

Exhibit D

Valve's Accused VR Instrumentalities infringe the following asserted claims of U.S. Patent No. 9,116,546 to Birnbaum et al. (the "'546 patent") in at least the following exemplary ways. To the extent that the cited documentation relating to Valve's Accused Instrumentalities does not disclose all features, methods or operations required by the asserted claims, such non-disclosed features, methods or operations are inherently or equivalently practiced. Immersion's preliminary infringement contentions are based on information presently available to Immersion. Based upon that information, Valve's deployment, operation, maintenance, testing, use, sale, and importation of the Accused Instrumentalities as described below infringes one or more claims of the '546 Patent either literally or under the doctrine of equivalents. Immersion reserves the right to provide further details regarding Valve's infringement, whether that infringement is literal or under the doctrine of equivalents, as discovery is provided by Valve, and to the fullest extent permissible under the Federal and Local Rules, and any Order of this Court. The specific components, systems, and constructs identified in this chart are for exemplary purposes only and Immersion reserves all rights to supplement as additional components, systems, and constructs become known through discovery, as well as after Valve produces documents and source code and/or the Court construes any terms from the claims of the '546 Patent.

For example, Valve provides guides for developing games and applications with the Unreal, Unity, and Source engines for the Accused VR Instrumentalities, which are subject to Valve's control and used for Valve's benefit. In addition, certain developers may develop games and applications with different engines that nonetheless must interoperate with the Accused VR Instrumentalities and are subject to Valve's control and used for Valve's benefit. Regardless of which engine is deployed, the Accused VR Instrumentalities infringe the asserted claims, as identified in the examples below.

Valve directly infringes the claims of the '546 Patent in the exemplary ways detailed below. Valve indirectly infringes the claims of the '546 Patent to the extent Valve's users are direct infringers of the claims of the '546 Patent as referenced below, and their acts of direct infringement are use of the Accused VR Instrumentalities in an infringing manner as described below. With knowledge of infringement of the claims of the '546 Patent going back to at least the filing of the Complaint in this matter, Valve has taken and continues to take active steps to induce infringement of the claims of the '546 Patent by its users. Such active steps include, but are not limited to, making and selling the Accused VR Instrumentalities, encouraging third parties to develop infringing features for the Accused VR Instrumentalities, providing its users with instructions on use of the accused features of Accused VR Instrumentalities.

In addition, Valve infringes by supplying or causing to be supplied in or from the United States all or a substantial portion of the components of the Accused VR Instrumentalities, including software, in such manner as to actively induce the combination of such components outside of the United States in a manner that would infringe the patent if such combination occurred within the United

States. Valve further also causes to be supplied in or from the United States components of the Accused VR Instrumentalities especially made for use in the Accused VR Instrumentalities, including without limitation software, that are not staple articles of commerce suitable for substantial noninfringing use, knowing that such component is so made or adapted and intending that such component will be combined outside of the United States in a manner that would infringe the patent if such combination occurred within the United States.

Claim 1	Valve's Accused Instrumentalities
1[P] A non-transitory computer-readable medium having instructions stored thereon that, when executed by a processor, cause the processor to generate a haptic effect, the generating the haptic effect comprising:	To the extent the preamble is determined to be limiting, the Accused VR Instrumentalities include a non-transitory computer-readable medium having instructions stored thereon that, when executed by a processor, cause the processor to generate a haptic effect, the generating the haptic effect comprising the limitations below. For example, Valve specifies certain minimum system specifications, including processor and memory requirements:¹ Minimum • OS: Windows 10, SteamOS, Linux • Processor: Dual Core with Hyper-Threading • Memory: 8 GB RAM • Graphics: Nvidia GeForce GTX 970 / AMD RX 480 • Network: Broadband Internet connection • Additional Notes: Available DisplayPort (Version1.2) and USB (2.0+) Port required

¹ See <https://help.steampowered.com/en/faqs/view/105E-66E3-962A-1577> (last accessed May 10, 2023).

