed:
1. A system comprising:
a proxy object comprising one or more haptic output
devices;
a display configured to output a visual effect onto a
45 surface of the proxy object;
a sensor for tracking a position of the proxy object; and
a processor configured to:
determine a modified visual effect based in part on data
received from the sensor;
50 determine a haptic effect based in part on data received
from the sensor;
transmit a display signal associated with the modified
visual effect to the display, the modified visual effect
to be displayed on the proxy object via the display;
55 transmit a haptic signal associated with the haptic effect
to the one or more haptic output devices; and
output the haptic effect using the one or more haptic
output devices.

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Ex. 1001, 10:44-45

Plain Meaning: “proxy object”

- Proxy object must have sensor track its position

(POR, 1-3; 10-17; Sur-Reply, 8-9)

40 What is claimed:
1. A system comprising:
a proxy object comprising one or more haptic output
devices;
a display configured to output a visual effect onto a
45 surface of the proxy object;
a sensor for tracking a position of the proxy object; and
a processor configured to:
determine a modified visual effect based in part on data
received from the sensor;
50 determine a haptic effect based in part on data received
from the sensor;
transmit a display signal associated with the modified
visual effect to the display, the modified visual effect
to be displayed on the proxy object via the display;
55 transmit a haptic signal associated with the haptic effect
to the one or more haptic output devices; and
output the haptic effect using the one or more haptic
output devices.

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Ex. 1001, 10:46

Claim construction: “based in part on data received from the sensor”

Patent Owner's Demonstrative Exhibit - Not Evidence

Claim Construction: “based in part on data received from the sensor”

Term	Proposed Construction
based in part on data received from the sensor	determine a haptic effect based in part on position data of the proxy object received from the sensor that tracks a position of the proxy object

POR, 12-13; Sur-Reply, 3

Patent Owner's Demonstrative Exhibit - Not Evidence

Claim Construction: “based in part on data received from the sensor”

- [1C] requires “a sensor for tracking a position of the proxy object” not sensor for tracking any kind of data
- “the sensor” referenced in [1D2] relies on [1C] for its antecedent basis

(Sur-Reply, 4-5)

40 What is claimed:
1. A system comprising:
a proxy object comprising one or more haptic output
devices;
a display configured to output a visual effect onto a
45 surface of the proxy object;
a sensor for tracking a position of the proxy object; and
a processor configured to:
determine a modified visual effect based in part on data
received from the sensor;
50 determine a haptic effect based in part on data received
from the sensor;
transmit a display signal associated with the modified
visual effect to the display, the modified visual effect
to be displayed on the proxy object via the display;
55 transmit a haptic signal associated with the haptic effect
to the one or more haptic output devices; and
output the haptic effect using the one or more haptic
output devices.

Ex. 1001, 10:46:51

Patent Owner's Demonstrative Exhibit - Not Evidence

Claim Construction: “based in part on data received from the sensor”

- “for tracking a position of the proxy object” is **adjectival modifier** that modifies noun “sensor,” limiting relevant data that sensor processes in claim 1

(Sur-Reply, 4-5)

40 What is claimed:

1. A system comprising:

a proxy object comprising one or more haptic output devices;

45 a display configured to output a visual effect onto a surface of the proxy object;

a sensor for tracking a position of the proxy object; and

a processor configured to:

determine a modified visual effect based in part on data received from the sensor;

50 determine a haptic effect based in part on data received from the sensor;

transmit a display signal associated with the modified visual effect to the display, the modified visual effect to be displayed on the proxy object via the display;

55 transmit a haptic signal associated with the haptic effect to the one or more haptic output devices; and output the haptic effect using the one or more haptic output devices.

Ex. 1001, 10:46:51

Patent Owner's Demonstrative Exhibit - Not Evidence

Claim Construction: “based in part on data received from the sensor”

- Courts have recognized in analogous situations that adjectival modifier introduced in claim to describe structural element that limits claim can be **used in interpretation of later relevant terms** to properly assess their meaning

(Sur-Reply, 4-5)

Claim Construction: “based in part on data received from the sensor”

- “electrical signal inputs” used “electrical signal” as adjectival modifier of “inputs” to explain structural inputs recited in claims
- Court construed “inputs to said wireless communication unit are operable for monitoring” as “signals provided to the wireless communication unit via a wired electrical connection that may be monitored”

Smith v. Honeywell Int'l, Inc., No. 2:14-CV-665, 2015 U.S. Dist. LEXIS 79503, at *59 (E.D. Tex. June 18, 2015)

(Sur-Reply, 4-5)

Patent Owner's Demonstrative Exhibit - Not Evidence

Claim Construction: “based in part on data received from the sensor”

- Valve does not dispute that data from “the sensor” must include data “for tracking a position of the proxy object”
- But **Valve ignores plain language of claim 1** and argues that “the sensor” in limitation [1D2] can determine haptic effect based on any type of data

(Reply, 6; Sur-Reply, 3-4)

Claim Construction: “based in part on data received from the sensor”

- **Excluding requirement** that sensor transmit positional data reads out express requirement for position tracking, rendering “for tracking a position of the proxy object” **superfluous**

Power Mosfet Techs., L.L.C. v. Siemens AG, 378 F.3d 1396, 1410 (Fed. Cir. 2004) (claim construction which renders claim terms superfluous is disfavored)

(Sur-Reply, 4-5)

Claim Construction: “based in part on data received from the sensor”

- Positional data is **requirement for [1D2] established by [1C]**; whether other data is also present is irrelevant
- That dependent claim 7 lists alternative sensor types simply means that position sensor of claim 1 can also comprise sensors that transmit other types of data alongside positional data

Littelfuse, Inc. v. Mersen USA EP Corp., 29 F.4th 1376, 1380 (Fed. Cir. 2022 (“an independent claim is broader than a claim that depends from it”))

(Sur-Reply, 5-6)

Patent Owner's Demonstrative Exhibit - Not Evidence

Plain Meaning: “position”

Patent Owner's Demonstrative Exhibit - Not Evidence

Plain Meaning: “position”

Term	Proposed Construction
position	POSITA would read plain meaning of position to be location in free space, e.g., by tracking its X-Y-Z coordinates. Position (X-Y-Z) is also distinct from orientation (rotation).

POR, 41-44; Sur-Reply, 6-8

Patent Owner's Demonstrative Exhibit - Not Evidence

Plain Meaning: “position”

- Immersion cites **unrebutted expert testimony** distinguishing “position” from “rotation (orientation)” and “movement”

Google LLC v. Lee, 759 Fed. Appx. 992, 996-997 (Fed. Cir. 2019) (reversing Board’s construction because it ignored unrebutted expert testimony)

(Sur-Reply, 6-7)

Rogers’ use of “inertial sensors” is to track movement, not position. For example, Rogers at ¶[0016] states: “In some implementations, the directional interface object further includes at least one inertial sensor for *sensing movement* of the directional interface object.” Rogers at ¶[0018] also states that “at least one inertial sensor configured to generate inertial data indicative of *movement* of the directional interface object.” A POSITA would understand that movement is different from position. Position tracking (in three dimensions) is typically tracking the X, Y, and Z coordinates of an object. Sensing the movement can be as simple as determining if an object has moved in either translation or rotation (*e.g.*, true or false), or may involve sensing the magnitude of translational or rotational movement.

