

Mixed Reality



VBS4 24.1.1



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The BISim Wiki is the primary resource on VBS4 scripting:

<https://sqf.bisimulations.com/display/SQF/VBS+Scripting+Reference>

PhysX

VBS4 uses the PhysX physics engine. For more information on PhysX visit the Nvidia site.

<https://gameworksdocs.nvidia.com/simulation.html>



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1. Mixed Reality: Overview

The mixed reality functionality allows trainees using VBS4 to interact with real equipment inside a synthetic scenario.



When configured, the scenario enables each player to do the following:

- While using the Varjo HMD headset:
 - See the virtual environment.
 - See avatars of other crew members positioned in their roles.
If the member of the crew mounts / dismounts a vehicle, the avatars appear or disappear, accordingly.
- Interact with real equipment that appears through a mixed reality cutout.

To setup and use Mixed Reality in VBS4, follow this process:

1. [Starting VBS4 with Mixed Reality \(on the next page\)](#)
2. [Creating Mixed Reality Masks \(on page 7\)](#)
3. [SDK API Modifications \(on page 11\)](#)

2. Starting VBS4 with Mixed Reality

Using the Mixed Reality functionality requires VBS4 to start with specific parameters.

Follow these steps:

1. Start VBS Launcher and open the **Client** tab.
2. In the **Preset** drop-down menu, select **Admin**.
3. In the **Parameters** field, input the following:

`-hmd=varjo_mask_manualtools_apprecenter`

This parameter enables the following functionality:

- `-hmd=varjo` - Uses the Varjo Software for tracking.
- `_mask` - Allows Varjo masking functionality.
- `_manualtools` - Allows for creation of mask with controller and the CAD tools used for editing the masks.
- `_apprecenter` - Overwrites the default recenter technology with one designed for cockpits and multiple created masks.

Launching with this parameter enable the user to create, manipulate, and save mixed reality mask configurations while in the virtual environment.

 **NOTE**

If VBS4 is running in the background, using `-window` is recommended.

For more information, see Launching with Parameters in the VBS4 Administrator Manual.

4. Click **Launch Modules** to start the VBS4 Admin Client.

For more information, see Starting VBS4 in the VBS4 Administrator Manual.

2.1 Optimizing Settings

Performance and compatibility can be optimized using these recommended settings.

Follow these steps:

1. Open the **Settings** menu in VBS4 and select the **Video** tab.
2. Expand the **Graphics Settings > Viewport Settings > Render Detail** section:
 - Select **Multi-Projection Technology > MVR / SPS**.
 - Select **DLSS > Disabled**.
3. Click **OK** to save the settings and close the window.

3. Creating Mixed Reality Masks

Define rectangular panels within the VBS4 scene where real-world equipment and monitors are located in relation to the 3D virtual environment.

You can set the XYZ dimensions of these panels, and their location and orientation in the 3D virtual environment. You can also configure rectangular 3D shapes and the size of panels in VBS4.

Select from the following topics to configure a mask:

- [Accessing the MR Mask Editor \(below\)](#)
- [Adding / Removing A Mask \(on the next page\)](#)
- [Selecting A Mask \(on page 9\)](#)
- [Scaling Masks \(on page 9\)](#)
- [Moving / Rotating Masks \(on page 10\)](#)

3.1 Accessing the MR Mask Editor

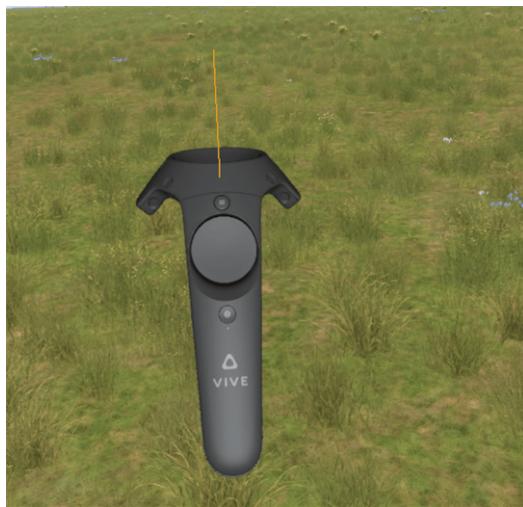
Users must be in Mask Editor mode to interact with and manipulate masks.