Claim 1	Valve's Accused Instrumentalities
	Further, Valve's SteamVR supports multiple engines, including the Unity Engine², the Unreal Engine³, and the proprietary Source 2 Engine, through multiple SDKs such as OpenVR⁴ and OpenXR⁵ to implement applications and games. As one example, OpenVR is divided into two layers: application and driver. Valve documentation notes that, "One real-world example of an application is a game engine like Unity."⁶ Further, "OpenVR for application talks to SteamVR. SteamVR then talks to OpenVR driver."⁷ As another example, Valve provides the Steam Input API, which is a flexible action-based API that supports all major controller types.⁸ This API includes member functions, such as, TriggerHapticPulse, that "[t]riggers a (low-level) haptic pulse on supported controllers."⁹
1[A] receiving input from a sensor, wherein the input comprises extra-sensory information, wherein the input further comprises one of more interaction	The Accused VR Instrumentalities receive input from a sensor, wherein the input comprises extra-sensory information, wherein the input further comprises one or more interaction parameters, and wherein each interaction parameter comprises a value. For example, SteamVR tracking has three main components, including a base station, sensors on tracked objects, and a host:¹⁰

² See https://valvesoftware.github.io/steamvr_unity_plugin/ (last accessed May 10, 2023); <https://github.com/ValveSoftware/unity-xr-plugin> (last accessed May 10, 2023).

³ See https://github.com/ValveSoftware/steamvr_unreal_plugin (last accessed May 10, 2023).

⁴ See <https://help.steampowered.com/en/faqs/view/46C3-050A-2E52-12D6> (last accessed May 10, 2023); <https://github.com/ValveSoftware/openvr/wiki/API-Documentation> (last accessed May 10, 2023).

⁵ See <https://github.com/ValveSoftware/OpenXR-Canonical-Pose-Tool> (last accessed May 10, 2023); https://github.com/ValveSoftware/openxr_engine_plugins (last accessed May 10, 2023).

⁶ See <https://github.com/ValveSoftware/openvr/wiki/API-Documentation> (last accessed May 10, 2023).

⁷ See <https://github.com/ValveSoftware/openvr/wiki/API-Documentation> (last accessed May 10, 2023).

⁸ See <https://partner.steamgames.com/doc/api/isteaminput> (last accessed May 10, 2023).

⁹ See <https://partner.steamgames.com/doc/api/isteaminput#functions> (last accessed May 10, 2023).

¹⁰ See <https://partner.steamgames.com/vrlicensing> (last accessed May 10, 2023).