Ex. 2007, ¶ 98

Patent Owner's Demonstrative Exhibit - Not Evidence

Plain Meaning: “position”

- “Position” (X, Y, Z) is not “rotation” (orientation)
- “Movement” is a change in position *or* rotation
- Mere disclosure of “movement” does not disclose “position” because genus (“movement”) does not disclose species (“position”)

Wasica Fin. GmbH v. Cont’l Auto. Sys., 853 F.3d 1272, 1285 (Fed. Cir. 2017) (recognizing that disclosure of genus in prior art is not disclosure of every species)

(Sur-Reply, 7)

Patent Owner's Demonstrative Exhibit - Not Evidence

No Anticipation or Obviousness

Patent Owner's Demonstrative Exhibit - Not Evidence

Summary

- Ground 1: Banerjee **lacks** “proxy object” (POR, 17-27; Sur-Reply, 10-14)
- Ground 2: Meglan **lacks** “proxy object” (POR, 27-34; Sur-Reply, 15-23)
- Ground 3: Rogers **does not** “determine a haptic effect based in part on data received from the sensor” (POR, 35-48; Sur-Reply 23-27)

No Anticipation or Obviousness: Banerjee

Patent Owner's Demonstrative Exhibit - Not Evidence

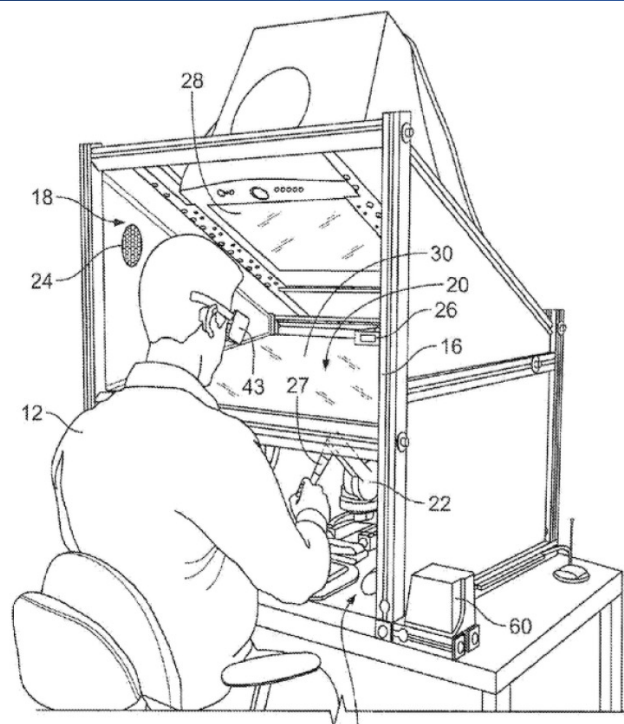
Banerjee: Summary

1. Overview of Banerjee
2. Banerjee does not disclose claimed “proxy object”
 - a) Valve inconsistently interprets “proxy object” across claim
 - b) No “proxy object” that comprises “haptic output device”
3. Undisputed: Banerjee is not invalidating under Immersion’s proposed construction

Banerjee: Overview

- Banerjee is directed to surgical workstation for simulation of cerebral aneurysm clipping using AR/VR system with haptic feedback

(POR, 18)



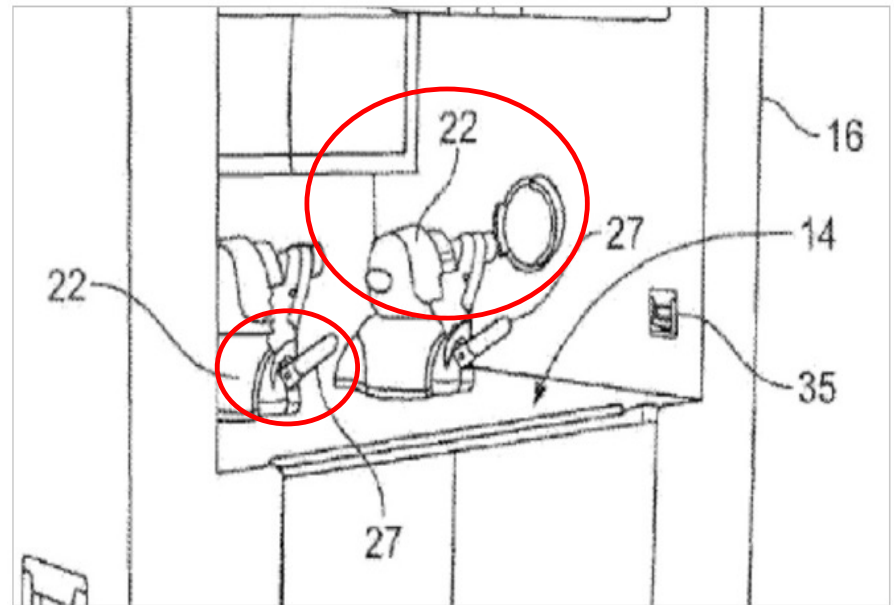
Ex. 1011, Fig. 1

Patent Owner's Demonstrative Exhibit - Not Evidence

Banerjee: Overview

- Banerjee discloses **separate** haptic device 22 and stylus 27
- **Contrast with '067 Patent**, which enhances user interaction within AR/VR by **integrating** haptics and visual effects via proxy object

(POR, 3-4; 21)



Ex. 1011, Fig. 4 (annotated excerpt)

Patent Owner's Demonstrative Exhibit - Not Evidence

Banerjee: Overview

- Board agrees that stylus 27 does not itself have haptic output device

(POR, 21)

Because of our preliminary finding that Banerjee's haptic device 22 (including haptic stylus 27) is a proxy object as recited in claim 1, we need not decide at this stage whether or not a person of ordinary skill in the art would have considered haptic stylus 27 alone to be the recited proxy object. However, we find at least some merit to Immersion's argument that Valve has not sufficiently established that haptic stylus 27 itself "compris[es] one or more haptic output devices" as recited in limitation 1A. Stylus 27 does not appear to "comprise" any of haptic device 22's force-feedback actuators. *See, e.g.,* Ex. 1011, Fig. 6; Ex. 1019, Fig. 3.

DI, 17

Banerjee: Inconsistent Mapping

- Valve's reliance on two separate components requires **implicit construction that is inconsistent across limitations**

2. Valve inconsistently interprets the term across the claim, or reads a limitation into claim 1.

Valve's reliance on two disparate components requires an implicit construction that is inconsistent across the limitations. *Google LLC v. Ecolfactor, Inc.*, 92 F.4th 1049, 1056 (Fed. Cir. 2024) ("We have found implicit claim constructions even when the Board does not recognize that it is construing a claim.) (cleaned up). **That is improper.** *Rexnord Corp.*, 274 F.3d at 1342 ("a claim term

12

Patent Owner's Sur-Reply
IPR2024-00557 (U.S. Patent No. 10,665,067)

should be construed consistently with its appearance in other places in the same claim.").

