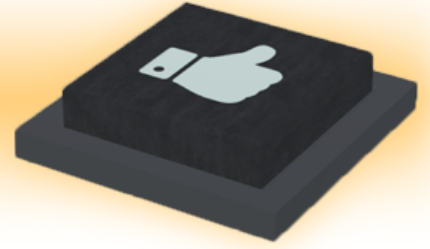# Immersive Interactions
## by Janooba

v0.2.x

# Welcome

Thank you for downloading Immersive Interactions. This project aims to provide the most comprehensive and physically accurate buttons and switches on the VRChat market.

If you'd like to test out the system, join the following world: Immersive Interactions

# Contents

# Quick Start

1. Install the ImmersiveInteractions package.
2. Drag the PlayerSkeletonInfo prefab located in **Packages/Immersive Interactions/Runtime/PlayerSkeletonInfo** into your scene.
   a. Ensure the **Bone Prefab** is set.
3. Drag one of the button prefabs located in **Packages/Immersive Interactions/Runtime/Button Prefabs** into your scene.
4. Once positioned where you'd like, select the child object with a **Pressable_Button** or **Flippable_Switch** component on it.
5. Click **Find Nearby Colliders To Ignore** under **// RUNTIME & DETECTION**. This will make sure the button doesn't get stuck in the wall or objects behind it. If this still happens, you may have to manually add the collider to the **Ignored Colliders** list.
6. Scroll to the **// EVENTS** section and add something to the list of receivers.
7. Toggle on one of the Send toggles and note the events that will be sent below.
8. Change the event name to match your own script's Events, or add a public event to your own Udon Behaviour that matches one of the events sent.
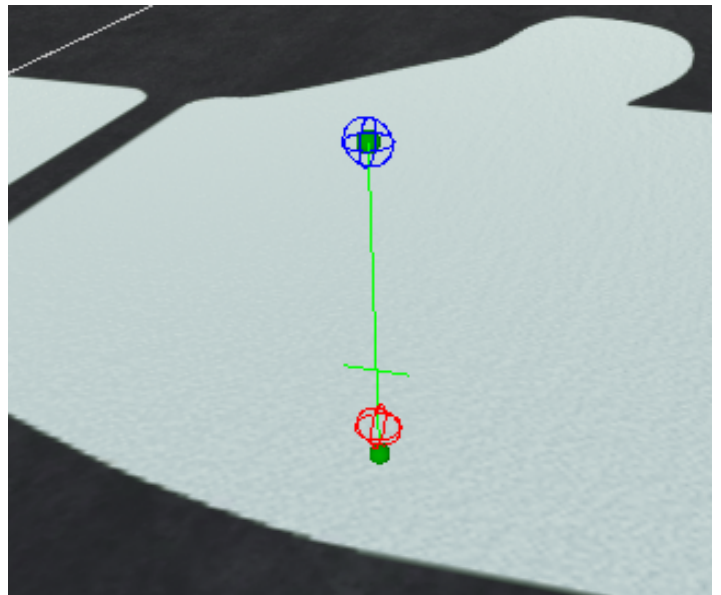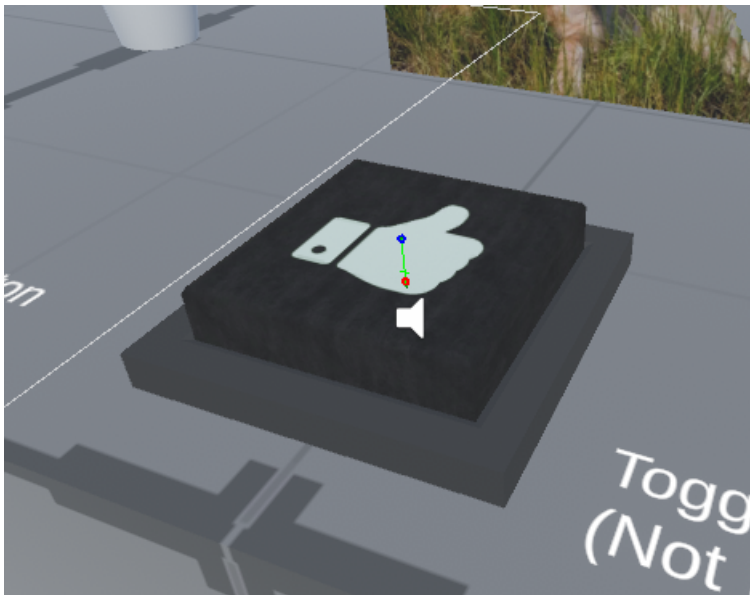
## Reading The Gizmo

This system has an in-scene gizmo to help you set up your buttons.

