

## VIRTUATILT MAIN CONFIGURATION AND SETUP GUIDE

Following some basic instructions to have your new VirtuaTilt up and running quickly.

VirtuaTilt controller is powered by RP2040 with **Pinscape Pico** firmware already installed.

**Please always refer to official Pinscape Pico repository:** <https://github.com/mjrgh/PinscapePico>

### RP2040 Software Setup

VirtuaTilt comes with a RP2040 "microcontroller", which is basically a tiny computer. **Pinscape Pico firmware is already installed (latest version available at shipping time)**. That serves as both the operating system and the application software. It controls all the virtual pinball functions of the RP2040, including the sensors, buttons, and feedback devices, and it handles communications with Windows and other devices.

In addition to the Pinscape Pico firmware that runs on the RP2040, there's a separate Pinscape Pico program that runs on your Windows PC, called **GUIConfigTool**. This provides an interactive interface for setting up the device, configuring it, and testing it. You don't need to leave the GUIConfigTool running all the time; it's only needed to set up and test the device. You can also run it again at any time to change options, update the firmware, or troubleshoot problems (it includes some testing features that can help debug the hardware setup).

For additional information about Config Tool and how to use it please refer to official documentation:

<http://mjrnet.org/pinscape/PinscapePico/Help/ConfigTool.htm>

The software installation process is all controlled from the PC. The Config Tool handles the RP2040 software setup, so the first step is to install the Config Tool on your PC. You can download it from the official page:

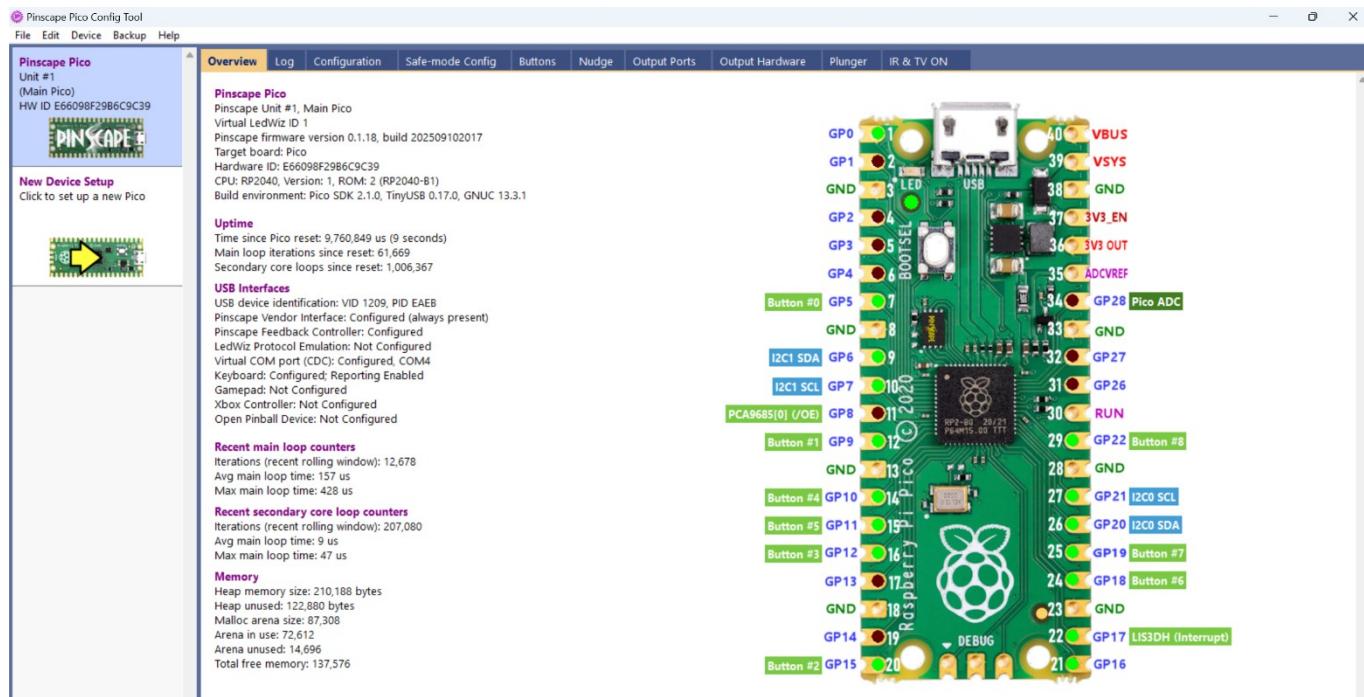
<https://github.com/mjrgh/PinscapePico/releases>

To install, download the ZIP file above, unblock it (**very important!**) and unpack it into a folder on your hard disk. Use any location that's convenient. Open the folder and double-click the "**GUIConfigTool.exe**" application:

This PC > Local Disk (C:) > PinscapePico >

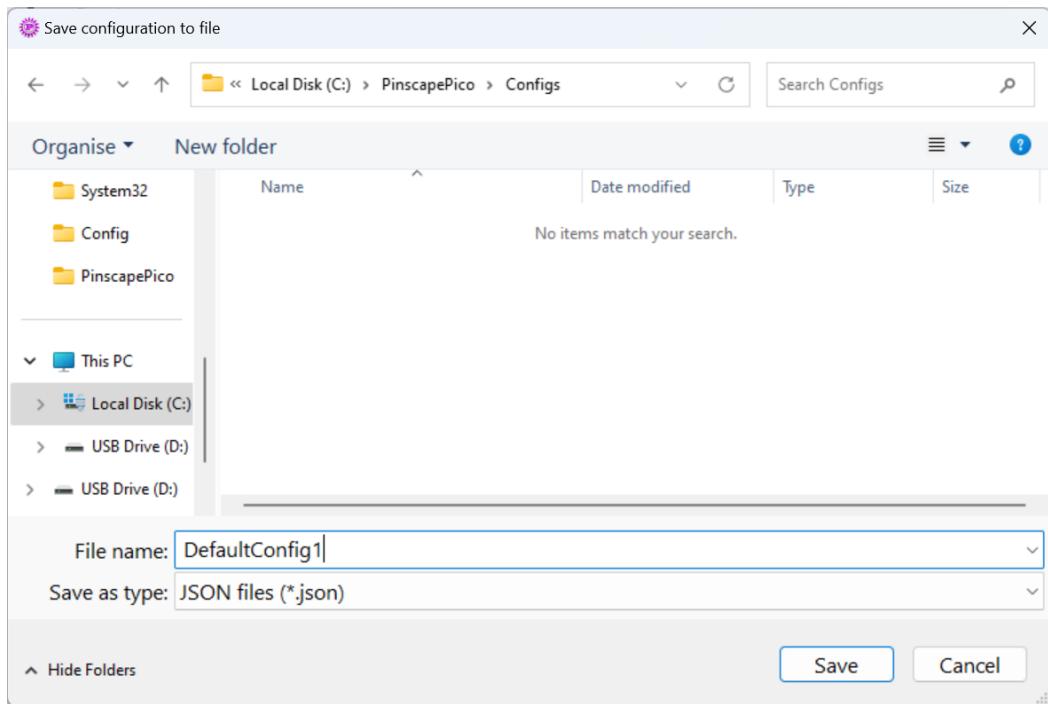
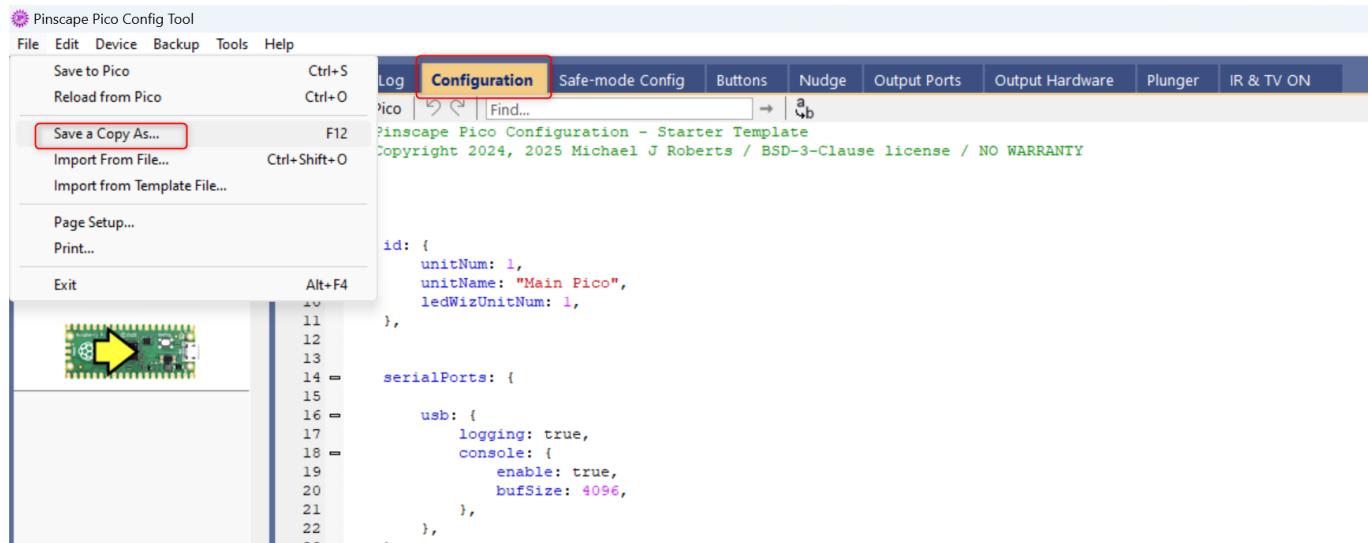
Search PinscapePico