Patent Owner's Demonstrative Exhibit - Not Evidence

Sur-Reply, 12-13

Banerjee: Valve's Inconsistent Mapping

Claim Limitation	Valve's Mapping
[1A] a proxy object comprising one or more haptic output devices	[1A] a [haptic device 22 + stylus 27] comprising [haptic device 22]
[1C] a sensor for tracking a position of the proxy object	[1C] a sensor for tracking a position of the [stylus 27]

Sur-Reply, 13

Patent Owner's Demonstrative Exhibit - Not Evidence

Banerjee: Valve's Inconsistent Mapping

Claim Limitation	Valve's Implicit Construction
[1A] a proxy object comprising one or more haptic output devices	[1A] a [whole] proxy object comprising one or more haptic output devices
[1C] a sensor for tracking a position of the proxy object	[1C] a sensor for tracking [part of] a position of the proxy object

Sur-Reply, 13

Patent Owner's Demonstrative Exhibit - Not Evidence

Banerjee: Valve's Inconsistent Mapping

- Valve's interpretation requires adopting inconsistent claim construction of “proxy object,” which is improper
 - *Google LLC v. Ecofactor, Inc.*, 92 F.4th 1049, 1056 (Fed. Cir. 2024) (“We have found implicit claim constructions even when the Board does not recognize that it is construing a claim.”)
 - *Rexnord Corp. v. Laitram Corp.*, 274 F.3d 1336, 1342 (Fed. Cir. 2001) (“a claim term should be construed consistently with its appearance in other places in the same claim.”).

(Sur-Reply, 7)

Banerjee: No Proxy Object

- Undisputed, and Board agrees, that stylus 27 **does not itself have haptic output device**

(POR, 21)

Because of our preliminary finding that Banerjee's haptic device 22 (including haptic stylus 27) is a proxy object as recited in claim 1, we need not decide at this stage whether or not a person of ordinary skill in the art would have considered haptic stylus 27 alone to be the recited proxy object. However, we find at least some merit to Immersion's argument that Valve has not sufficiently established that haptic stylus 27 itself "compris[es] one or more haptic output devices" as recited in limitation 1A. Stylus 27 does not appear to "comprise" any of haptic device 22's force-feedback actuators. *See, e.g.,* Ex. 1011, Fig. 6; Ex. 1019, Fig. 3.

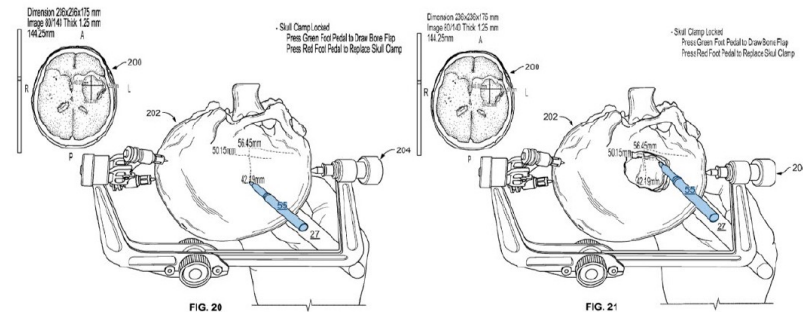
DI, 17

Banerjee: No Proxy Object

- Undisputed that Banerjee does not disclose overlaying images on haptic device 22

(POR, 21)

Note that Petitioner does not rely on haptic device 22 for this limitation, nor can it because Banerjee does not disclose superimposing any images on to the surface of haptic device 22 because haptic device 22 does not act as a proxy for virtual objects. This is also shown in the Petition's discussion of the claimed modified visual effect where it reproduces Banerjee's figures 20-21, which only depicts stylus 27 highlighted in blue, but not haptic device 22:



POR, 26

Patent Owner's Demonstrative Exhibit - Not Evidence

Banerjee: No Proxy Object

- Undisputed that Banerjee
does not disclose overlaying
images on haptic device 22

(POR, 21)

- Valve concedes that image is
only overlaid on stylus 27

(Pet., 33)

The “*modified visual effect*” of the image of the virtual tool whose position/orientation is updated as the user moves stylus 27 is “*displayed on the proxy object via the display,*” as discussed *supra* §VII.B.3. Specifically, Banerjee’s OSS 10 meets [1D3] because its display system “superimpose[s] an image of the tool over the real haptic stylus 27 visible through partially transparent mirror” ([0057]) such

Pet., 33

Patent Owner's Demonstrative Exhibit - Not Evidence

Banerjee: No Proxy Object

- Undisputed that Banerjee
does not disclose tracking
position of haptic device 22

(POR, 21)

Patent Owner's Response
IPR2024-00557 (U.S. Patent No. 10,665,067)

74. Haptic device 22 is a stationary base unit with its own fixed position in the real world, which is not tracked, while stylus 27 does not contain inside the haptic output device actuator. *Id.* Thus, Banerjee does not disclose a sensor that tracks the position of the proxy object, nor does it disclose a proxy object that meets all the requirements of the claim as understood by a POSA. *See ABS Global, Inc. v. Cytonome/ST, LLC*, IPR2017-02161, Paper 11 at 23 (PTAB April 9, 2018) (citing *Net MoneyIN, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008) (Petitioner must establish that the prior art “not only disclose[s] all elements of the claim within the four corners of the document, but ... also disclose[s] those elements ‘arranged as in the claim.’”).

POR, 25

Patent Owner's Demonstrative Exhibit - Not Evidence

Banerjee: No Proxy Object

- Undisputed that Banerjee **does not disclose tracking position** of haptic device 22

(POR, 21)

- Valve concedes that only position of stylus 27 is tracked

(Pet., 22)

4. [1C]: “a sensor for tracking a position of the proxy object”

Banerjee’s system meets [1C] because haptic device 22 tracks the position of haptic stylus 27, in both OSS 10 and MSS 11. Welch, ¶126.

Pet., 22

Patent Owner's Demonstrative Exhibit - Not Evidence

Banerjee: No Proxy Object

Term	Plain Meaning
proxy object	Limitation [1A]: “a proxy object comprising one or more haptic output devices” <i>Proxy object must comprise—i.e., contain or otherwise include—haptic output device</i> Limitation [1C]: “a sensor for tracking the position of the proxy object” <i>Proxy object must have position tracked by sensor</i> Limitation [1D-3]: “the modified visual effect to be displayed on the proxy object.” <i>Proxy object must include visual overlay</i>

Patent Owner's Demonstrative Exhibit - Not Evidence

Banerjee: No Proxy Object

- Valve attempts to overcome Banerjee's deficiencies by treating haptic device 22 and stylus 27 as single unit

Banerjee is explicit that its stylus 27 is part of haptic device 22. As the Board observed (DI, 16), Banerjee explains that a “user can hold and manipulate the haptic device 22 with *its* stylus 27.” EX1011, [0035]. Likewise, Banerjee's claim 1 explicitly recites a “first haptic device *comprising* a hand-held stylus.” EX1011, claim 1. This is consistent with Figure 4 (reproduced above) which depicts haptic device 22 as a device with various parts, including stylus 27. EX1011, FIG. 4.

Reply, 11

Banerjee: No Proxy Object

- But Valve relies on **inverse relationship** between proxy object and haptic output device from what is claimed in '067 Patent

A. Banerjee Does Not Disclose the Claimed “Proxy Object”

1. Valve fails to identify a “proxy object” that includes a “haptic output device.”

Despite conceding that the proxy object must include the haptic output device, (Reply, 5), Valve’s argument hinges on rejecting this premise. Valve argues that stylus 27 has a visual overlay and has its position tracked. But to be a proxy object, stylus 27 would have to “comprise” a haptic output device. The Board correctly found, however, that stylus 27 alone does not. DI, 17. Unable to cure this deficiency, Valve identifies the *inverse* relationship: a haptic device 22 (i.e., the alleged haptic output device) that includes stylus 27 (i.e., the alleged proxy object). Reply, 11. This does not meet the plain meaning of proxy object.