**Green vertical line:** The total travel distance.

**Green Cross:** The "toggled" stop point.

**Blue wire sphere:** The current position of the button.

**Red wire sphere:** The "trigger" point, beyond which, the button will trigger.

# Making a Button from Scratch

## Step 1 - Make your button/switch model

Use your modeling software of choice to create the shape for your button. For buttons, the button itself (the part that moves) should have its origin at the very top surface of the button and it should be a child of a base object.

For switches, the origin should be at the pivot point. It will pivot around the X axis.

Position the button and switch in its resting or out/off position.

Keep your UVs in mind if you want to use the Texture swapping module.
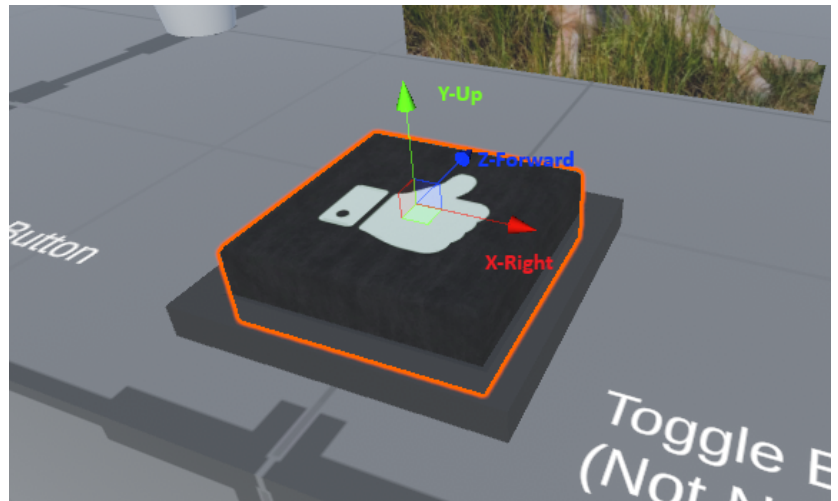


## Step 2 - Setting up the prefab

Place your model in the world when you are ready. It should be a parent object, with the button as a child.

Select your child button object, and add a **Pressable_Button** or **Flippable_Switch** component. This will automatically add a **Rigidbody** if needed, and set **Is Kinematic** to true.

The bare minimum needed is a **Collider** on the button itself and set it to **Is Trigger** (This is important for the system to work correctly). Primitive colliders are always preferred over mesh colliders for performance reasons. You can create children with colliders if you have a more complex button shape too, but if you do this, you MUST assign a fallback collider.

Set up the **Button Axis** according to how you modeled your button. The axis should point away from the button face in local space. So if **Y-Up** is your button facing, enter **X:0 Y:1 Z:0**.



If you want to add a collider to your button's parent/border, either make sure it doesn't cover the button completely, even when the button is pressed in, or add a fallback collider. This will ensure the button doesn't get stuck, and can be interacted with properly by anyone, VR or not. You will also need to add any parent colliders to the **Ignored Colliders** list, so that the button doesn't get "stuck" in it.

Drag your button into the Project panel to create a prefab. That's it! Refer to the Quick Start guide to see how to actually use this button.

# Step 3 - (Optional) Setting Up Modules

## > Audio

To give your button audio, all you need is an **Audio Source**, and clips for either press and release, or both. I personally like to put the **Audio Source** on a child object of the button base, for organization's sake. Assign the **Audio Source** to your **Button Source** field under Audio.

## > Tint

The button system can change an arbitrary color on whatever renderer you choose by targeting a shader keyword. This will require you to know the shader keyword that needs to change in advance. You can often find this by enabling **Debug Mode** in the inspector while a material is selected, and looking through the values. By default, a lot of shaders use "**_Color**", "**_Tint**", or "**_EmissionColor**" for emission.

All you need to do is assign the target renderer that will have the material you want to change in the **Tint Renderer** field, and set the **Tint Shader Keyword** to the property you want to set.

I've included a Standard Shader called **Janooba/Button Standard** that should work for most people. The default inspector values will work for it.

## > Texture

This option can be used to change a texture, such as an icon, depending on the button state. Much like the **Tint** module, This will require you to know the shader keyword needed to change the appropriate texture. Most shaders use "**_MainTex**" as their main diffuse texture.

All you need to do is assign the target renderer that will have the material you want to change in the **Texture Renderer** field, and set the **Texture Shader Keyword** to the property you want to set.

I've included a Standard Shader called **Janooba/Button Standard** that should work for most people. The default inspector values will work for it.