	Name	Date modified	Type	Size
📁	AutoBackup	11/09/2025 22:10	File folder	
📁	Configs	12/09/2025 09:19	File folder	
📁	ConfigTemplates	26/07/2025 17:58	File folder	
📁	GUIConfigTool.exe.WebView2	27/07/2025 10:14	File folder	
📁	Help	26/07/2025 17:58	File folder	
📅	ConfigTool.exe	10/09/2025 20:21	Application	407 KB
📅	GUIConfigTool.exe	10/09/2025 20:22	Application	4,550 KB
📅	GUIConfigToolSettings.json	11/09/2025 22:24	JSON Source File	1 KB
📅	License.txt	25/02/2025 23:25	Text Document	5 KB
📅	MicrosoftEdgeWebview2Setup.exe	21/06/2024 10:58	Application	1,598 KB
📄	PinscapePico-pico.elf.map	10/09/2025 20:19	MAP File	2,223 KB
📄	PinscapePico-pico.uf2	10/09/2025 20:19	UF2 File	1,138 KB
📄	PinscapePico-pico2.elf.map	10/09/2025 20:15	MAP File	2,245 KB
📄	PinscapePico-pico2.uf2	10/09/2025 20:17	UF2 File	1,091 KB
📄	PWMWorker-pico.uf2	10/09/2025 20:19	UF2 File	60 KB
📄	PWMWorker-pico2.uf2	10/09/2025 20:19	UF2 File	53 KB
dll	Scintilla.dll	10/09/2025 20:22	Application extension	997 KB
exe	SetPWMWorkerAddr.exe	07/04/2025 19:58	Application	214 KB



## VirtuaTilt Default Config

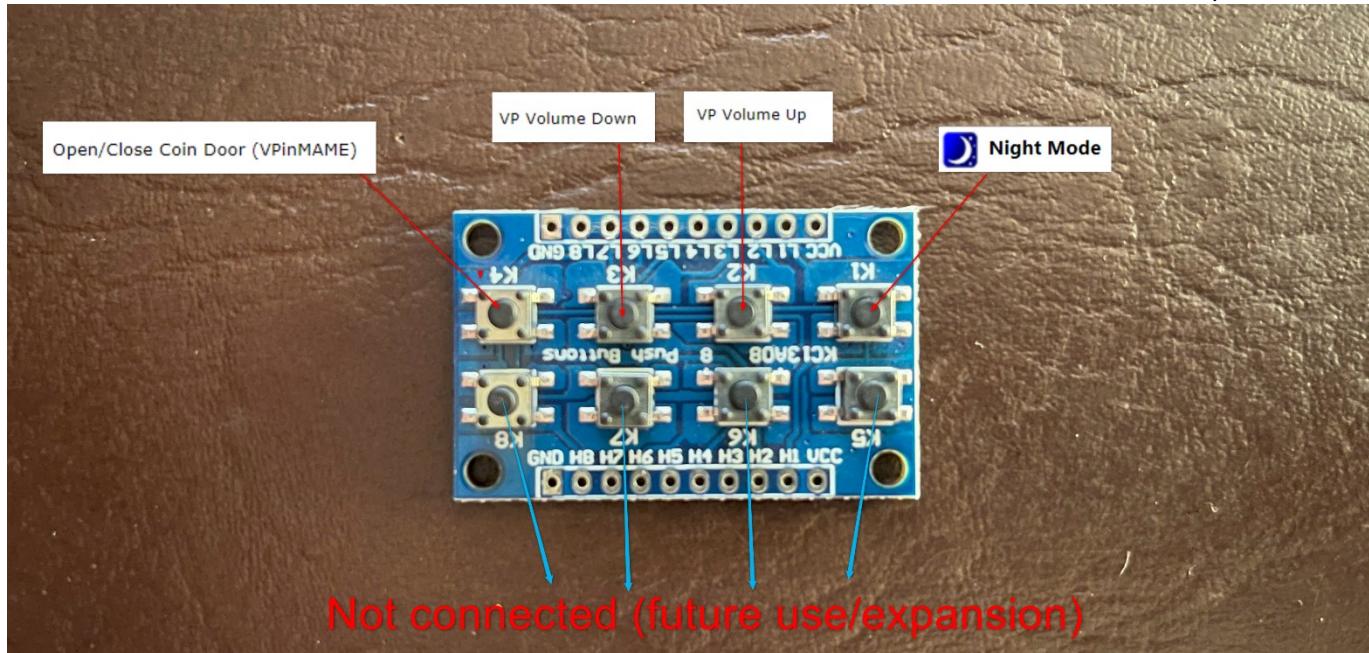
VirtuaTilt comes preconfigured with a **standard PC profile for Visual Pinball X**. We recommend using it at the beginning for testing buttons, potentiometer, feedback devices, etc. You can obviously change/unload it afterwards (see [Appendix D](#)). We also recommend saving it, in case you need to revert to the original configuration:



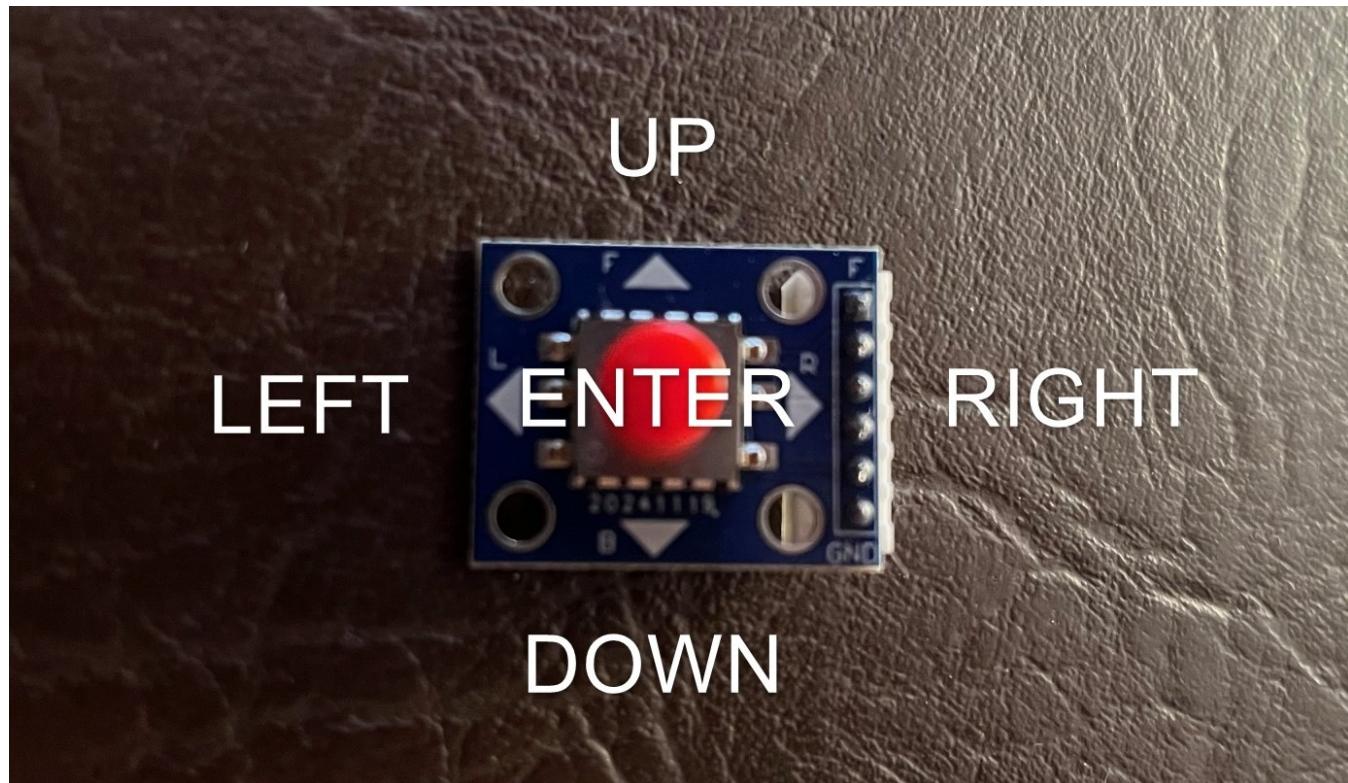
## Default Buttons Mapping

## VPX / Future Pinball

Default Control	Keyboard Config	Button Color
<b>Left Flipper</b>	 Shift (Left)	Left Flipper 
<b>Left MagnaSave</b>	 Ctrl (Left)	Left MagnaSave 
<b>Right Flipper</b>	 Shift (Right)	Right Flipper 
<b>Right MagnaSave</b>	 Ctrl (Right)	Right MagnaSave 
<b>Start</b>	 :	Start Game 
<b>Coin In</b>	 % 5	Coin In 
<b>Exit/Cancel</b>	 Esc	Exit to menu 
<b>Launch Ball</b>	 Enter	Plunger/Launch Ball 
<b>Extra Ball</b>	 @ 2	Extra Ball (Buy-In) 
<b>Fire!</b>	To be assigned on Visual Pinball	



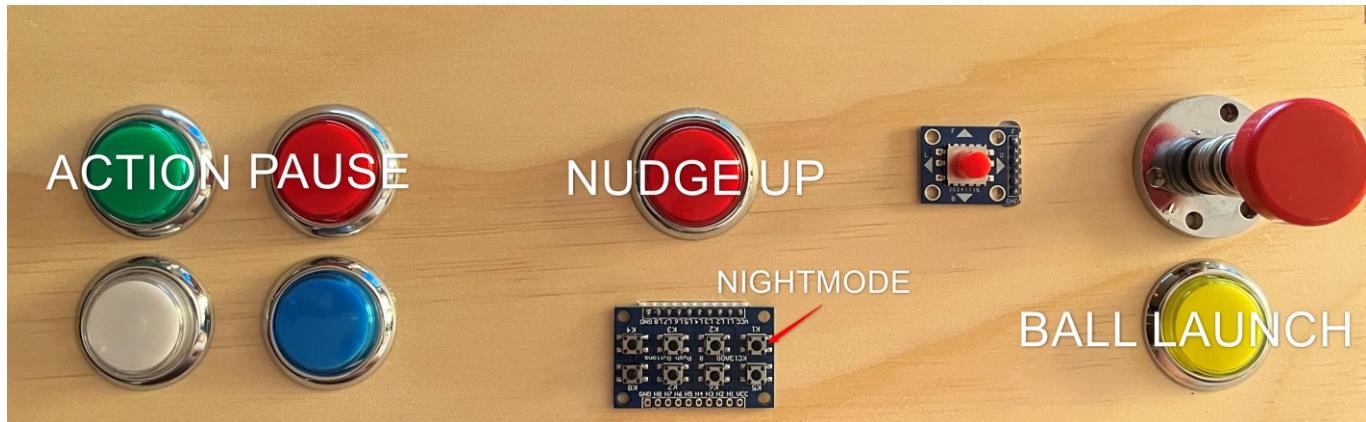
NOTE: Nightmode on VirtuaTilt is enabled for all feedback devices when Nightmode button is pressed.



**STEAM (X-Input): PinballFX / FX3 / Pinball M / Infected Mushroom Pinball / Pinball VR Classic / Star Wars Pinball VR / IOS/Android /etc.**



## PinballFX VR



You can use the Pinscape Pico **Buttons** tab to check if your VirtuaTilt's buttons are working as expected:

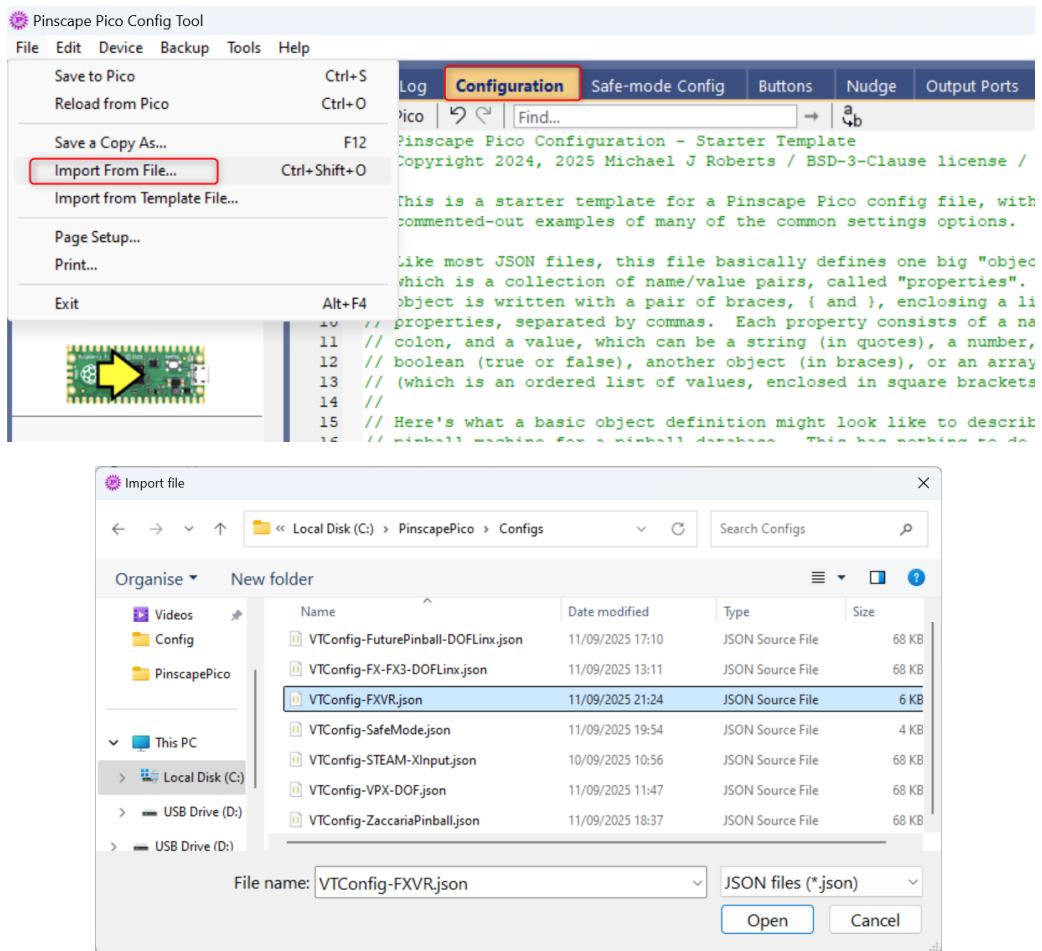
Logical Buttons	GPIO (GP)	Action
#0 Off	Pushbutton	=> Keyboard Return
#1 Off	Pushbutton	=> Keyboard Right
#2 Off	Pushbutton	=> Keyboard Left
#3 Off	Pushbutton	=> Keyboard Down
#4 Off	Pushbutton	=> Keyboard Up
#5 Off	Toggle Button	=> Night Mode
#6 Off	Pushbutton	=> Keyboard Left Shift
#7 Off	Pushbutton	=> Keyboard X
#8 Off	Pushbutton	=> Keyboard 1
#9 Off	Pushbutton	=> Keyboard Esc
#10 Off	Pushbutton	=> Keyboard 2
#11 Off	Pushbutton	=> Keyboard 5
#12 Off	Pushbutton	=> Keyboard Left Ctrl
#13 Off	Pushbutton	=> Keyboard Right Ctrl
#14 Off	Pushbutton	=> Keyboard Right Shift
#15 Off	Pushbutton	=> Keyboard Return
#16 Off	Pushbutton	=> Keyboard =
#17 Off	Pushbutton	=> Keyboard -
#18 Off	Pushbutton	=> Keyboard End