Sur-Reply, 10-11

Patent Owner's Demonstrative Exhibit - Not Evidence

Banerjee: No Proxy Object

- Proxy object must contain haptic output device, not other way around
- Inverted structure proposed by Valve **cannot anticipate** because proxy object is not arranged as in claim 1 of '067 Patent

Valve argues that haptic device 22 and stylus 27 together form the proxy object. Although the Board preliminarily accepted Valve's argument, (DI, 16), it should reject it as inconsistent with the requirement that the proxy object include the haptic output device. This is set by the claim and cannot be inverted. Valve, however, concedes that Banerjee inverts it: "Banerjee's claim 1 explicitly recites 'a first haptic device comprising a hand-held stylus.'" Reply, 11. The Board does too: "haptic device 22 comprises haptic stylus 27." DI, 16. Banerjee's inverted structure does not anticipate because it is not arranged as in the claim. *Net MoneyIN, Inc.*, 545 F.3d at 1369 ("the prior art ...must not only disclose all elements of the claim within the four corners of the document, but must also disclose those elements arranged as in the claim.").

Sur-Reply, 11

Patent Owner's Demonstrative Exhibit - Not Evidence

Banerjee: No Proxy Object

- Federal Circuit has found that A “comprising” B means A “includes” B and **does not cover inverse** where B includes A

relationship between the two. The Federal Circuit has found that A “comprising” B means A “includes” B and does *not* cover the inverse where B includes A. *Smith & Nephew, Inc. v. Arthrex, Inc.*, 453 Fed. Appx. 977, 980-81 (Fed. Cir. 2011) (ruling that plain meaning of “a graft connection element *comprising* a sling member” means “the graft connection element *includes* at least a sling member” and expressly does *not* include sling member comprising graft connection element) (emphasis added). In *Smith & Nephew*, defendants argued that this reversed relationship was a “distinction without a difference.” *Id.* at 980. The Federal Circuit rejected this argument, ruling that the “graft connection element” is a portion of the “sling member,” but the “graft connection element” does not include the entire “sling member.” *Id.* Because the claimed arrangement matters, Valve cannot show that haptic device 22 comprising stylus 27 is equivalent to the inverse.

Sur-Reply, 12

Patent Owner's Demonstrative Exhibit - Not Evidence

Banerjee: Not Invalidating Under Immersion's Construction

Term	Proposed Construction
a proxy object comprising one or more haptic output devices	a physical object that acts as a proxy for a virtual object and that itself contains inside a haptic output device, e.g., an actuator

POR, 10; Sur-Reply, 1

Patent Owner's Demonstrative Exhibit - Not Evidence

Banerjee: Not Invalidating Under Immersion's Construction

B. It Is Undisputed that Banerjee Does Not Disclose “A Proxy Object Comprising One or More Haptic Output Devices” Under Immersion's Proposed Construction

If the Board accepts Immersion's proposed construction, Valve does not dispute that Banerjee fails to disclose a proxy object comprising one or more haptic output devices. Reply, 10-12.

Sur-Reply, 14

Patent Owner's Demonstrative Exhibit - Not Evidence

No Anticipation or Obviousness: Meglan

Patent Owner's Demonstrative Exhibit - Not Evidence

Meglan: Summary

1. Overview of Meglan
2. Meglan does not disclose claimed “proxy object”
 - A. Surrogate alone is not “proxy object”
 - B. Substrate alone is not “proxy object”
 - C. Combination of surrogate + substrate is not “proxy object”
3. Meglan is not invalidating under Immersion’s proposed construction

Meglan: Overview

- Meglan is directed to devices for training individuals to treat hemorrhaging injuries
- Meglan discloses hemorrhage control simulator that enables assessment of trainees

(POR, 28)

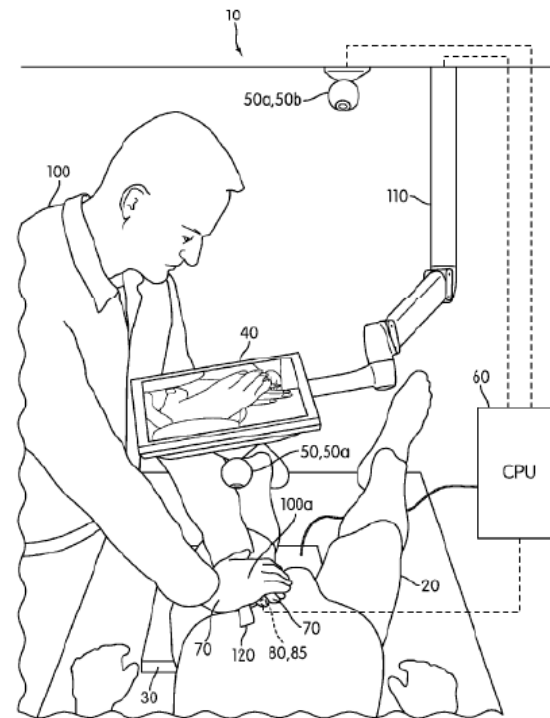


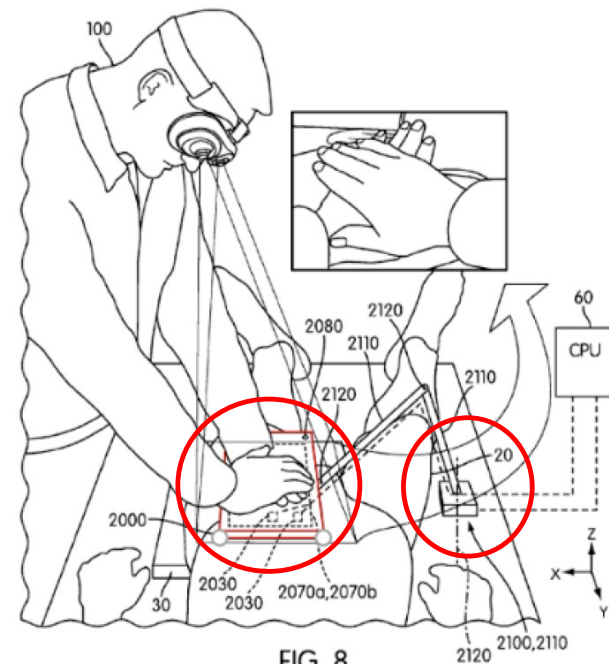
FIG. 1

Patent Owner's Demonstrative Exhibit - Not Evidence

Ex. 1012, Fig. 1

Meglan: Overview

- Key components: **surrogate** 2000 and **substrate** 20
- Surrogate: stationary mannequin that represents trauma victim
- Substrate: stationary; detects interaction between trainee and surrogate



Pet, 49 (citing annotated Fig. 8) (annotated)

(Reply, 12) Patent Owner's Demonstrative Exhibit - Not Evidence

Meglan: Overview

- Surrogate is **separate from** substrate
- Surrogate **does not** **comprise** substrate

(Sur-Reply, 19)

[0108] The substrate 2000 mounts to the automated positioning device 2100, which in turn, either directly or indirectly, connects to the surrogate 20. For example, in the embodiment illustrated in FIG. 8, the device 210 mounts to a table on which the surrogate 20 is placed (e.g., gravity-based connection between the surrogate 20 and table). The device 2100 includes means for selectively positioning the substrate 2000 relative to the surrogate 20.