## > Animation

Buttons are able to control an arbitrary **Animator** parameter with this module. This is useful for buttons that have a complex animation while being pressed. This system will set a float parameter to a value between 0 and 1, depending on how far the button is pressed. See the Button Prefab **Bumper Button** for an example of how this system can be set up. Typically, you will create a linear animation of the button being pressed, then assign the node's **Motion Time** to the controlled parameter.

## > Haptics

Not much to say about this. Default values work pretty well, but may need more tuning if you'd like a more clicky feel. Tweaking this is all about feel, so there isn't too much that can be explained.

# Debugging Buttons

One of the quickest ways to debug buttons that may not be working as expected is to add the **DebugButtonCanvas** prefab to your scene, and assign the button to its **Button_Logger** script.

This will allow you to see what's going on in the button internally. Otherwise, refer to the [Troubleshooting](#) section for common hangups.

If still, you cannot seem to find a cause for the button malfunction, please create an issue on my github [here](#).

# Component Reference

## Player Skeleton Info

| Field | Type | Description |
|---|---|---|
| Bone Prefab | GameObject | Should be set for you. The prefab that will be used for tracked bones. Don't change this unless you really know what you're doing. |
| Force Fallback | Bool | Will force all buttons to use the basic VRChat interact system instead of tracking the skeleton. Will not disable physics interactions. Can be changed at runtime. Useful for giving the player performance options. |
| Include Head | Bool | Will add a tracked sphere for the head. |
| Include Hips | Bool | Will add a tracked sphere for the hips. |
| Include Feet | Bool | Will add a tracked capsule for feet. |
| Include Full Hands | Bool | Will track all fingers and palms. If this is off, only the index finger will be tracked. |
| Show Debug | Bool | Shows the bone colliders as blue transparent shapes. |
| Debug Status | TextMeshPro UGUI | An optional TMP text component to display debug information. |
| All Bones | Array (PlayerBone) | For debug use. Will be filled with all created and tracked player bones. |

## Pressable Button

| Field | Type | Description |
|---|---|---|
| **// RUNTIME & DETECTION** | | |
| Is Locked | Bool | If the button is locked, it cannot be moved or pressed. |
| Detect Players | Bool | Whether or not to detect the player skeleton. |
| Detect Rigidbodies | Bool | Whether or not dynamic objects with rigidbodies are detected. |
| Detect Static | Bool | Whether or not static objects (like the world) are detected. Useful if your button is on a dynamic object. |
| Find Nearby Colliders To Ignore | Button | Will try to automatically find objects that may obstruct the button as it's pressed in, so they can be ignored. |
| Clean Up Nulls | Button | Will remove null entries from the Ignored Colliders list. |
| Ignored Colliders | Array (Colliders) | All colliders in here will be completely ignored. |

| // GENERAL SETTINGS | | |
|---|---|---|
| Button Axis | Vector3 | Which direction does the button face? Points away from the button. |
| Button Thickness | Float | How far the button travels before bottoming out. |
| Trigger Zone | Float (Slider) | Percentage of the thickness the button needs to travel before being considered "pressed". Where 0 is fully unpressed, and 1 is fully pressed. |
| Cooldown | Float | Minimum amount of time passed, in seconds, before the button will register a new press. |
| Return Rate | Float | How fast the button will return to its unpressed position. |
| Limit Backpressing | Bool | Limits how quickly a button can move in a frame so that it doesn't snap down from presses coming from behind it. |
| Is Toggle Button | Bool | Will the button stay pressed until pressed again. |
| -  Start Toggled On | Bool | Should the button be on when initialized? |
| -  Toggle In Position | Float | The position to set as the new "top" in travel distance percentage when pressed in. The button will rest at this point until toggled off. |
| Fallback Collider | Collider | Optional. Will be used for desktop users and fallback if the normal button collider isn't accessible. This can happen if the button is pushed inside of another collider. |
| Fallback Press Time | Float | How long to stay pressed when using a fallback/non vr press before popping back up. |
| // EVENTS | | |
| Send Pressed Event | Bool | This event will be sent to receivers when pressed. Will have "_On" or "_Off" appended if the button is a toggle button. |
| Send Released Event | Bool | This event will be sent to receivers when released. Will have "_On" or "_Off" appended if the button is a toggle button. |
| Force Send Stateless | Bool | This forces the system to send the pressed and released events without "_On" or "_Off" as well. |
| Udon Receivers | Array (GameObject) | A list of Udon Behaviours to send events to. |
| // MODULES | | |
| Network Sync | | Enables network syncing for this button. |
| Master Only | Bool | If on, the button will only be interactable by the instance master. Even by physics. |
| Transfer Receiver Ownership | Bool | Attempts to transfer ownership to the person pushing, even with physics. In most cases you want this on, as it may lead to players that don't own the button not being able to press it. |
| Disable When Network Clogged | Bool | In certain circumstances, the network may get clogged by too much traffic (which may or may not be related to buttons). In order to help the network recover, this option will lock buttons so they cannot be pressed until the network has recovered. |