Claim 1	Valve's Accused Instrumentalities						
parameters, and wherein each interaction parameter comprises a value;	<table><tr><th>BASE STATION</th><th>SENSORS ON TRACKED OBJECTS</th><th>HOST</th></tr><tr><td> ▪ 120° multi-axis laser emitter ▪ Aside from power, fully self-contained - no cable connection to the host or tracked objects ▪ 2 base-stations can be used for 360° coverage </td><td> ▪ Lightweight, low power, low cost ASIC sensors ▪ Up to 32 sensors per object for full 360° coverage ▪ Software toolkit to calculate optimal sensor placement ▪ Built-In 1000Hz IMU for low latency, high resolution tracking ▪ Wireless communication with host for cable-free peripherals </td><td> ▪ Integrates 3D positional information from multiple devices. For now, this means a PC. ▪ SteamVR API for accurate timing, synchronization, and prediction ▪ Compatibility with Steam and access to the full SteamVR catalog </td></tr></table>	BASE STATION	SENSORS ON TRACKED OBJECTS	HOST	▪ 120° multi-axis laser emitter ▪ Aside from power, fully self-contained - no cable connection to the host or tracked objects ▪ 2 base-stations can be used for 360° coverage	▪ Lightweight, low power, low cost ASIC sensors ▪ Up to 32 sensors per object for full 360° coverage ▪ Software toolkit to calculate optimal sensor placement ▪ Built-In 1000Hz IMU for low latency, high resolution tracking ▪ Wireless communication with host for cable-free peripherals	▪ Integrates 3D positional information from multiple devices. For now, this means a PC. ▪ SteamVR API for accurate timing, synchronization, and prediction ▪ Compatibility with Steam and access to the full SteamVR catalog
	BASE STATION	SENSORS ON TRACKED OBJECTS	HOST				
	▪ 120° multi-axis laser emitter ▪ Aside from power, fully self-contained - no cable connection to the host or tracked objects ▪ 2 base-stations can be used for 360° coverage	▪ Lightweight, low power, low cost ASIC sensors ▪ Up to 32 sensors per object for full 360° coverage ▪ Software toolkit to calculate optimal sensor placement ▪ Built-In 1000Hz IMU for low latency, high resolution tracking ▪ Wireless communication with host for cable-free peripherals	▪ Integrates 3D positional information from multiple devices. For now, this means a PC. ▪ SteamVR API for accurate timing, synchronization, and prediction ▪ Compatibility with Steam and access to the full SteamVR catalog				
	Further, the Accused VR Instrumentalities perform the step of “receiving input from a sensor, wherein the input comprises extra-sensory information.”						
	For example, the SteamVR Tracking Base stations sweep the room with “sync pulses and laser lines” to “find the location of each sensor within a fraction of a millimeter,” which are examples of a sensor receiving input that comprises extra-sensory information: How It Works The SteamVR Tracking Basestations sweep the room with multiple sync pulses and laser lines, reaching out to about 5 meters. By keeping careful track of the timings between pulses and sweeps, the SteamVR Tracking system uses simple trigonometry to find the location of each sensor to within a fraction of a millimeter. By combining multiple sensors, 2 basestations, as well as adding a high speed IMU (inertial measurement unit), SteamVR also calculates the tracked object's orientation, velocity, and angular velocity, all at an update rate of 1000Hz.						

Claim 1	Valve's Accused Instrumentalities
	Moreover, the SteamVR API includes methods that provide this controller pose information, which is just one example that demonstrates how the Accused VR Instrumentalities receives input from a sensor. One such example method includes GetControllerState:¹¹ IVRSystem::GetControllerState Matthew Hoffman edited this page on Aug 10, 2016 · 3 revisions <pre> bool GetControllerState(vr::TrackedDeviceIndex_t unControllerDeviceIndex, vr::VRControllerState_t *pControllerState) bool GetControllerStateWithPose(TrackingUniverseOrigin eOrigin, vr::TrackedDeviceIndex_t unControllerDeviceIndex, vr::VRControllerState_t *pControllerState, TrackedDevicePose_t *pTrackedDevicePose) </pre> Fills the supplied struct with the current state of the controller. • <code>vr::TrackedDeviceIndex_t unControllerDeviceIndex</code> - The tracked device index of the controller to get the state of. • <code>vr::VRControllerState_t *pControllerState</code> - A struct to fill with the controller state. • <code>TrackingUniverseOrigin eOrigin</code> - The tracking coordinate system to return the pose in. • <code>TrackedDevicePose_t *pTrackedDevicePose</code> - A pose struct to fill with the pose of the controller when the last button event occurred. As just one additional example, in <i>Moondust</i>,¹² which demonstrates the technical capabilities of the Valve Index controllers (also known as Knuckles), users “[c]rush moon rocks to a fine powder with your powerful hands, taking advantage of the high-fidelity force sensors on Knuckles.”¹³ The “source code and assets” for <i>Moondust</i> are publicly available.¹⁴ This project uses Unity and “the new SteamVR Input System.”¹⁵ Inside of the script MoonRock.cs, the Update() method contains the following line that gets a value for the user’s grip

¹¹ See <https://github.com/ValveSoftware/openvr/wiki/IVRSystem::GetControllerState> (last accessed May 10, 2023).

¹² See https://store.steampowered.com/app/887260/Moondust_Knuckles_Tech_Demos/ (last accessed May 10, 2023).

¹³ See https://store.steampowered.com/app/887260/Moondust_Knuckles_Tech_Demos/ (last accessed May 10, 2023).

