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## Introduction

Foottroller playground is a VR game for Meta Quest VR headsets which uses inputs from the Foottroller for complete foot-action based movement control. It supports Foottroller four-way movement control and walk-in-place. And the foot pointing direction of the user's right foot from the Foottroller is used to control (Forward) direction of the movement. As a result, the user can look around freely and the user's hands can move freely while moving without affecting the movement.

Another function of the Foottroller playground app is to allow the use of VR controllers to control PC games through the VR Foottroller Hub application.

## Get Foottroller playground app in Quest headsets

Use link <u>https://www.meta.com/s/3bKC8Gkn6</u> to join the app's beta test channel. And the Foottroller playground app will be pushed to your quest 2 or 3 headset.

## Find Foottroller playground app in the Quest headset

Go to library and click the circled icons in the Figure below to find the Foottroller playground app in your Quest headset.



The Figure below is a screenshot after the foottroller playground app is started.



## The VR Foottroller hub application

The foottroller playground app gets Foottroller controls and data from the VR Foottroller hub application on the Windows PC to which the Foottroller is connected. Use the link below to download the application.

https://www.dropbox.com/scl/fi/2y1cme12mtb0abwmhibgz/Foottroller\_hub.rar?rlkey=6lcz5c1jszp19xvdoefiq6l7y&st=x xmudwhk&dl=0

Extract the program in a folder, and make sure the folder's path contains no space.

Eoottroller_hub					_	
File Home Share View						~ ?
	Move Copy to *	New item • The basy access • New folder	Properties	Select all Select none Invert selection		
Clipboard	Organize	New	Open	Select		
✓ ▲ =						
$\leftarrow$ $\rightarrow$ $\checkmark$ $\uparrow$ $\blacksquare$ $\rightarrow$ This PC $\rightarrow$ DATA	D:) > Foottroller_hub		✓ Ū Searc	h Foottroller_hub		م
L drivers	* ^ Name	^	Date modified	<sup>1</sup> 2 items		
Assets	feeder		4/16/2025 9:13 AM	F		
📕 Assets	😻 VR Foottroller Hub_	v1.1.exe	4/18/2025 12:39 AM	4		
FoottrollerXRSample_2025_c						
📜 JPTI distributes						
🗢 This PC						
3D Objects						
🔜 Desktop						
Documents						

Run the VR Foottroller Hub application. The Figure below shows the GUI of the hub application.

VR Foottroller Hub (v1.1)	×	
The app gets data from Foo to generate controls for app	ottroller and other sources olications, including steamVR www.foottroller.com	
Foottroller inputs Joystick X: 128 Joystick Y: 128 Heading RF: 0 Tilt RF: 0 Heading LF: 0 Tilt LF: 0	Viol         Viol           Viol         0.00000           Buttons: A B X Y T1 T2         0.0000           Vjoy mode         0.00000           Throttle: 1.000000         Brake: 0.000000	
Touch State: Status: no remote app con	Swith mode Pedal 1 nected Start vjoy feeder	

Make the quest headset and the windows PC are in the same local network. The Foottroller playground app will automatically search and connect to the VR Foottroller hub. Before the connection between the foottroller playground app and the VR foottroller hub is established, the status of the hub shows "no remote app connected", as in the Figure above.

After the Foottroller playground app connects to the hub application, the status of the hub application shows "remote app connected" as shown in the Figure below. And the Foottroller hub starts to send controls and data from the Foottroller to the Foottroller playground app.

The app gets data from Foottroller and other sources to generate controls for applications, including steamVR www.foottroller.com Foottroller inputs Joystick X: 128 Joystick Y: 128 Heading RF: 0 Tilt RF: 0 Heading LF: 0 Tilt LF: 0 Touch State: Status: remote app connected Tatus: remote app connected	VR Foottroller Hub (v1.1	) – 🗆 🗙
Foottroller inputs       Remote app inputs         Joystick X:       128         Joystick Y:       128         Heading RF:       0         Tilt RF:       0         Heading LF:       0         Tilt LF:       0         Touch State:       Start vjoy feeder	The app gets data from Form for generate controls for a	oottroller and other sources pplications, including steamVR www.foottroller.com
Tilt RF:       0         Heading LF:       0         Tilt LF:       0         Throttle:       1.000000         Brake:       0.000000         Swith mode       Pedal 1         Status: remote app connected       Start vjoy feeder	Foottroller inputs Joystick X: 128 Joystick Y: 128 Heading RF: 0	Remote app inputs Steering wheel: -1.000000 Buttons: A B X Y T1 T2 0 0 0 0 0 0
Touch State:     Swith mode     Pedal 1       Status: remote app connected     Start vjoy feeder	Tilt RF: 0 Heading LF: 0 Tilt LF: 0	vjoy mode Throttle: 1.000000 Brake: 0.000000
	Touch State: Status: remote app conne	Swith mode Pedal 1