Ex. 1012, ¶[0108]

Meglan: No Proxy Object

- Surrogate alone cannot be “proxy object”
 - No haptic output device
 - Valve does not contend surrogate alone
- Substrate alone cannot be “proxy object”
 - No visual overlay
 - Valve does not contend substrate alone

(Sur-Reply, 20-21)

Patent Owner's Demonstrative Exhibit - Not Evidence

Meglan: No Proxy Object—Surrogate Alone

- Surrogate itself **does not have haptics**

(Sur-Reply, 20)

Any of these proxy objects meet [1A] because substrate 2000 comprises “pulse generators” and “heat generators” ([0107]) that are “*haptic output devices*.” [0029], [0111], [0113]; Welch, ¶221. Additionally, surrogate 20 itself meets [1A] because POSAs understood that surrogate 20 comprises the connected substrate that conformally contacts its surface, as the ’067 patent does not limit “*comprising*” to any particular relationship. [0108]-[0109], [0114]-[0115]; Welch, ¶¶222-223; EX1001, 6:26-29.

Pet, 51

Patent Owner's Demonstrative Exhibit - Not Evidence

Meglan: No Proxy Object—Surrogate Alone

- Valve does not attempt to show that surrogate alone is proxy object

1. The surrogate is not a “proxy object.”

The surrogate is not a proxy object because it does not include a haptic output device. Valve argues that the surrogate comprises a haptic device only because it allegedly comprises the substrate. Pet, 51 (“surrogate 20 itself meets [1A] because POSAs understood that surrogate 20 comprises the connected substrate”). Thus, although Valve purports to argue that the surrogate alone is a proxy device, its argument combines the surrogate with the substrate. Valve thus concedes the surrogate alone is not a proxy object.

Sur-Reply, 20

Patent Owner's Demonstrative Exhibit - Not Evidence

Meglan: No Proxy Object—Substrate Alone

- Substrate **does not have visual overlay**
- Figures cited by Valve to show visual overlay are of surrogate, not substrate

(Sur-Reply, 18)

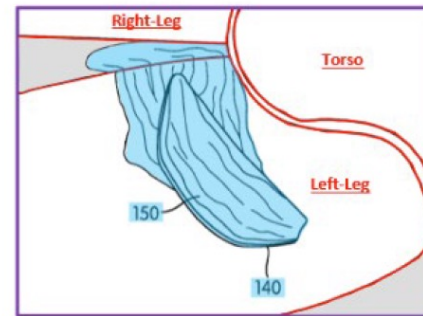


FIG. 2

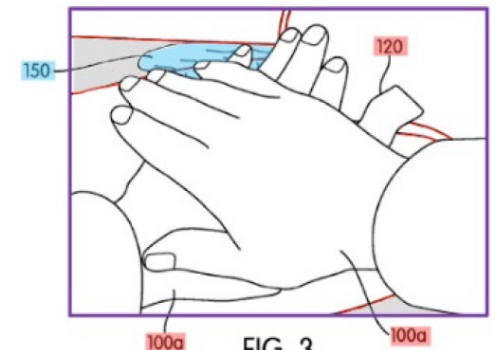


FIG. 3

Pet, 56 (citing annotated Fig. 2 and Fig. 3)

Patent Owner's Demonstrative Exhibit - Not Evidence

Meglan: No Proxy Object—Substrate Alone

- Substrate does not have visual overlay

[0112] The program 90 may filter the substrate 2000 and device 2100 out of the composite image sent to the display 40 such that the substrate 2000 and device 2100 are invisible to the trainee 100. Any suitable conventional mechanism for filtering objects out of video feeds may be used. For example, portions of the substrate 2000 and device 2100 that might enter the trainee's view could be colored a specific color that the program 90 is programmed to make transparent using known video filtering techniques.

EX1012, ¶ [0112]

Meglan: No Proxy Object—Substrate Alone

- Valve does not attempt to show that substrate alone is proxy object

2. The substrate is not a “proxy object.”

The substrate is not a proxy object. Although Valve argues in its Petition that “surrogate 20 and haptic substrate 2000, by themselves or together as a unit” disclose a proxy object, (Pet, 48), Valve made no attempt to support its contention that the substrate alone can be a proxy object. One of the conditions of a proxy object is that a “modified visual effect” can be “displayed on the proxy object.” II.C. Although Valve cites ¶¶82-84 in support of its argument that the substrate “gets overlaid with the virtual wound in the output video,” (Pet, 53), neither these paragraphs nor any part of Meglan make any reference to a visual overlay on the substrate. Meglan teaches the opposite: it teaches *excluding* the substrate from the visual overlay to make it invisible to the user. *Supra* IV.A.2.

Sur-Reply, 21

Patent Owner's Demonstrative Exhibit - Not Evidence

Meglan: No Proxy Object—Combination

- Combination of surrogate and substrate is not “proxy object”
 - Requires inconsistent claim construction
 - Unsupported by Meglan’s disclosures

Meglan: Inconsistent Construction

Claim Limitation	Valve's Mapping
[1A] a proxy object comprising one or more haptic output devices	[1A] a [substrate + surrogate] comprising [substrate]
[1C] a sensor for tracking a position of the proxy object	[1C] a sensor for tracking a position of the [substrate]
[1D2] determine a haptic effect based in part on data received from the sensor [for tracking a position of the proxy object]	[1D2] determine a haptic effect based in part on data received from the sensor [for tracking a position of the substrate]

Sur-Reply, 22

Patent Owner's Demonstrative Exhibit - Not Evidence

Meglan: Inconsistent Construction

Claim Limitation	Valve's Implicit Construction
[1A] a proxy object comprising one or more haptic output devices	[1A] a [whole] proxy object comprising one or more haptic output devices
[1C] a sensor for tracking a position of the proxy object	[1C] a sensor for tracking [part of] a position of the proxy object
[1D2] determine a haptic effect based in part on data received from the sensor [for tracking a position of the proxy object]	[1D2] determine a haptic effect based in part on data received from the sensor [for tracking [part of] a position of the proxy object]

Sur-Reply, 22

Patent Owner's Demonstrative Exhibit - Not Evidence

Meglan: No Support

- Sole theory under which Valve argues surrogate qualifies as “proxy object” requires substrate for haptics
- Valve relies on ¶[0090], claims 1 and 13, and ¶¶[0072-74]
- No support for combination as “proxy object”

(Reply, 12-13)

Meglan: No Support

- Valve relies on ¶[0090] to argue that surrogate and substrate are “proxy object”
- Board also relied on ¶[0090] at Institution Decision

As the Board correctly determined at institution, Meglan’s camera system “tracks not just trainee 100’s hands, but also the *position* and orientation of *surrogate 20*,” and provides a haptic effect “only when trainee 100’s hands contact the surface of surrogate 20.” DI, 25 (quotations omitted) (citing EX1012, [0072]-[0074], [0090], claims 1, 13). Claim 1 of Meglan—which the Board cited—makes crystal clear that Meglan (i) uses a “*video feed*” to determine “*a location of the surrogate* and [] at least one object,” (ii) “detect[s] an interaction” between the surrogate and the object “*based at least in part on the determined location of the surrogate* and the at least one object,” and then (iii) “generate[s] a simulated

Reply, 13

Patent Owner's Demonstrative Exhibit - Not Evidence

Meglan: No Support

- Valve mischaracterizes Meglan's disclosures
- Meglan does *not* teach tracking position of **surrogate** and **substrate** “to determine a haptic effect”

1. Meglan does not track the position of the surrogate “to determine a haptic effect.”

Although Valve argues that Immersion's argument is based on two “unfounded assertions,” its purported support for this only underscores Valve's own misrepresentations. The primary dispute concerns the surrogate at ¶90, because Valve relies on it for its central premise, i.e., its contention that Meglan teaches (1) tracking the position of the surrogate (2) “to determine a haptic effect.” Pet, 57-58; *see also* DI, 25; Reply, 12. But ¶90 makes no such disclosure. This is fatal to Valve's argument. *Infra*, IV.B.