This mode can be accessed at any point when VBS4 is running.

Follow these steps:

1. Open the Mask Editor mode by pressing and holding the Touch Pad for 2 seconds.

The VR Controller rumbles and yellow picker lines appear on the controllers.



2. Close the Mask editor mode by pressing and holding the Touch Pad for 2 seconds

NOTE

The yellow picker lines, mask outlines, and mask editor tools will all disappear

3.2 Adding / Removing A Mask

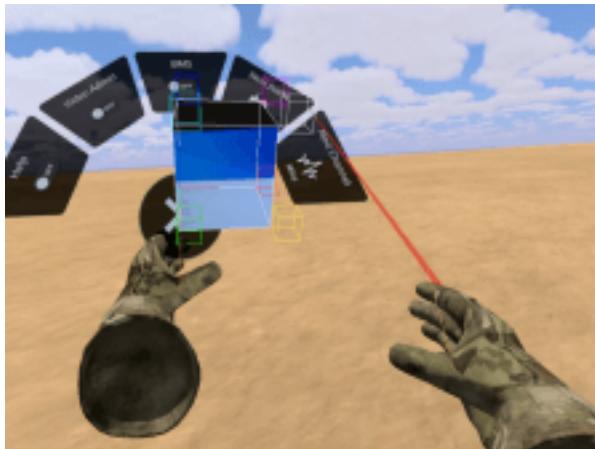
Add and remove masks in the scenario, as required.

Follow these steps:

1. To add a new mask, press the **Menu** button on the controller.

The mask is created at the tip of the yellow picker line.

- If the right-hand controller is used then the scaling root will be in the back bottom-right corner .
- If the left-hand controller is used then the scale root will be in the back bottom-left corner.



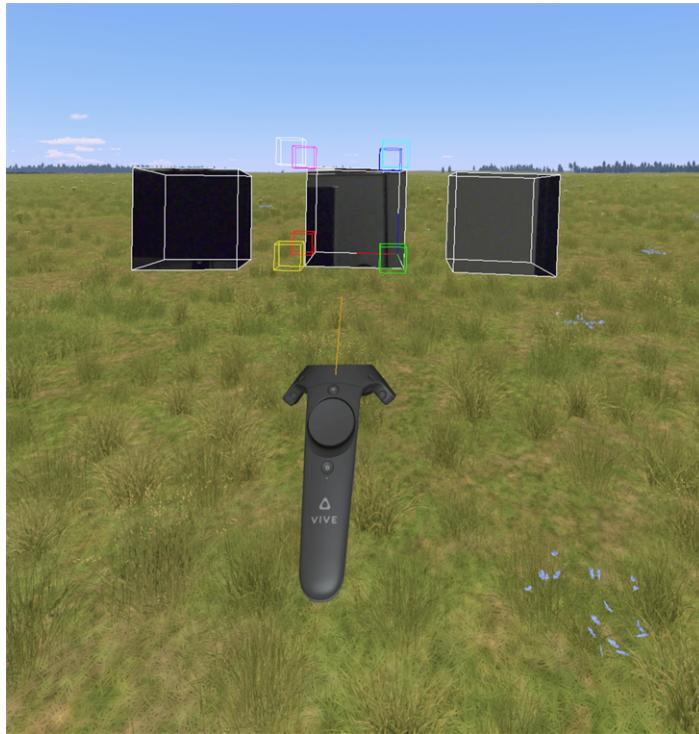
2. To add additional masks, press the **Menu** button again.