¹⁴ See <https://github.com/ValveSoftware/Moondust> (last accessed May 10, 2023).

¹⁵ See, e.g., <https://github.com/ValveSoftware/Moondust>; <https://youtu.be/qo-9CmcKWY?t=55> (last accessed May 10, 2023).

Claim 1	Valve's Accused Instrumentalities
	squeeze, which indicates that the Accused VR Instrumentalities receive input further comprised of one or more interaction parameters, wherein each interaction parameter comprises a value:¹⁶ <pre>42 float squeeze = actionSqueeze.GetAxis(hand);</pre> As another example, <i>Half-Life: Alyx</i> offers users several achievements, including the “Freshly Squeezed” achievement in <i>Chapter 2: The Quarantine Zone</i>, where users squeeze headcrab hearts.¹⁷  As another example, <i>Half-Life: Alyx</i>¹⁸ offers several mechanics, including pulling on handles by grabbing the handle and moving the controller.

¹⁶ See <https://github.com/ValveSoftware/Moondust/blob/master/Assets/Scripts/MoonRock.cs> (last accessed May 10, 2023).

¹⁷ See <https://steamcommunity.com/sharedfiles/filedetails/?id=2032991058>.

¹⁸ See https://store.steampowered.com/app/546560/HalfLife_Alyx/.

Claim 1	Valve's Accused Instrumentalities
	 As another example, in <i>The Lab</i>¹⁹ offers several mini-games, including “Xortex 26XX”, where users can grab a virtual spaceship, as shown below. Moving the controller moves the spaceship as shown below.

¹⁹ See https://store.steampowered.com/app/450390/The_Lab/.

Claim 1	Valve's Accused Instrumentalities
	A screenshot from the VR game Blade and Sorcery. The scene is set in a dark, industrial environment with a background of glowing hexagonal patterns. In the center, a character is seen from behind, holding a glowing sword. Above the character, a red line points to a 'GLOBAL HIGH SCORE' display. The top of the screen shows 'XORTEX 26XX' and 'LEVEL SELECT'. As another example, <i>Blade and Sorcery</i>²⁰ offers several mechanics, including imbuing a sword with a fire spell. Moving the controller swings the sword. As another example, <i>Pavlov VR</i>²¹ offers several mechanics, including pulling a pin out of a grenade and pulling back the hammer on a gun. The virtual hand and weapons are rendered differently as the controller moves. As another example, <i>Job Simulator</i>²² offers several mechanics, including pulling a lever to start the game and pulling down chains in the mechanic garage. The virtual hand is rendered differently as the controller moves.

²⁰ See https://store.steampowered.com/app/629730/Blade_and_Sorcery/.

²¹ See https://store.steampowered.com/app/555160/Pavlov_VR/.

²² See https://store.steampowered.com/app/448280/Job_Simulator/.

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Claim 1	Valve's Accused Instrumentalities
	As another example, <i>Vacation Simulator</i>²³ offers several mechanics, including pulling a lever to start the game and opening a fridge door. The virtual hand is rendered differently as the controller moves. As another example, <i>Contractors</i>²⁴ offers several mechanics, pulling back the hammer on a gun. The virtual hand is rendered differently as the controller moves. As another example, <i>Walking Dead: Sinners & Saints – Chapter 2</i>²⁵ offers several mechanics, pulling back the hammer on a gun. The virtual hand is rendered differently as the controller moves. Thus, the Accused VR Instrumentalities receive input from a sensor, wherein the input comprises extra-sensory information, wherein the input further comprises one or more interaction parameters, and wherein each interaction parameter comprises a value, consistent with the examples noted above.
1[B] mapping the received input to a haptic signal; and	The Accused VR Instrumentalities map the received input to a haptic signal. For example, the “source code and assets” for <i>Moondust</i> are publicly available.²⁶ This project uses Unity and “the new SteamVR Input System.”²⁷ Inside of the script MoonRock.cs, the Update() method contains the following line that inputs the user’s “squeeze” value as a parameter to TriggerHapticPulse through a linear interpolation,²⁸ which is just one example for how the Accused VR Instrumentalities map the received input to a haptic signal:²⁹ <pre> 59 if (squeeze > 0.3f) 60 interactable.attachedToHand.TriggerHapticPulse((ushort)Mathf.Lerp(200, 1000, squeeze * 2)); </pre>
1[C] sending the haptic signal to an	The Accused VR Instrumentalities send the haptic signal to an actuator to generate the haptic effect.