Sur-Reply, 15

Meglan: No Support

- No tracking of position for haptics
- In embodiment at ¶[0090]
 - No **substrate**
 - No haptics from **surrogate**
 - Haptics provided by unanalyzed glove
- Claims 1 and 13 and ¶¶[0072-74] don't refer to haptics at all

(Sur-Reply, 15-16)

Patent Owner's Demonstrative Exhibit - Not Evidence

Meglan: No Position Tracking for Haptics

- ¶[0087] explains embodiment discussed at ¶[0090] includes pulse-feedback gloves—no substrate

(Sur-Reply, 15)

[0087] According to an embodiment of the invention, the trainee **100** wears pulse-feedback gloves **70** during use of the simulator **10**. The gloves **70** include a pulse generator **80** (or multiple pulse generators) in one or more of the finger tips such that the magnitude, frequency, and rapidity of increase/decrease of pulse movement can be controlled by the simulator **10**. The pulse generator **80** is operatively connected to the processor **60** such that the processor **60** can control the operation of the pulse generator **80**.

Ex. 1012, ¶[0087]

Patent Owner's Demonstrative Exhibit - Not Evidence

Meglan: No Position Tracking for Haptics

- In ¶[0090], haptics are provided by glove, **not substrate**

(Sur-Reply, 15)

[0090] When the trainee 100 places his/her gloved hand on the surrogate 20, the location of the finger(s) over simulated vascular structures, combined with the current state of the hemodynamic simulation of the hemorrhagic patient as a result of the injury and whatever the trainee 100 has done thus far on the surrogate 20, will result in the program 90 calculating a simulated pulse. The processor 60 signals the pulse generator(s) 80 to exhibit the calculated simulated pulse. By combining the information from the load sensor 30 beneath the surrogate 20 with the finger location(s) detected by the camera system 50, the status of the injury, and the hemodynamic state, the specific feel of the pulse can be modified to reflect the strength of the trainee's pressing into the surrogate 20.

Meglan: No Position Tracking for Haptics

- ¶[0090] describes tracking position of “finger locations”—not of surrogate nor substrate—because it describes **glove embodiment**
- “Glove” is not “proxy object”

(Sur-Reply, 15-16)

[0090] When the trainee 100 places his/her **gloved hand** on the surrogate 20, the location of the finger(s) over simulated vascular structures, combined with the current state of the hemodynamic simulation of the hemorrhagic patient as a result of the injury and whatever the trainee 100 has done thus far on the surrogate 20, will result in the program 90 calculating a simulated pulse. **The processor 60 signals the pulse generator(s) 80 to exhibit the calculated simulated pulse.** By combining the information from the load sensor 30 beneath the surrogate 20 with the finger location(s) detected by the camera system 50, the status of the injury, and the hemodynamic state, the specific feel of the pulse can be modified to reflect the strength of the trainee’s pressing into the surrogate 20.

Ex. 1012, ¶[0090]

Patent Owner's Demonstrative Exhibit - Not Evidence

Meglan: No Position Tracking for Haptics

- ¶[0090] teaches combining information from load sensor and finger locations “to reflect the strength of the trainee’s pressing into the surrogate 20”
- ¶[0090] **does not teach** tracking position of **surrogate** to determine haptics

(Sur-Reply, 15)

[0090] When the trainee 100 places his/her gloved hand on the surrogate 20, the location of the finger(s) over simulated vascular structures, combined with the current state of the hemodynamic simulation of the hemorrhagic patient as a result of the injury and whatever the trainee 100 has done thus far on the surrogate 20, will result in the program 90 calculating a simulated pulse. The processor 60 signals the pulse generator(s) 80 to exhibit the calculated simulated pulse. By combining the information from the load sensor 30 beneath the surrogate 20 with the finger location(s) detected by the camera system 50, the status of the injury, and the hemodynamic state, the specific feel of the pulse can be modified to reflect the strength of the trainee’s pressing into the surrogate 20.

Ex. 1012, ¶[0090]

Patent Owner's Demonstrative Exhibit - Not Evidence

Meglan: No Position Tracking for Haptics

1. A simulator comprising:

a physical surrogate for a portion of a simulated human patient, the surrogate having a surface feature of a portion of a human body;
a camera system aimed at the surrogate to generate an input video feed;
a processor having a program operatively connected to the camera system, wherein the program is programmed to create a simulation of an interaction between at least one object and the simulated patient, the program being programmed to, in real time:
receive the input video feed,
determine, based at least in part on the input video feed,
a location of the surrogate and the at least one object,
detect an interaction between the at least one object and the surrogate based at least in part on the determined location of the surrogate and the at least one object,
generate a simulated hemodynamic consequence of the detected interaction between the at least one object and the surrogate based on a computational model of a human body's hemodynamic system,

generate a simulated location and appearance of the simulated hemodynamic consequence on the simulated human patient,
identify a portion of the simulated hemodynamic consequence that is not obstructed from a user's view according to the simulation,
generate a visual rendering of the portion of the appearance of the simulated hemodynamic consequence,
determine from the simulated location of the simulated hemodynamic consequence a corresponding position of the visual rendering relative to the surrogate, and
generate an output video feed that comprises at least the visual rendering; and
a display operatively connected to the processor and configured to display the output video feed so that the visual rendering is viewable along a line of sight toward the position of the visual rendering relative to the surrogate.

13. The simulator of claim 1, wherein the at least one object comprises a hand of the user.

- Claims 1 and 13 concerned with visual rendering; make no reference to haptics

(Sur-Reply, 16-17)

Ex. 1012, cl.1 and 13

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Meglan: No Position Tracking for Haptics

- ¶¶[0072-74] make no reference to haptics

(Sur-Reply, 16)

[0072] The program 90 may use any suitable technique for identifying and determining the position and orientation of objects viewed by the camera system 50. Such objects may include, among others, the surrogate 20, trainee 100, and any additional objects being used by the trainee 100 to treat a simulated trauma (e.g., hemostatic agents; bandages; hemostatic-agent enhanced gauze 120; tourniquets 200, medical instruments, etc.). As illustrated in FIG. 1, the use of two cameras 50a,50b may provide stereoscopic information to triangulate the location of imaged objects. However, depending on the type of video camera system 50 used, a single camera may be sufficient to determine the position and orientation of the objects. For example, the video camera system 50 may include a single camera that includes distance sensors whose measurements are provided to the processor 60 and program 90 to assist the program 90 in determining the position and orientation of the imaged objects.

[0073] The gloves 70, surrogate 20, and/or any other objects to be imaged (e.g., gauze 120, the tourniquet 200 described below) may be color coded to help the program 90 distinguish between these objects using the video feed(s) from the camera system 50. Additionally and/or alternatively, the objects may include spatial tracking marker(s) that the program 90 can identify from the video feed(s) and use to help determine the position and orientation of the objects. Such tracking markers are now very widely used in augmented reality (AR) systems as is commonly seen in open source AR codes such as AR Toolkit and FLARKit.