For additional information about the Pinscape Pico button tester, please refer to official reference:

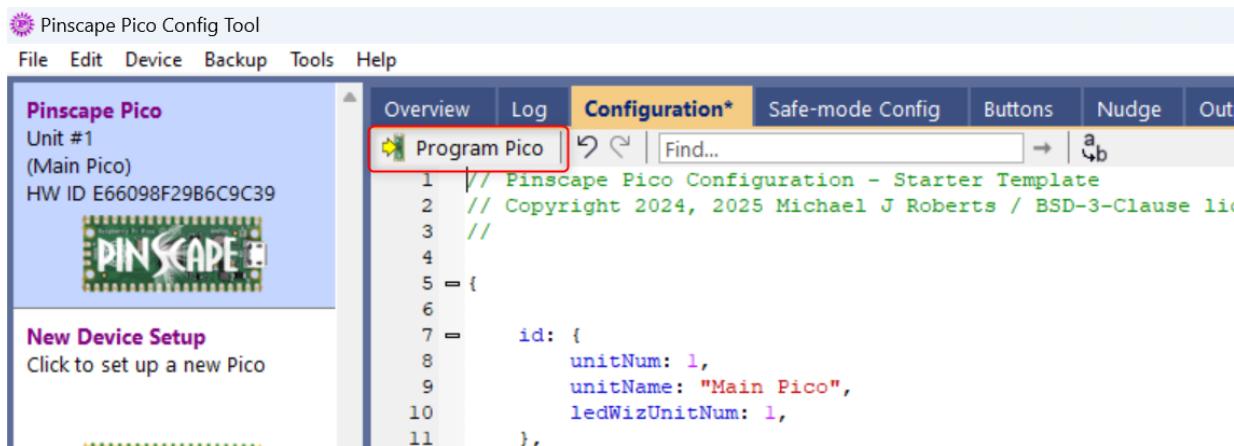
<http://mjrnet.org/pinscape/PinscapePico/Help/ButtonTester.htm>

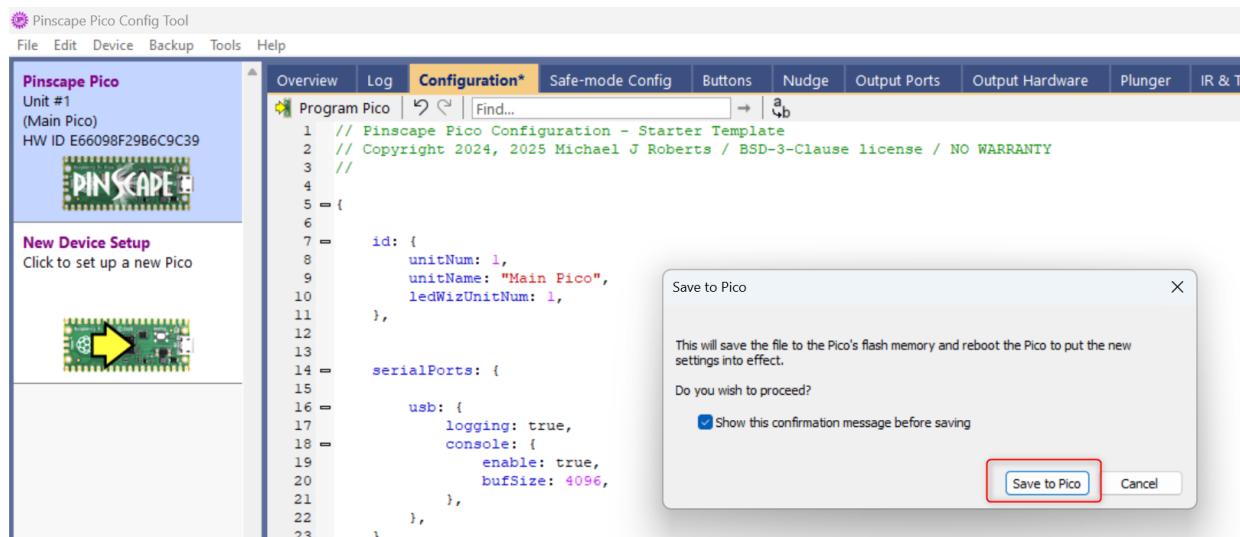
## Pinscape Pico Profiles

For a smooth experience, we created many configuration profiles for Pinscape Pico and different Virtual Pinball emulators. [Look at configuration guides for the various VP emulators to know which profile to use or go to Appendix D](#). What you need to do is load the profile you need and save the configuration, very easy!



Now click on 'Program Pico' and confirm saving:





Pico will now reboot and you're ready to go!

**NOTE:** For additional info on how to modify configuration profiles, always refer to official reference:

<http://mjrnet.org/pinscape/PinscapePico/Help/JSONConfigRef.htm>

## Change Solenoids Strength

One of the new features of VirtuaTilt is the option to adjust strength for left and right flippers solenoids!

In the **Configuration** tab jump to **outputs** section and modify following values (**suggested range is 200 as min and 255 as max**):



```
195
196
197 =      {
198     source: "button('left flipper', 220, 0)",
199
200
201
202
203
204
205
206
207
208
209 =      {
210     source: "button('right flipper', 220, 0)",
211
212
213
214
215
216
```

After modifications click on '**Program Pico**' and confirm saving.

**NOTE:** It's perfectly safe to modify values outside the suggested range (0 is the min value and 255 is the max value). You won't go into any issue and you won't blow any fuse because protection timers come in and avoid overheating of devices, but below 200 it's almost useless to have a solenoid (you don't feel the kick anymore). If you need to mute all feedback devices, use **Nightmode** button instead.