²³ See https://store.steampowered.com/app/726830/Vacation_Simulator/.

²⁴ See <https://store.steampowered.com/app/963930/Contractors/>.

²⁵ See <https://store.steampowered.com/app/1947500/>.

²⁶ See <https://github.com/ValveSoftware/Moondust> (last accessed May 10, 2023).

²⁷ See <https://github.com/ValveSoftware/Moondust> (last accessed May 10, 2023).

²⁸ See <https://docs.unity3d.com/ScriptReference/Mathf.Lerp.html> (last accessed May 10, 2023).

²⁹ See <https://github.com/ValveSoftware/Moondust/blob/master/Assets/Scripts/MoonRock.cs> (last accessed May 10, 2023).

Claim 1	Valve's Accused Instrumentalities
actuator to generate the haptic effect;	For example, in <i>Moondust</i>,³⁰ users can “[c]rush moon rocks to a fine powder with your powerful hands, taking advantage of the high-fidelity force sensors on Knuckles.”³¹ As shown below, while recording this interaction, a “Squeeze” bar shows how much pressure the user applies while squeezing the controller. Testing confirms that this functionality generates haptics effects.  As another example in <i>Half-Life: Alyx</i>, users can squeeze objects as shown below. Testing confirms that this functionality generates haptics effects:

³⁰ See https://store.steampowered.com/app/887260/Moondust_Knuckles_Tech_Demos/ (last accessed May 10, 2023).

³¹ See https://store.steampowered.com/app/887260/Moondust_Knuckles_Tech_Demos/ (last accessed May 10, 2023).

Claim 1	Valve's Accused Instrumentalities
	 As another example in <i>Half-Life: Alyx</i>, users can pull handles. Testing confirms that this functionality generates haptics effects:

Claim 1	Valve's Accused Instrumentalities
	 As another example, in the “Xortex 26XX” mini-game in, users can grab and move a virtual spaceship by moving the controller. Testing confirms that this functionality generates haptics effects:

Claim 1	Valve's Accused Instrumentalities
	 As another example, testing confirms that the uses cases described in limitation 1[A] generates haptics effects for the following games: <i>Blade & Sorcery</i>, <i>Pavlov VR</i>, <i>Job Simulator</i>, <i>Vacation Simulator</i>, <i>Contractors</i>, and <i>Walking Dead: Sinners & Saints – Chapter 2</i>. Further, the Valve Index Controllers include an HD LRA for Haptics actuator:³²

³² See <https://www.valvesoftware.com/en/index/controllers> (last accessed May 10, 2023).