[0074] The program 90 may use a variety of conventional software programs/code to detect the three-dimensional shape and position and orientation of the surrogate 20, the trainee's hands, and any other object that interacts with the surrogate. The program 90 may use a variety of conventional software programs to distinguish between imaged objects and track and identify their movements. Such software may include the algorithms and codes including various combinations of: code from EPFL called BazAR, PTAM from Oxford, Robot Operating System (ROS) originated with and maintained by Willow Garage, OpenCV, and/or code/software from ARToolWorks such as ARToolKit,

Ex. 1012, ¶¶[0072-74]

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Meglan: Not Invalidating Under Immersion's Construction

Term	Proposed Construction
a proxy object comprising one or more haptic output devices	a physical object that acts as a proxy for a virtual object and that itself contains inside a haptic output device, e.g., an actuator

POR, 10; Sur-Reply, 1

Patent Owner's Demonstrative Exhibit - Not Evidence

Meglan: Not Invalidating Under Immersion's Construction

C. Meglan Does Not Disclose Limitation [1A] Under Immersion's Proposed Construction

The surrogate does not contain inside it a haptic output device, the substrate does not have a visual effect on it, and the surrogate does not contain inside the substrate. IV.A. Meglan does not disclose limitation [1A] under Immersion's proposed construction.

Sur-Reply, 23

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No Anticipation or Obviousness: Rogers

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Rogers: Summary

1. Overview of Rogers
2. Rogers does not “determine a haptic effect based in part on data received from the sensor”

Rogers: Overview

- Rogers is directed to **directional interface object** designed for various computing environments such as video games

(POR, 35-36)

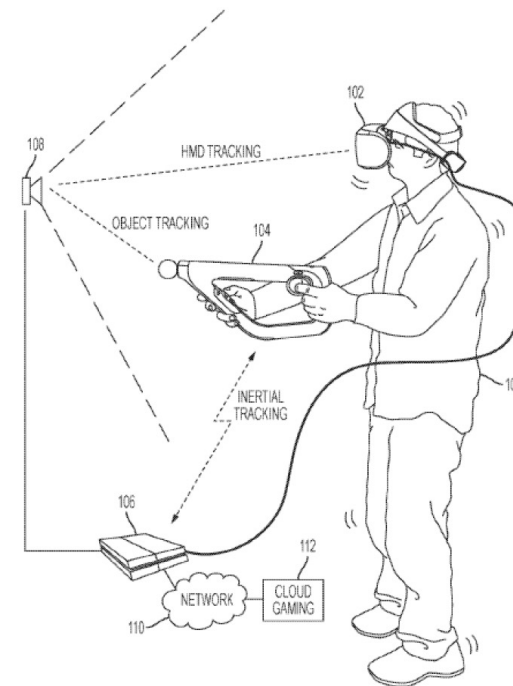


FIG. 1

Patent Owner's Demonstrative Exhibit - Not Evidence

Ex. 1010, Fig. 1

Rogers: Overview

- Rogers' weapon reload embodiment: user points weapon upward to reload

(POR, 38)

kickback sensation similar to that of an actual weapon. In another example, when a user reloads their corresponding virtual weapon by, for example, pointing the directional interface object 104 upward, the moveable weight 800 may be caused to move so as to mimic the sensation of weapon reloading mechanics of the virtual weapon.

Ex. 1010, ¶[0105].

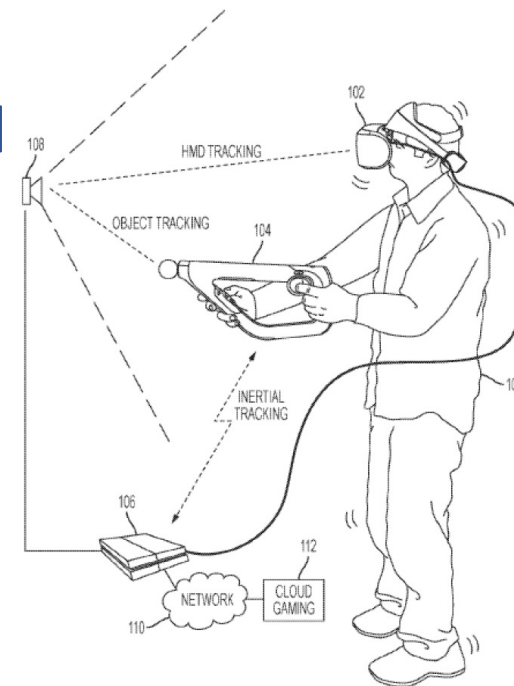


FIG. 1

Patent Owner's Demonstrative Exhibit - Not Evidence

Ex. 1010, Fig. 1

Rogers: Overview

- In short, Valve improperly conflates:
 - 1) shooting/aiming embodiment of ¶[0106] requires position (X-Y-Z) and orientation (rotation), but **does not produce haptic effect**; and
 - 2) reloading embodiment of ¶[0105], which produces haptic effect but **does not require position (X-Y-Z)**, and instead only requires orientation (rotation)

(Reply, 20; Sur-Reply, 23)

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Rogers: Overview

- Relevant components:
camera 108 and interface
object 104's inertial
sensor
- Valve alleges either is
claimed “sensor”

(POR, 37)

4. [1C]: “a sensor...”

Rogers’s system includes “camera 108” for “determin[ing] the location and movements of the...interface object 104.” [0044]; *see also* [0081] [0103]; Welch, ¶¶299-300. Camera 108 is “a sensor for tracking a position of the proxy object.”

Rogers’s interface object 104 also “includes an inertial sensor” by which “inertial tracking [is] communicated with computer 106” ([0052]) to determine interface object 104’s “location and orientation” ([0044]). *See also* [0111], FIG.1 (“Inertial Tracking”), claim 9. This inertial sensor is also “a sensor for tracking a position of the proxy object.” Welch, ¶¶300-302.

Rogers: Overview

- Interface object 104's inertial sensor senses movement (rotation change)—*not* position

[0016] In some implementations, the directional interface object further includes at least one inertial sensor for sensing movement of the directional interface object.

9. The directional interface object of claim 1, further comprising at least one inertial sensor for sensing movement of the directional interface object.

Ex. 1010, ¶¶ [0016], [0018]; cl. 9.

[0018] In some implementations, a system is provided, including: a directional interface object, the directional interface object including, a top tubular portion, a front tubular portion, a top end of the front tubular portion being joined to a first end of the top tubular portion, a bottom tubular portion, a first end of the bottom tubular portion being joined to a bottom end of the front tubular portion, a rear tubular portion, a top end of the rear tubular portion being joined to a second end of the front tubular portion opposite the first end of the front tubular portion, a bottom end of the rear tubular portion being joined to a second end of the bottom tubular portion opposite the first end of the bottom tubular portion, a trackable object disposed at the first end of the top tubular portion, and at least one inertial sensor configured to generate inertial data indicative of movement of the directional interface object; an image captured device configured to capture images of an interactive environment in which the directional interface object is disposed; a computing device configured to execute an interactive application to render a view of a virtual environment to a head-mounted display (HMD), the computing device configured to process the captured images and the inertial data to determine a position of a virtual object that is rendered in the view of the virtual environment.

[0019] Other aspects and advantages of the disclosure will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, illustrating by way of example the principles of the disclosure.