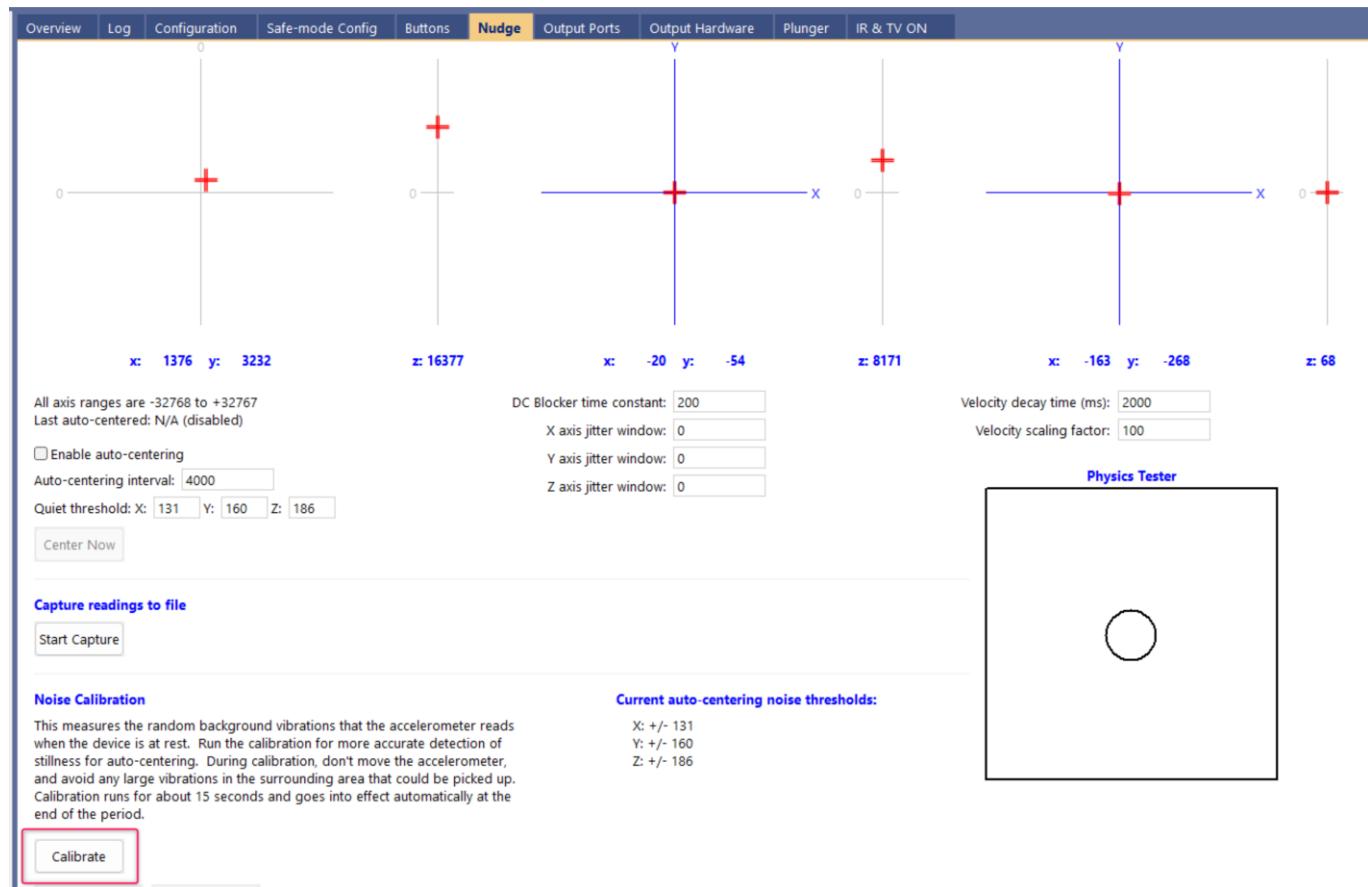
## Accelerometer Noise Calibration

Accelerometer readings always have some random fluctuations in the readings, even when the device is perfect still and you're not doing jumping jacks next to it. Accelerometer noise comes from a combination of ambient vibrations that the accelerometer picks up from its environment and internal imperfections as the device converts the vibrations it senses into an electronic signal. There's a certain baseline amount of noise endemic to any given device that you can't get rid of, no matter how much foam cushioning you pack around the chip.

Some devices are inherently noisier than others, which is what the noise calibration feature is all about. The Pinscape Pico firmware tries to determine when the cabinet is motionless, to determine if it's a good time to auto-center the readings, by watching for periods with a small amount of jiggle in the readings. The problem is that some devices have more random jiggles when at rest than others, so it's hard to come up with a one-size-fits-all threshold for what constitutes a period of motionless readings.

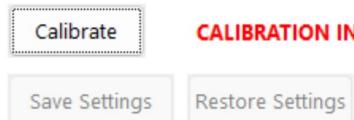
The **Calibrate** button runs a calibration to get a baseline noise level for your specific device. This customizes the threshold that the auto-centering mechanism uses according to the observed characteristics of your accelerometer.

Clicking the Calibrate button starts the calibration process on the device, which runs for about 15 seconds. During the calibration, Pinscape Pico collects statistics on the incoming raw readings. At the end of the period, it uses the statistics collected over the calibration period to set the new "quiet" thresholds, based on the standard deviation of the readings collected on each axis over the calibration period.



**Noise Calibration**

This measures the random background vibrations that the accelerometer reads when the device is at rest. Run the calibration for more accurate detection of stillness for auto-centering. During calibration, don't move the accelerometer, and avoid any large vibrations in the surrounding area that could be picked up. Calibration runs for about 15 seconds and goes into effect automatically at the end of the period.

**Current auto-centering noise thresholds:**

X: +/- 131  
Y: +/- 160  
Z: +/- 186

There's nothing special you have to do during the calibration process, other than leaving the accelerometer undisturbed. Don't move the device or cause any major vibrations nearby. The point is to gather statistics on the normal background vibration level that the device picks up when you're not actively trying to jiggle the VirtuaTilt. Note that you shouldn't do anything special to make it extra-quiet during calibration; just let the device measure the normal background level that would be in effect during normal use.

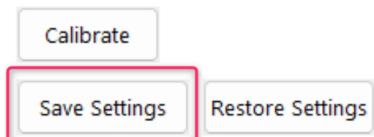
Click on **Save Settings** when done:

**Noise Calibration**

This measures the random background vibrations that the accelerometer reads when the device is at rest. Run the calibration for more accurate detection of stillness for auto-centering. During calibration, don't move the accelerometer, and avoid any large vibrations in the surrounding area that could be picked up. Calibration runs for about 15 seconds and goes into effect automatically at the end of the period.