Claim 1	Valve's Accused Instrumentalities								
	Tech specs <table><tr><th>Inputs</th><th>Ergonomics</th><th>Connections</th><th>Haptics</th></tr><tr><td>A Button, B Button, System Button, Trigger, Thumbstick, Track Button with Force Sensor, Grip Force Sensor, Finger Tracking, IMU</td><td>Adjustable strap with pivot, antimicrobial tech fabric</td><td>USB-C, 2.4GHz Wireless</td><td>HD LRA</td></tr></table> Thus, the Accused VR Instrumentalities send the haptic signal to an actuator to generate the haptic effect, consistent with the examples noted above.	Inputs	Ergonomics	Connections	Haptics	A Button, B Button, System Button, Trigger, Thumbstick, Track Button with Force Sensor, Grip Force Sensor, Finger Tracking, IMU	Adjustable strap with pivot, antimicrobial tech fabric	USB-C, 2.4GHz Wireless	HD LRA
Inputs	Ergonomics	Connections	Haptics						
A Button, B Button, System Button, Trigger, Thumbstick, Track Button with Force Sensor, Grip Force Sensor, Finger Tracking, IMU	Adjustable strap with pivot, antimicrobial tech fabric	USB-C, 2.4GHz Wireless	HD LRA						
1[D] the mapping the received input to the haptic signal further comprising modulating the haptic signal when new input is received, wherein the new received input comprises an update of at least one value of at least one interaction parameter of the received input; and	The Accused VR Instrumentalities map the received input to the haptic signal further comprising modulating the haptic signal when new input is received, wherein the new received input comprises an update of at least one value of at least one interaction parameter of the received input. For example, in <i>Moondust</i>,³³ users can “[c]rush moon rocks to a fine powder with your powerful hands, taking advantage of the high-fidelity force sensors on Knuckles.”³⁴ As shown below, while recording this interaction, a “Squeeze” bar shows how much pressure the user applies while squeezing the controller:								

³³ See https://store.steampowered.com/app/887260/Moondust_Knuckles_Tech_Demos/ (last accessed May 10, 2023).

³⁴ See https://store.steampowered.com/app/887260/Moondust_Knuckles_Tech_Demos/ (last accessed May 10, 2023).

Claim 1	Valve's Accused Instrumentalities
	 As another example in <i>Half-Life: Alyx</i>, users can squeeze objects, which results in haptics that vary with grip strength. Testing confirms this functionality:

Claim 1	Valve's Accused Instrumentalities
	 As another example in <i>Half-Life: Alyx</i>, users can pull handles, which results in haptics that vary with speed. Testing confirms that this functionality:

Claim 1	Valve's Accused Instrumentalities
	 As another example, in the “Xortex 26XX” mini-game in, users can grab and move a virtual spaceship by moving the controller which results in haptics that vary with speed. Testing confirms that this functionality:

Claim 1	Valve's Accused Instrumentalities
	As another example, testing confirms that the uses cases described in limitation 1[A] generates haptics effects that vary based on the controller position for the following games: <i>Blade & Sorcery</i>, <i>Pavlov VR</i>, <i>Job Simulator</i>, <i>Vacation Simulator</i>, <i>Contractors</i>, and <i>Walking Dead: Sinners & Saints – Chapter 2</i>. Further, the Accused VR Instrumentalities perform the step of “modulating the haptic signal when new input is received.” For example, the harder the user squeezes, the more haptic effects occur. Inside of the script MoonRock.cs, the Update() method contains the following line that updates the value for the user’s grip squeeze:³⁵ <pre>42 float squeeze = actionSqueeze.GetAxis(hand);</pre>

³⁵ See <https://github.com/ValveSoftware/Moondust/blob/master/Assets/Scripts/MoonRock.cs> (last accessed May 10, 2023).