With this setup, the foottroller does not need to directly connect to a VR headset. Applications in VR headset and any other devices can have full access to Foottroller controls and data from the hub application through the local network.

Note, VPN software may block the PC's access from the local network. If the Foottroller playground app cannot connect to the hub, turn off the VPN will resolve the problem.

# The use of foot pointing direction for movement direction control

Most VR applications use the orientation of the VR headset, or the pointing direction of a VR controller to determine the forward movement direction. As a result, the changes of the user's looking direction or controller pointing direction will change the movement direction. In the real world, the forward movement direction is not controlled by a person's head or hands, but the pointing direction of the feet. In operation mode 3, the Foottroller provides the pointing directions of the user's feet. The Foottroller playground app uses the right foot pointing direction to control the forward movement direction, which allows the user to look around freely while moving in the VR environment without affecting the movement.

### Foot pointing direction calibration in the Foottroller playground VR app

The user's foot pointing direction needs to be associated with the directions in VR. In the Foottroller playground app, this calibration process is done by pressing the menu button of the left hand touch controller when the user's looking direction aligns with the user's right foot pointing direction. After the calibration, a blue dot moves in front of the user's view as shown in the Figure below, which indicates the current forward direction for movements in the game. The forward movement direction changes with the user's right foot pointing direction.

In the Foottroller playground app, the user can move forward, backward, left and right in reference to the forward movement direction using the Foottroller Four-way movement control, and walk-in-place functions.



Video shows Foottroller playground app in action <u>https://youtu.be/DBhiTu2qajs</u>

## Play PC games with VR controllers and the Foottroller

Another function of the Foottroller playground app is to forward controls of the quest touch controllers to the VR Foottroller hub, which can be used to control games on the windows PC.

### Connect Foootroller playground app with the VR Foottroller hub (on Windows PC)

The Figure below shows the GUI of the Footroller hub. After the Foottroller playground connects to the VR Foottroller Hub, the "Remote app inputs" panel shows controls from the quest touch VR controller. The "steering wheel" value changes as the user holding the two VR controllers and moving them up and down in opposite direction, which mimics

the operation of a steering wheel. When the user pressing buttons on the VR controllers the button status will be updated in the hub program. For PC game control, the Foottroller operation mode needs to be set to mode 3, the developer mode, such that foot pointing directions and tilt angles are sent the hub for game control generation.

VR Foottroller Hub (v1.1	) – 🗆 X
The app gets data from Fo to generate controls for a	pottroller and other sources pplications, including steamVR www.foottroller.com
Foottroller inputs Joystick X: 128 Joystick Y: 128 Heading RF: 0 Tilt RF: 0 Heading LF: 0 Tilt LF: 0 Touch State:	Remote app inputs Steering wheel: -1.00000 Buttons: A B X Y T1 T2 0 0 0 0 0 0 vjoy mode Throttle: 1.000000 Brake: 0.000000 Swith mode Pedal 1
Status: remote app conne	ected Start vjoy feeder

#### Disable Proximity sensor of the Quest headset

The Proximity sensor of the Quest headset needs to be disabled to stop the headset from going into sleep mode when the user is not wearing it.

The SideQuest application, <u>https://sidequestvr.com/</u>, can be used to disable the proximity sensor. The Figure below shows the setting page of the SideQuest application GUI, and the option to disable the proximity sensor of the connected VR headset.