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Rogers Does Not “determine a haptic effect based in part on data received from the sensor”

Term	Proposed Construction
based in part on data received from the sensor	determine a haptic effect based in part on position data of the proxy object received from the sensor that tracks a position of the proxy object

Term	Proposed Construction
position	POSITA would read plain meaning of position to be location in free space, e.g., by tracking its X-Y-Z coordinates. Position (X-Y-Z) is also distinct from orientation (rotation).

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POR, 12-13; Sur-Reply, 3

Rogers Does Not “determine a haptic effect based in part on data received from the sensor”

- Reloading embodiment that Valve identifies to satisfy [1C] is directed to use case that **does not involve position** of proxy object
- Instead, haptic effect is based on **direction** of proxy object

(POR, 38)

[0105] FIG. 8 illustrates a directional interface object having a movable weight, in accordance with implementations of the disclosure. In the illustrated implementation, the movable weight 800 is disposed inside of the top tubular portion of the directional interface object 104, and configured to move along a track 802. However, in other implementations, the moveable weight 800 may be disposed in other portions of the directional interface object 104. The moveable weight 800 can be caused to move in response to tactile feedback data received from a computer or HMD. The moveable weight 800 can be controlled to move at variable acceleration levels, variable velocities, and for variable distances depending upon the desired haptic effect. The moveable weight 800 may be utilized to provide sensations of momentum based on events occurring in the VR environment. For example, the moveable weight may be caused to move when the user fires a virtual weapon that is controlled by the directional interface object, providing a kickback sensation similar to that of an actual weapon. In another example, when a user reloads their corresponding virtual weapon by, for example, pointing the directional interface object 104 upward, the moveable weight 800 may be caused to move so as to mimic the sensation of weapon reloading mechanics of the virtual weapon.

Rogers Does Not “determine a haptic effect based in part on data received from the sensor”

- Changing **position** (X-Y-Z) alone will *never* reload
- Only orientation change (**rotational movement**) reloads—not position

(POR, 38)

[0105] FIG. 8 illustrates a directional interface object having a movable weight, in accordance with implementations of the disclosure. In the illustrated implementation, the movable weight 800 is disposed inside of the top tubular portion of the directional interface object 104, and configured to move along a track 802. However, in other implementations, the moveable weight 800 may be disposed in other portions of the directional interface object 104. The moveable weight 800 can be caused to move in response to tactile feedback data received from a computer or HMD. The moveable weight 800 can be controlled to move at variable acceleration levels, variable velocities, and for variable distances depending upon the desired haptic effect. The moveable weight 800 may be utilized to provide sensations of momentum based on events occurring in the VR environment. For example, the moveable weight may be caused to move when the user fires a virtual weapon that is controlled by the directional interface object, providing a kickback sensation similar to that of an actual weapon. In another example, when a user reloads their corresponding virtual weapon by, for example, pointing the directional interface object 104 upward, the moveable weight 800 may be caused to move so as to mimic the sensation of weapon reloading mechanics of the virtual weapon.

Rogers Does Not “determine a haptic effect based in part on data received from the sensor”

- Immersion’s expert provides **undisputed testimony** that Rogers does not disclose using position tracking data from camera 108 for weapon reloading embodiment

(POR, 38)

94. But there is no disclosure whatsoever in Rogers that position tracking data from camera 108 is utilized for this weapon reload use case. Based on the disclosure of Rogers, a POSITA would understand that position tracking data is not used to sense whether the weapon is tilted upward.

Rogers Does Not “determine a haptic effect based in part on data received from the sensor”

- Immersion’s expert provides **unrebutted testimony** that position-sensing camera is unnecessary to determine whether weapon is tilted upward

(POR, 40)

96. Second, not only does Rogers fail to disclose the use of position-sensing data for the weapon reload use case, a POSITA would understand that there is no need for a position-sensing camera to determine whether the weapon is tilted upward. Ex. 1010 at ¶[0105]. A POSITA would understand that this embodiment does not depend on the position of the weapon, nor would there be a need for such location-based dependency because a weapon reload can occur anywhere. A haptic feedback only depends on tilting or movement in the upward direction. Therefore, a POSITA would understand that specifically for the weapon reload use case, haptic feedback is based on “Inertial Tracking” (depicted in Fig. 1), which for this use case only needs to track direction rather than position. Even if the “Object Tracking” line in Figure 1 (*i.e.*, which is based on data from camera 108) is used at all in this embodiment, a POSITA would understand that the camera sensor would only likely be used to aid in the placement of the visual overlay.

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Ex. 2007, ¶[0096]

Rogers Does Not “determine a haptic effect based in part on data received from the sensor”

- Immersion’s expert provides **undisputed testimony** that “movement” (change) is different from “position” (X-Y-Z)
- Movement includes change in translation (position) or rotation (orientation)

(POR, 43)

2. Rogers’ inertial sensor is not a “sensor for tracking a position of the proxy object” to “determine a haptic effect based in part on data received from the sensor”

98. I understand that Petitioner also argues on page 73 of the Petition that “inertial sensor” meets this limitation because the inertial sensor determines “interface object 104’s ‘location and orientation.’” But for purposes of determining whether a weapon is tilted upward in place, a POSITA would understand that Rogers’ use of “inertial sensors” is to track movement, not position. For example, Rogers at ¶[0016] states: “In some implementations, the directional interface object further includes at least one inertial sensor for *sensing movement* of the directional interface object.” Rogers at ¶[0018] also states that “at least one inertial sensor configured to generate inertial data indicative of *movement* of the directional interface object.” A POSITA would understand that movement is different from position. Position tracking (in three dimensions) is typically tracking the X, Y, and Z coordinates of an object. Sensing the movement can be as simple as determining if an object has moved in either translation or rotation (*e.g.*, true or false), or may involve sensing the magnitude of translational or rotational movement.

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Ex. 2007, ¶[0098]

Rogers Does Not “determine a haptic effect based in part on data received from the sensor”

- No evidence that both camera 108 (for tracking position) and inertial sensor are employed for weapon reload use case relied on by Valve

(POR, 44)

C. Rogers does not disclose “determine a haptic effect based in part on data received from the sensor”

100. As I have explained above, the weapon reload use case mapped by Petitioner does not depend on position tracking sensor data for the weapon (which is what Petitioner identifies as the proxy object). A POSITA would understand that there would not be a need to use such *position sensor* data because that use case is based on tilting the weapon in the upward direction rather than on the location of the weapon. According to the Petitioner, the weapon reload use case only discloses haptic effects based on direction—not position and as explained above, direction is determined by an inertial sensor—not a camera sensor. The Petition does not show any evidence that camera 108 (for tracking position) is utilized for the weapon reload use case, specifically for the purpose of determining haptics. Therefore, Petitioner fails to demonstrate that Rogers discloses the determination of haptic effects based on data received from the sensor, *i.e.*, a sensor for tracking position of the proxy object for which haptic output is based on as required by the claim.

Rogers Does Not “determine a haptic effect based in part on data received from the sensor”

- Aiming and shooting embodiment does involve position, but does not include haptic effects

(Sur-Reply, 23)

[0106] FIG. 9 illustrates a user 100 using an HMD 102 to view a VR environment, in accordance with implementations of the disclosure. The user 100 is provided with a view 900 of a VR environment, and furthermore is holding a directional interface object 104 to interact with the virtual scene. The directional interface object 104 is utilized to aim a weapon in the VR environment and shoot at objects such as the threatening bear shown in the view 900. A combination of visual tracking of the trackable object and data from inertial sensors in the directional interface object can be utilized as input to determine the pointing direction of the virtual weapon in the VR environment.

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