| Audio | | Allows this button to make press and release sounds. |
|---|---|---|
| Button Source | Audio Source | The audio source that button sounds will come from. |
| Press Clip | Audio Clip | The sound to play when the button has been pressed. |
| Release Clip | Audio Clip | The sound to play when the button has been released. |
| Tint | | Changes a renderer's tint depending on button state. Will target all materials on a renderer with a [MaterialPropertyBlock](#), and set a shader keyword. |
| Tint Renderer | Renderer | The renderer to target for tinting. |
| Tint Shader Keyword | String | The shader keyword on the materials that should be changed. |
| Off Tint | Color | Color for the default "out" state of the button. |
| In Tint | Color | Color displayed while the button is pressed in, but not released. |
| On Tint | Color | Color displayed if the button is a toggle button, and it is currently toggled on. |
| Locked Tint | Color | Color displayed when the button is locked. |
| Texture | | Changes a renderer's texture depending on button state. Will target all materials on a renderer with a [MaterialPropertyBlock](#), and set a shader keyword. |
| Texture Renderer | Renderer | The renderer to target for texture swapping. |
| Texture Shader Keyword | String | The shader keyword on the materials that should be changed. |
| Off Texture | Texture 2D | Texture for the default "out" state of the button. |
| In Texture | Texture 2D | Texture displayed while the button is pressed in, but not released. |
| On Tint | Texture 2D | Texture displayed if the button is a toggle button, and it is currently toggled on. |
| Locked Texture | Texture 2D | Texture displayed when the button is locked. |
| Animation | | Controls an animator's parameter with the press progress. Useful if you want a button to have a unique animation for pressing. |
| Animator | Animator | The animator that will be controlled by this button. |
| Progress Parameter | String | The parameter that will be set to the button progress (0 to 1). |
| Haptics | | Trigger haptic feedback for users pressing this button. |
| Haptics Duration | Float | How long to vibrate the controller. |
| Haptics Amplitude | Float (Slider) | How strong the vibration should be. |
| Haptics Frequency | Float | How fast the vibration should be in Hz. |

# Flippable Switch

| Field | Type | Description |
|---|---|---|
| // RUNTIME & DETECTION (See Pressable Button) | | |
| // GENERAL SETTINGS | | |
| Max Rotation | Float | How far to rotate the switch in degrees. |
| Trigger Zone | Float (Slider) | Percentage of the rotation the button needs to travel before being considered "pressed". Where 0 is fully unpressed, and 1 is fully pressed. |
| Cooldown | Float | Minimum amount of time passed, in seconds, before the button will register a new press. |
| Return Rate | Float | How fast the button will return to its unpressed position. |
| Is Toggle Button | Bool | Will the button stay pressed until pressed again. |
| - Start Toggled On | Bool | Should the button be on when initialized? |
| Fallback Collider | Collider | Optional. Will be used for desktop users and fallback if the normal button collider isn't accessible. This can happen if the button is pushed inside of another collider. |
| Fallback Press Time | Float | How long to stay pressed when using a fallback/non vr press before popping back up. |
| // EVENTS (See Pressable Button) | | |
| // MODULES (See Pressable Button) | | |

# Public Scripting API

| Method / Field | Description |
| --- | --- |
| CurrentUnitProgress | Field. A 0 to 1 value that represents how far pressed this button is. |
| IsSleeping | Field. Whether this button is sleeping (Not being updated). |
| IsTriggered | Field. Will be true while the button is beyond the trigger threshold. |
| IsToggled | Field. Will be true when the button is toggled, if this button is a toggle button. |
| Pressed / Pressed_On / Pressed_Off | Methods. Can be used to manually press this button as if a person pressed it. |
| Lock_On / Lock_Off | Methods. Locks or Unlocks the button. |
| Wake / Sleep | Methods. Will force the button awake or to sleep. May be useful if you are modifying things like its progress outside of the API. |
| NonVR_Interact | Method. Can be used to manually press this button as if a NonVR user pressed it. |

# Troubleshooting

| Issue | Solution |
|---|---|
| My button gets stuck when I press it. | Ensure the surfaces behind the button are added to the collider ignore list. |