SideQuest	-		×
	=√ ٩	?	Ð
This allows you to transfer files between your computer and your headset using your favourite file explorer. You may need to re- enable this when you re-connect your headset.			
Off On			
BONELAB Mods			
This will enable mods inside BONELAB on your quest.			
ENABLE BONELAB MODS			
Proximity Sensor			
This disables the proximity sensor effectively keeping your quest awake.			
ENABLE PROXIMITY SENSOR			
Guardian			
This will enable/disable the guardian.			
Off On			
Full Rate Capture			

For good controller position tracking accuracy while not wearing the VR headset, put the headset facing downward as shown in the Figure below.



Install and run vJoy software and start feeding controls from the Foottroller hub to the virtual Jostick created by vJoy

vJoy is a simple application that is originally used to set the mouse and keyboard as a device needed to play a game without using devices like a joystick which you need to play the game. <u>https://www.vjoy.org/</u> or <u>https://sourceforge.net/projects/vjoystick/</u>

The Figure below shows the configuration user interface of the vJoy application.

vJoyConf - Configu	ire vJoy Devices	- · ×	
vJoy Device: 1 Axes V X V Y V V V V V V V V V V V V V V V V V V	(v2.1.9) Number of Buttons (v2.1.9) Number of Buttons 8 POV Hat Switch C 4 Directions C Continuous POVs: 0 1 2 3 4	Force Feedback Force Feedback Constant Gramp Square Sine Triangle Sawtooth Up Sawtooth Up Sawtooth Up Sawtooth Dow Spring Damper	
✓ Enable vJoy	Apply Undo Delete Device Reset All	Image: Image of the image	

After vJoy is enabled, the "setup usb game controller" program on Windows can be used to check the states of the created virtual Joystick. The Figure below shows two devices. The "Joystick" device is the Foottroller, and the vJoy Device is the virtual joystick created by vJoy.

Same Controllers	×	Test the game controller. If the controller is to be calibrated. To calibrate	ne controller is not functioning properly, it may n e it, go to the Settings page.
computer.	ire the game controllers installed on your	Axes	Z Axis
Controller	Status		X Rotation
vJoy Device	OK	+	Z Botation
Joystick	ОК		Slider
		X Axis / Y Axis	Dial
		Buttons	
A	dvanced Properties	••••	• • • •
-	ОК		

The VR foottroller Hub has a vJoy feeder, which allows the use of Foottroller and VR controller inputs to control the virtual joystick created by vJoy. To allow the Foottroller hub to send controls to the vJoy virtual joystick, click the "start vJoy feeder" button on the GUI of the Foottroller hub. The Figure below shows the console of the feeder program. Note that the Foottroller hub software need to be placed on a path that has no space, otherwise, the Feeder program cannot be found.



At this point, the axes and buttons of the vJoy virtual joystick can be controlled by the Foottroller and the VR controllers.

#### vJoy mode selection

The VR Foottroller hub has multiple vJoy modes, which can be changed by clicking the "Switch mode" button.

In mode "Pedal 1", the Foottroller's right foot is used to control the throttle and brake for driving games. When the user's right foot swipe right, the foot is on the throttle, and when the user's right foot swipe left, the foot is on the brake. The steering wheel input is used for steering, which is controlled by the VR controller.

In mode "Pedal 2", the left hand trigger of the VR controller is used for brake control, and the right and trigger of the VR controller is used for acceleration control.

In mode "pass through", controls from the VR controllers are mapped to controls of the vJoy virtual joystick.

In mode "four-way mov", the main axis of the virtual joystick is controlled by the Foottroller with the four-way movement control.

#### Create an emulated xBox controller for PC games

Many PC games use xBox controllers for game control. Using xBox controller emulator, e.g., <u>https://www.x360ce.com/</u> controls of the vJoy virtual joystick can be mapped to an emulated xBox controller.

The Figure below shows the downloaded x360ce xBox controller emulator.



The Figure below shows the GUI of the xBox controller emulator after running the program. Press "Add" button to add the vJoy virtual joystick to the emulator's device list. Map the axes and buttons of the vJoy joystick to the corresponding controls of the emulated xBox controller. Then check the "Eable 1 Mapped Device" option. An emulated xBox controller will be added to the system, which is controlled by the vJoy joystick controls.