Claim 1	Valve's Accused Instrumentalities								
	This updated value is passed as a parameter to TriggerHapticPulse, which is just one example that demonstrates how the Accused VR Instrumentalities modulate the haptic signal when new input is received:³⁶ <pre>59 if (squeeze > 0.3f) 60 interactable.attachedToHand.TriggerHapticPulse((ushort)Mathf.Lerp(200, 1000, squeeze * 2));</pre> Thus, the Accused VR Instrumentalities map the received input to the haptic signal further comprising modulating the haptic signal when new input is received, wherein the new received input comprises an update of at least one value of at least one interaction parameter of the received input, consistent with the examples noted above.								
1[E] the sending the haptic signal to the actuator the generate the haptic effect further comprising sending the modulated haptic signal to the actuator to modulate the generated haptic effect.	The Accused VR Instrumentalities send the haptic signal to the actuator to generate the haptic effect further comprising sending the modulated haptic signal to the actuator to modulate the generated haptic effect. For example, the Valve Index Controllers include an HD LRA for Haptics actuator:³⁷ Tech specs <table><tr><th>Inputs</th><th>Ergonomics</th><th>Connections</th><th>Haptics</th></tr><tr><td>A Button, B Button, System Button, Trigger, Thumbstick, Track Button with Force Sensor, Grip Force Sensor, Finger Tracking, IMU</td><td>Adjustable strap with pivot, antimicrobial tech fabric</td><td>USB-C, 2.4GHz Wireless</td><td>HD LRA</td></tr></table> As just one additional example, in <i>Moondust</i>, the harder the user squeezes, the more haptic effects occur. Testing confirms this functionality, which is just one example that the Accused VR Instrumentalities send the modulated haptic signal to the actuator to modulate the generated haptic effect. Further, Inside of the	Inputs	Ergonomics	Connections	Haptics	A Button, B Button, System Button, Trigger, Thumbstick, Track Button with Force Sensor, Grip Force Sensor, Finger Tracking, IMU	Adjustable strap with pivot, antimicrobial tech fabric	USB-C, 2.4GHz Wireless	HD LRA
Inputs	Ergonomics	Connections	Haptics						
A Button, B Button, System Button, Trigger, Thumbstick, Track Button with Force Sensor, Grip Force Sensor, Finger Tracking, IMU	Adjustable strap with pivot, antimicrobial tech fabric	USB-C, 2.4GHz Wireless	HD LRA						

³⁶ See <https://github.com/ValveSoftware/Moondust/blob/master/Assets/Scripts/MoonRock.cs> (last accessed May 10, 2023).

³⁷ See <https://www.valvesoftware.com/en/index/controllers> (last accessed May 10, 2023).

Claim 1	Valve's Accused Instrumentalities
	script MoonRock.cs, the Update() method contains the following line that inputs the user's "squeeze" value as a parameter to TriggerHapticPulse.³⁸ <pre> 59 if (squeeze > 0.3f) 60 interactable.attachedToHand.TriggerHapticPulse((ushort)Mathf.Lerp(200, 1000, squeeze * 2)); </pre> This functionality indicates that the Accused VR Instrumentalities send a modulated haptic signal to the actuator to modulate the generated haptic effect.
Claim 2	Valve's Accused Instrumentalities
2. The non-transitory computer-readable medium of claim 1, the mapping the received input to the haptic signal further comprising generating the haptic signal when the value of at least on interaction parameter exceeds a specified value.	The Accused VR Instrumentalities include the non-transitory computer-readable medium of claim 1, the mapping the received input to the haptic signal further comprising generating the haptic signal when the value of at least on interaction parameter exceeds a specified value. As just one example, in <i>Moondust</i>, the harder the user squeezes, the more haptic effects occur. Testing confirms this functionality, which is just one example that the Accused VR Instrumentalities send the modulated haptic signal to the actuator to modulate the generated haptic effect. Further, Inside of the script MoonRock.cs, the Update() method contains the following line that inputs the user's "squeeze" value as a parameter to TriggerHapticPulse.³⁹ <pre> 59 if (squeeze > 0.3f) 60 interactable.attachedToHand.TriggerHapticPulse((ushort)Mathf.Lerp(200, 1000, squeeze * 2)); </pre>

³⁸ See <https://github.com/ValveSoftware/Moondust/blob/master/Assets/Scripts/MoonRock.cs> (last accessed May 10, 2023).

³⁹ See <https://github.com/ValveSoftware/Moondust/blob/master/Assets/Scripts/MoonRock.cs> (last accessed May 10, 2023).