3. To remove a mask, press the touchpad when the yellow picker line is inside the mask.

3.3 Selecting A Mask

Select a mask by moving the yellow picker line into the mask. A mask is selected when the CAD tools appear around the mask. Once a mask is selected, you may scale, move, and rotate it.



3.4 Scaling Masks

Masks scale outwards from a corner (labeled with RGB axes), which changes based on the controller that creates the mask.

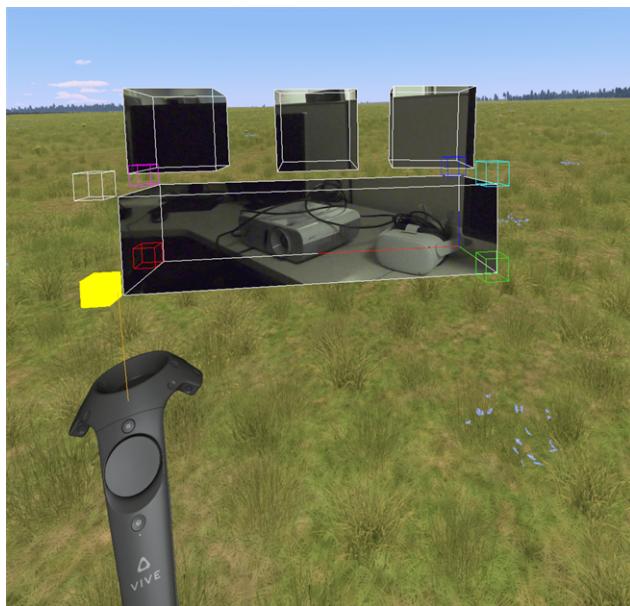
Select a cube grab point to scale a mask.

Use any of the available grab points to affect a different axis or multiple axes:

- **Red** - X-Axis
- **Green** - Y-Axis
- **Blue** - Z-Axis
- **Yellow** - X-Axis, Y-Axis
- **Purple** - X-Axis, Z-Axis
- **Cyan** - Y-Axis, Z-Axis
- **White** - X-Axis, Y-Axis, Z-Axis

TIP

The **White** grab point, which scales all three axes, is the most useful when first placing and scaling a mask. It is always at the opposite corner from the root corner.



3.4.1 Moving / Rotating Masks

Move and rotate masks simultaneously.

Follow these steps:

1. Place the yellow picker line inside the mask, then press and hold the trigger to grab the mask.

NOTE

The mask highlights when the yellow picker line is placed inside the mask.

2. While grabbing a mask, move and rotate it with the controller.

4. SDK API Modifications

Defining rectangular masks is available in the VBS SDK APIs (Simulation SDK and IG SDK) with related documentation.

- [MR API Additions \(below\)](#)
- [MRLISTENER API Additions \(below\)](#)

4.1 MR API Additions

The VR API provides access to the state VR devices (HMD, controllers, trackers), querying whether and which VR runtime is active, and state of extra features such as mixed-reality masking, eye tracking and visual marker detection (if supported by the hardware and VR runtime).

- `CreateManualMask`: Creates a new mask.
- `RemoveManualMask`: Removes a mask.
- `SetManualMaskTransform`: Transforms a mask via 4x3 transformation matrix .
- `GetManualMaskTransform`: Gets a 4x3 transformation matrix for a mask.
- `GetManualMask`: Gets the total list of created manual masks.
- `SetManualMaskShown`: Toggles rendering for a mask.
- `SetManualMaskToolsEnabled`: Toggles a mask transform tool for the given mask.
- `GetManualMaskToolsEnabled`: Inquires whether a mask transform tool is enabled for the given mask.

4.2 MRLISTENER API Additions

The VR Listener API provides notifications to components when certain VR events happen, such as transformation updates from VR devices, button presses on VR controllers, or other VR-specific events such as recentering.

- `OnManualMaskCreated`: Notifies the listener when a manual mask has been created.
- `OnManualMaskDeleted`: Notifies the listener when a manual mask has been deleted.