- 000y5.00	In ASSO CONTONER EMUIATOR 4.1	11.15.0 (Build, 2020-11	1.57		
i) Usefu applic	2 I Tip: Minimize X360CE Application ation automatically turns off CPU h	during gameplay to redu eavy tasks like Interface i	ice its load on CPU updates or state rec	and GPU. Minimized quests from XInput.	Car
Game: x360d	ce.exe - X360 Controller Emulator		•	🕂 Add Ga	ame 📙 Save
Controlle	r 2 E Controller 3 E Controller	4 Options Games D	evices Cloud H	elp About 📀 Issu	es 🔹
Enable 1	I Mapped Device     Get XInput S       Setting ID     Map %       Instance ID       AP27PEE7     62       AP27PEE7     62	State Vendor Name Produ Sharul Fizikovich v Iov	uct Name	🗆 Auto May 🕇 Ar	dd Remo
General B	uttons D-Pad Triggers Left Th	umb Right Thumb Fore	ce Feedback Dire	ct Input - 8200A530	
0	LEFT	Remap All Default	-	RIGHT	0
Axis 6	- Trigger			Trigger	Axis 3 •
	Bumper	. NOT		Bumper	
	- Back			Y Button	Button 4 -
	- Start	A COLOR OF A		X Button	Button 3 -
	- Guide			B Button	Button 2 -
	• D-Pad	0.00	0	A Button	Button 1 +
-2767:	0		00		0:0
Axis 1	Stick Axis X			Stick Axis X	Axis 4 •
IAxis 2	Stick Axis Y	00		Stick Axis Y	Axis 5 •
	Stick Button			Stick Button	•
	<ul> <li>Stick Up</li> </ul>		D-Pad Up	Stick Up	
	Stick Left		D-Pad Left	Stick Left	
	Stick Right		D-Pad Right	Stick Right	
	- Stick Down		D-Pad Down	Stick Down	

The Figure below shows the emulated xBox controller in Windows' "Setup USB game controller" tool. Now we have a emulated xBox controller controlled by the Foottroller and VR controllers, and is ready for games on the Windows PC.

These settings help you configure the game	controllers installed on your	Test the game controller. If t	the controller is not functioning properly, it may r
Installed game controllers		Axes	z Avia
Controller	Status		X Potation
Controller (XBOX 360 For Windows)	OK		X Potetion
vJoy Device	OK	+	1 Rotation
ooyonex	UK I	X Axis / Y Axis	
		Buttons	Point of View H
Advanced	Properties		
	OK		•

### Use the Pedal mode of the VR Foottroller Hub to play driving games on the Windows PC

The pedal modes of the VR Foottroller hub allows the use of VR controllers as the steering wheel, and the use of Foottroller or triggers of the VR controllers for acceleration and brake.

For good control experience, steering wheel settings of the driving game need to be adjusted to suitable sensitivity levels, which includes steering wheel dead zone and steering wheel nonlinearity. In game Forza, the setting can be found at "settings->CONTROL SETTINGS->Advanced".

A recommended settings for Forza is

STEERING AXIS DEADZONE INSDIE = 8

STEERING LINEARITY = 40

Adjust the setting to fine tune the driving control experience.

### Use Foottroller in game development

Foottroller can connect to various devices as a generic Joystick. It provides a joystick controlled by Four-way movement control, and raw Foottroller data including user foot touch states, user foot pointing directions, and user foot tilt angles. The information can be accessed axes and buttons of the generic joystick.

Another way of using Foottroller in game development is to access Foottroller controls and data from the VR Foottroller Hub application. With this approach, there is no need to directly connect foottroller (control box) to different devices. With the Foottroller control box connected to a Windows PC, all applications can get Foottroller controls and data from the VR Foottroller hub application as long as its device is on the same local network as the windows PC.

The unity C# script for accessing Foottroller controls and data from the Foottroller Hub through UDP links can be downloaded from the following link

https://www.dropbox.com/scl/fi/9wdtfwm5j9c3q3ofg9pcx/FoottrollerNet.cs?rlkey=iab7rskr7owy2u6h9c0hw9uzl&st=az Ituzlf&dl=0

The code can be easily modified and used in other game development environments.