Claim 3	Valve's Accused Instrumentalities								
3. The non-transitory computer-readable medium of claim 1, wherein the actuator comprises a vibration actuator, and wherein the haptic effect generated by the vibration actuator comprises a vibration haptic effect.	The Accused VR Instrumentalities include the non-transitory computer-readable medium of claim 1, wherein the actuator comprises a vibration actuator, and wherein the haptic effect generated by the vibration actuator comprises a vibration haptic effect. For example, the Valve Index Controllers include an HD LRA for Haptics actuator:⁴⁰ Tech specs <table><tr><th>Inputs</th><th>Ergonomics</th><th>Connections</th><th>Haptics</th></tr><tr><td>A Button, B Button, System Button, Trigger, Thumbstick, Track Button with Force Sensor, Grip Force Sensor, Finger Tracking, IMU</td><td>Adjustable strap with pivot, antimicrobial tech fabric</td><td>USB-C, 2.4GHz Wireless</td><td>HD LRA</td></tr></table>	Inputs	Ergonomics	Connections	Haptics	A Button, B Button, System Button, Trigger, Thumbstick, Track Button with Force Sensor, Grip Force Sensor, Finger Tracking, IMU	Adjustable strap with pivot, antimicrobial tech fabric	USB-C, 2.4GHz Wireless	HD LRA
Inputs	Ergonomics	Connections	Haptics						
A Button, B Button, System Button, Trigger, Thumbstick, Track Button with Force Sensor, Grip Force Sensor, Finger Tracking, IMU	Adjustable strap with pivot, antimicrobial tech fabric	USB-C, 2.4GHz Wireless	HD LRA						

Claim 5	Valve's Accused Instrumentalities
5[P] A computer-implemented method for generating a haptic effect, the computer-implemented method comprising:	To the extent the preamble is determined to be limiting, the Accused VR Instrumentalities include a computer-implemented method for generating a haptic effect, the computer-implemented method comprising. See limitation 1[P].
5[A] receiving input from a sensor, wherein the input comprises extra-sensory information, wherein the input	The Accused VR Instrumentalities receive input from a sensor, wherein the input comprises extra-sensory information, wherein the input further comprises one or more interaction parameters, and wherein each interaction parameter comprises a value. See limitation 1[A].

⁴⁰ See <https://www.valvesoftware.com/en/index/controllers> (last accessed May 10, 2023).

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Claim 5	Valve's Accused Instrumentalities
further comprises one or more interaction parameters, and wherein each interaction parameter comprises a value;	
5[B] mapping the received input to a haptic signal; and	The Accused VR Instrumentalities map the received input to a haptic signal. See limitation 1[B].
5[C] sending the haptic signal to an actuator to generate the haptic effect;	The Accused VR Instrumentalities send the haptic signal to an actuator to generate the haptic effect. See limitation 1[C].
5[D] the mapping the received input to the haptic signal further comprising modulating the haptic signal when new input is received, wherein the new received input comprises an update of at least one value of at least one interaction parameter of the received input; and	The Accused VR Instrumentalities map the received input to the haptic signal further comprising modulating the haptic signal when new input is received, wherein the new received input comprises an update of at least one value of at least one interaction parameter of the received input. See limitation 1[D].

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Claim 5	Valve's Accused Instrumentalities
5[E] the sending the haptic signal to the actuator to generate the haptic effect further comprising sending the modulated haptic signal to the actuator to modulate the generated haptic effect.	The Accused VR Instrumentalities send the haptic signal to the actuator to generate the haptic effect further comprising sending the modulated haptic signal to the actuator to modulate the generated haptic effect. See limitation 1[E].
Claim 6	Valve's Accused Instrumentalities
6. The computer-implemented method of claim 5, the mapping the received input to the haptic signal further comprising generating the haptic signal when the value of at least one interaction parameter exceeds a specified value.	The Accused VR Instrumentalities include the non-transitory computer-readable medium of claim 5, the mapping the received input to the haptic signal further comprising generating the haptic signal when the value of at least on interaction parameter exceeds a specified value. See Claim 2.
Claim 7	Valve's Accused Instrumentalities
7. The computer-implemented method of claim 5, wherein the actuator	The Accused VR Instrumentalities include the non-transitory computer-readable medium of claim 7, wherein the actuator comprises a vibration actuator, and wherein the haptic effect generated by the vibration actuator comprises a vibration haptic effect.

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Claim 7	Valve's Accused Instrumentalities
comprises a vibration actuator, and wherein the haptic effect generated by the vibration actuator comprises a haptic effect.	See Claim 3.