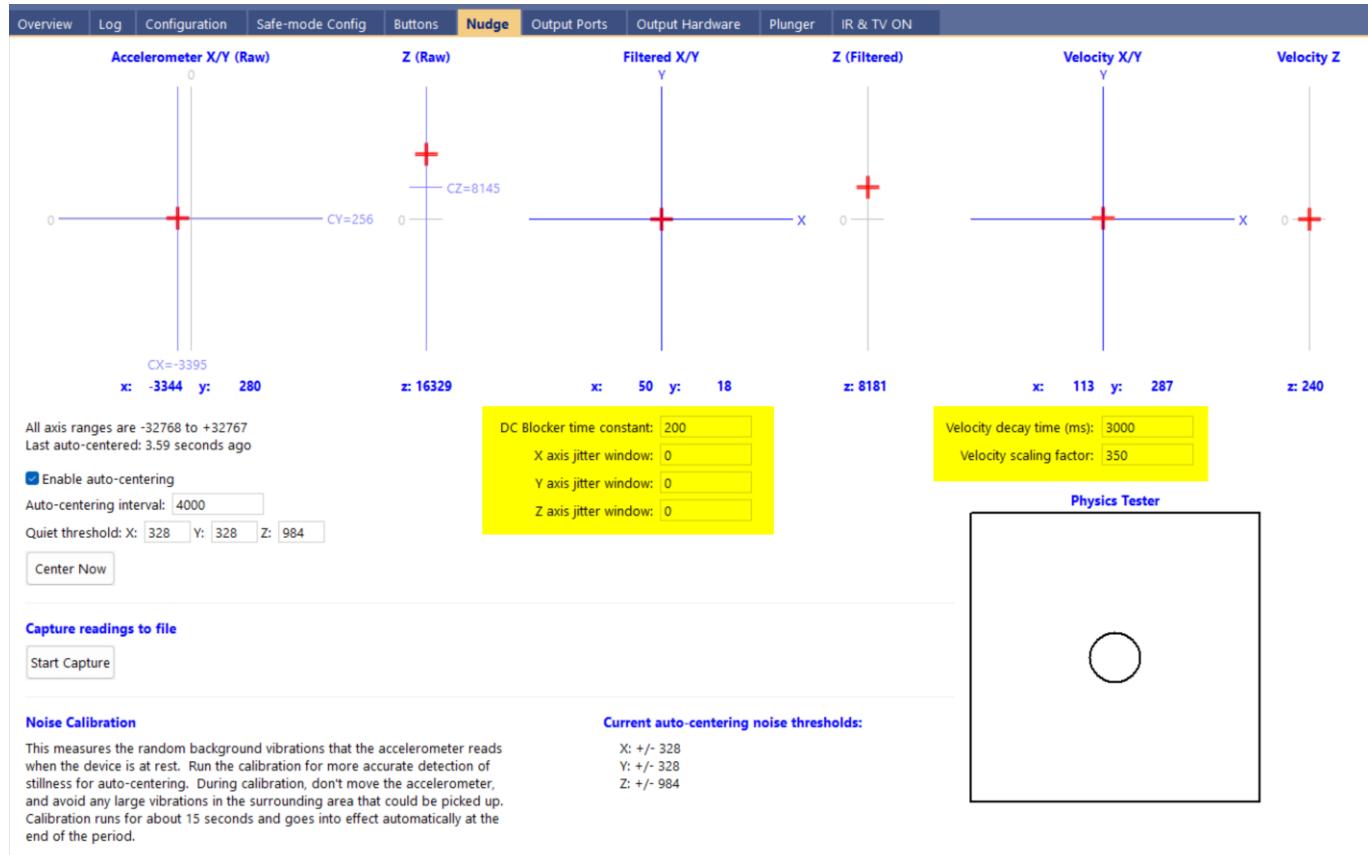
**Current auto-centering noise thresholds:**

X: +/- 139  
Y: +/- 175  
Z: +/- 197

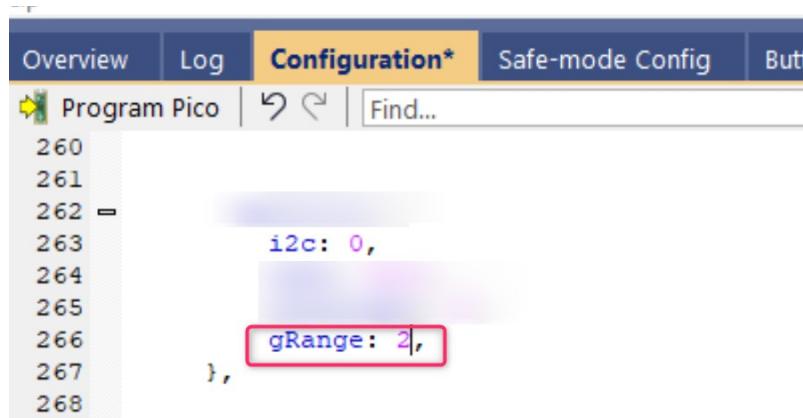


# Accelerometer Tuning

**VERY IMPORTANT NOTE:** You need to find your right settings (according to your personal preferences) for nudging. You can adjust both Pinscape Pico accelerometer settings and your VP game settings until you find your perfect spot:



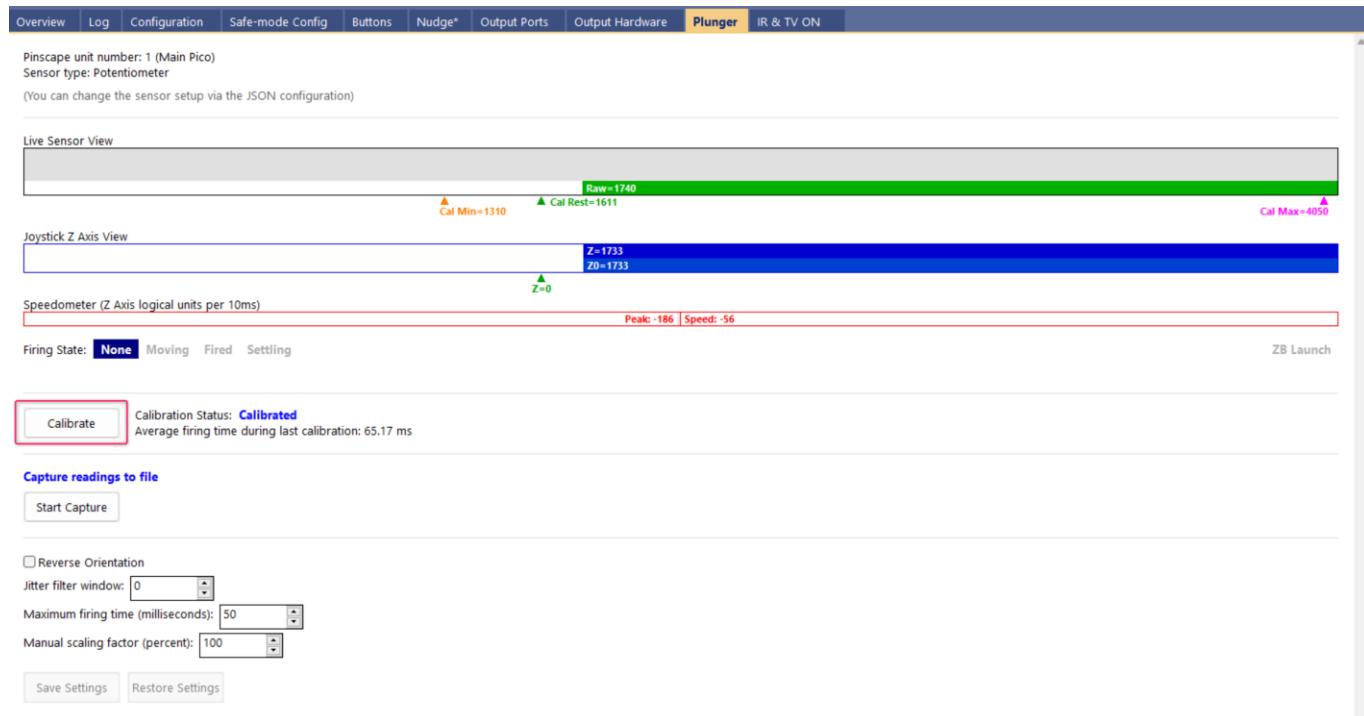
You can also increase accelerometer sensitivity by changing **gRange** value to **2** in any profile:



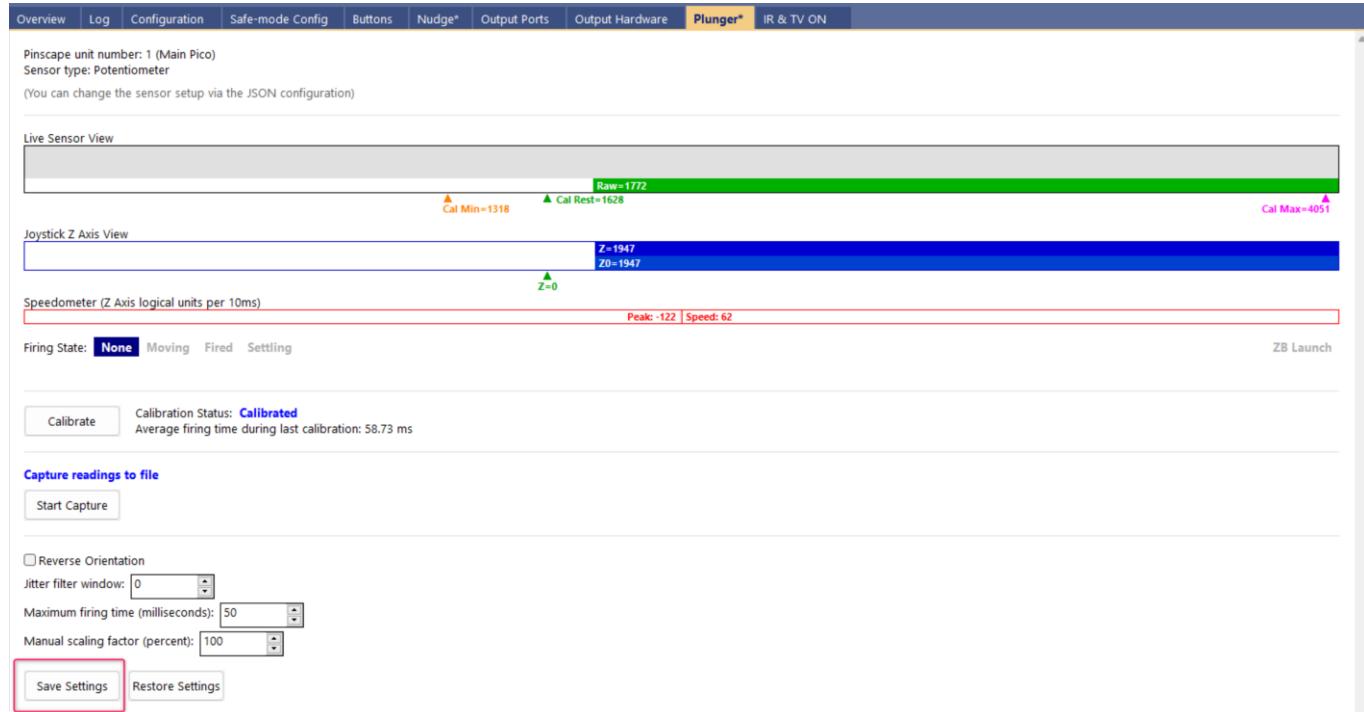
Please refer to the official Pinscape Pico reference for additional information about accelerometer parameters: <http://mjrnet.org/pinscape/PinscapePico/Help/NudgeWin.htm>

# Plunger Calibration

VirtuaTilt's plunger comes already calibrated, but if you need/want to calibrate it again just go to Plunger tab, press **Calibrate** button and follow the instructions:



After the procedure is completed, click on **Save Settings**:



For additional information about Pinscape Pico plunger setup, please refer to official reference:

<http://mjrnet.org/pinscape/PinscapePico/Help/PlungerCal.htm>

# Output Ports Testers

- Output Port Tester:** this tool lets you exercise the DOF output ports, to help troubleshoot any devices that aren't working.

The screenshot shows the 'Output Ports' tab of the VirtuaTilt setup interface. It has two main sections: 'Logical (DOF) Ports' and 'Physical Device Ports'.  
**Logical (DOF) Ports:** A table with columns: Port, Name, Device Port, Attributes, Host, Calc, Out. It lists four ports:

- #1 Bumpers/Slings... (Attributes: Bumper, Slingshot, Infrared, Infrared)
- #2 Shaker Motor (Attributes: Shaker, Motor)
- #3 Left Flipper S... (Attributes: Left, Flipper, Solenoid)
- #4 Right Flipper ... (Attributes: Right, Flipper, Solenoid)

  
**Physical Device Ports:** A grid of 30 physical GPIO pins (0-29). Pin 26 is highlighted in black, while others are greyed out.

Pico GPIO	0	1	2	3	4	5	6	7
0		X						
1	X							
2		X						
3			X					
4				X				
5					X			
6						X		
7							X	
8	X							
9		X						
10			X					
11				X				
12					X			
13						X		
14							X	
15								X
16								
17								
18								
19								
20								
21								
22								
23								
24	X							
25		X						
26								
27					X			
28						X		
29							X	

- Output Hardware Tester:** this is a lower-level output tester tool that accesses the physical output ports directly, bypassing the DOF port assignments and going directly to the GPIO ports and external peripheral chips.

**WARNING!** Flipper Logic timers are disabled when this view is active. Exercise caution with solenoids, because they could overheat if activated for long intervals, since the normal protective timers can't intervene in this mode. When you activate a device port in this mode, it will remain activated until you manually turn it back off. We're not responsible if you blow some fuses or damage feedback devices.

The screenshot shows the 'Output Hardware' tab of the VirtuaTilt setup interface. It displays a list of 30 Pico GPIO pins (0-29) with corresponding sliders for each.  
**Pico GPIO**: 30 ports, 256-step PWM.  

Pico GPIO	Value
0	0.0
1	0.1
2	0.2
3	0.3
4	0.4
5	0.5
6	0.6
7	0.7
8	1.0
9	1.1
10	1.2
11	1.3
12	1.4
13	1.5
14	1.6
15	1.7
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	

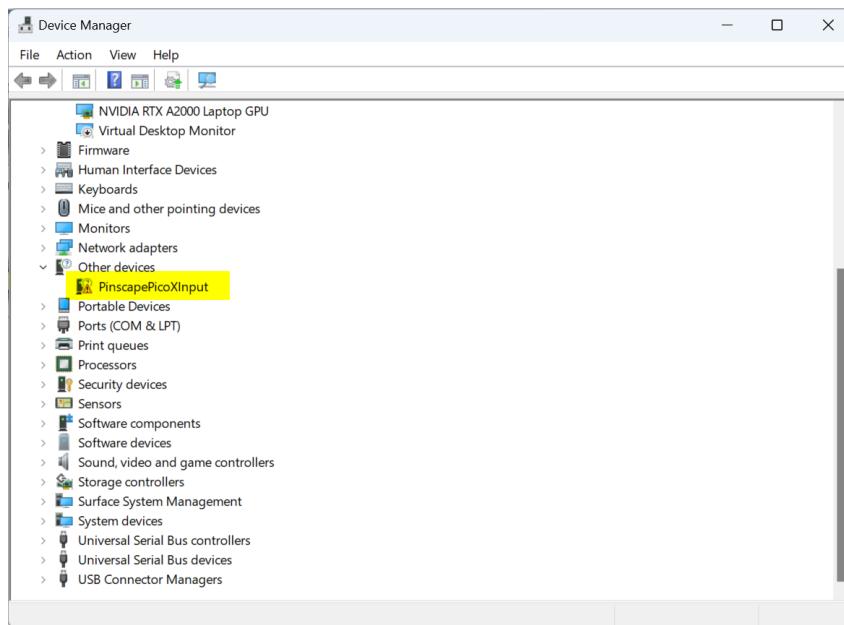
  

**Warning:** Flipper Logic timer protection is disabled while in direct hardware test mode. Use caution with devices that might overheat if activated too long.

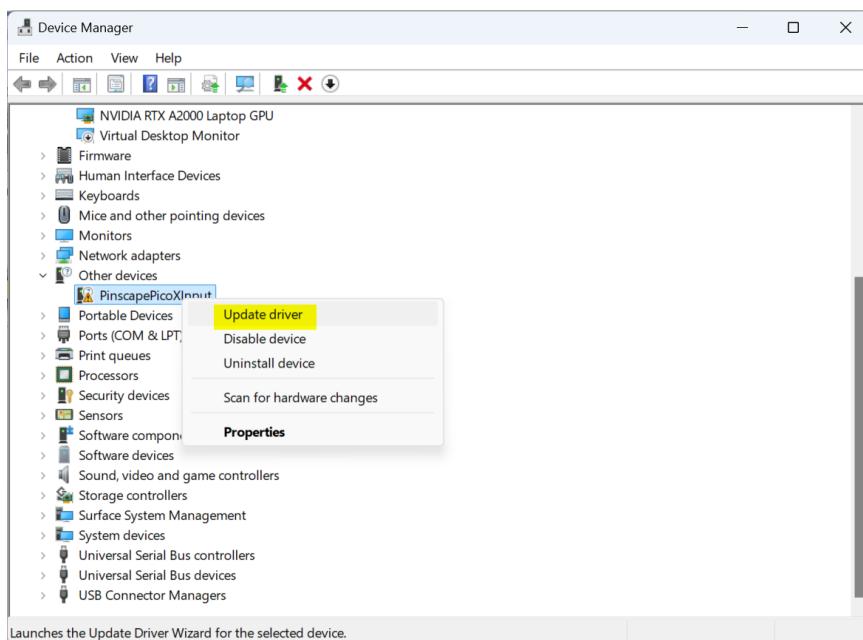
## Xbox Drivers Installation

When you configure a virtual Xbox controller input, you **MUST** go through a one-time manual device driver installation procedure in Windows:

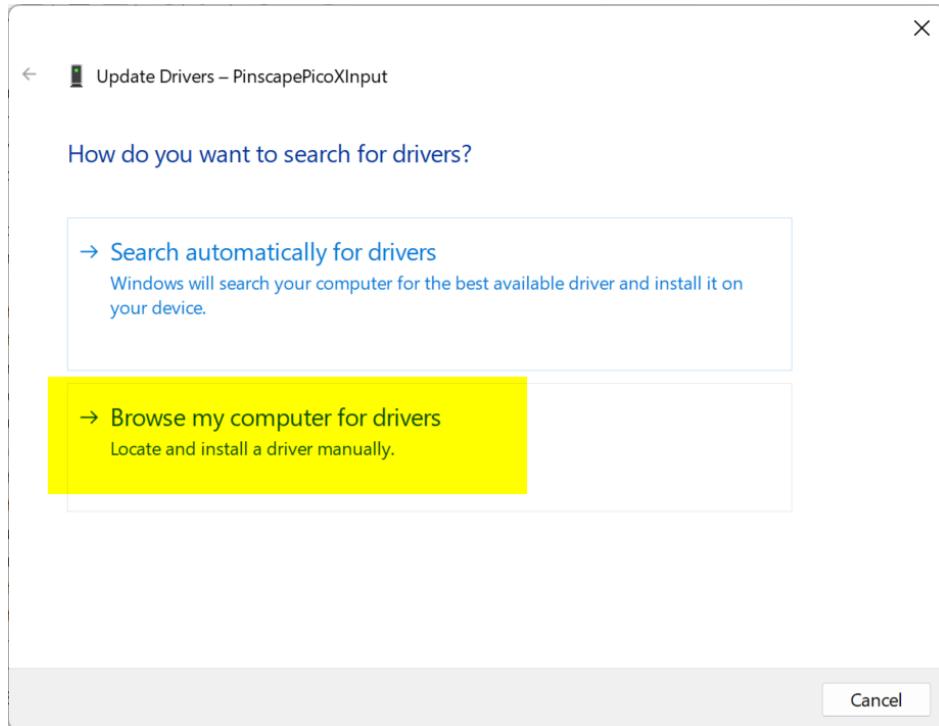
- Load/Import the **X-Input profile** in Configuration Tool (**VTConfig-STEAM-XInput.json**)
- Save the new configuration to the Pico (**Configuration→Program Pico**) so that it reboots with the new settings in effect
- Open Device Manager and find the **PinscapePicoXInput** device



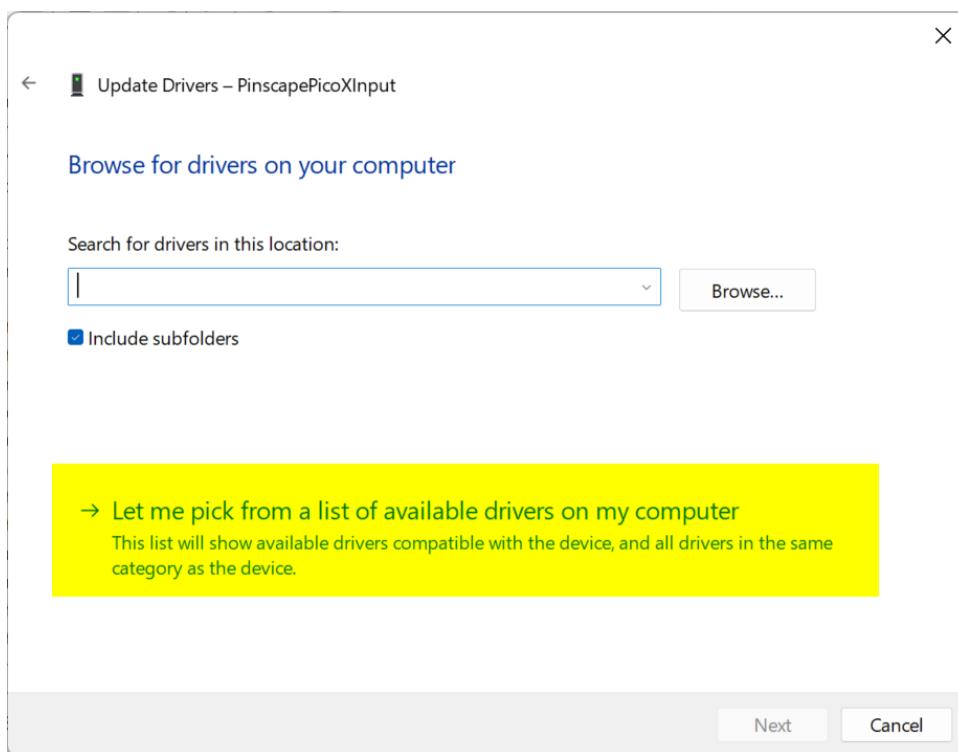
- Right-click the device in Device Manager and click **Update Driver**



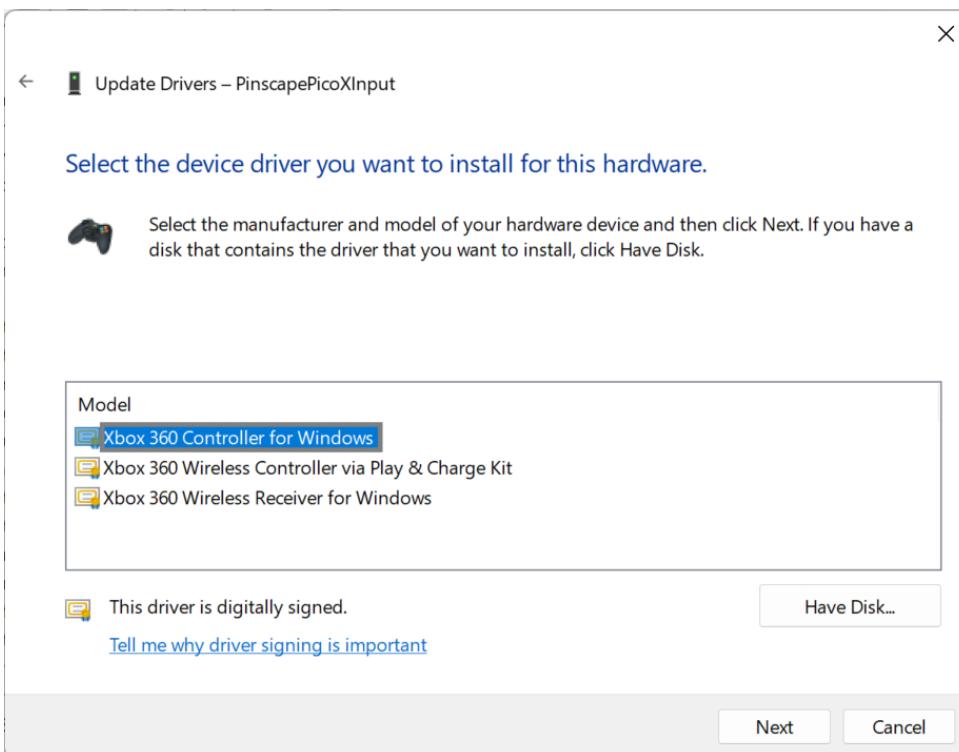
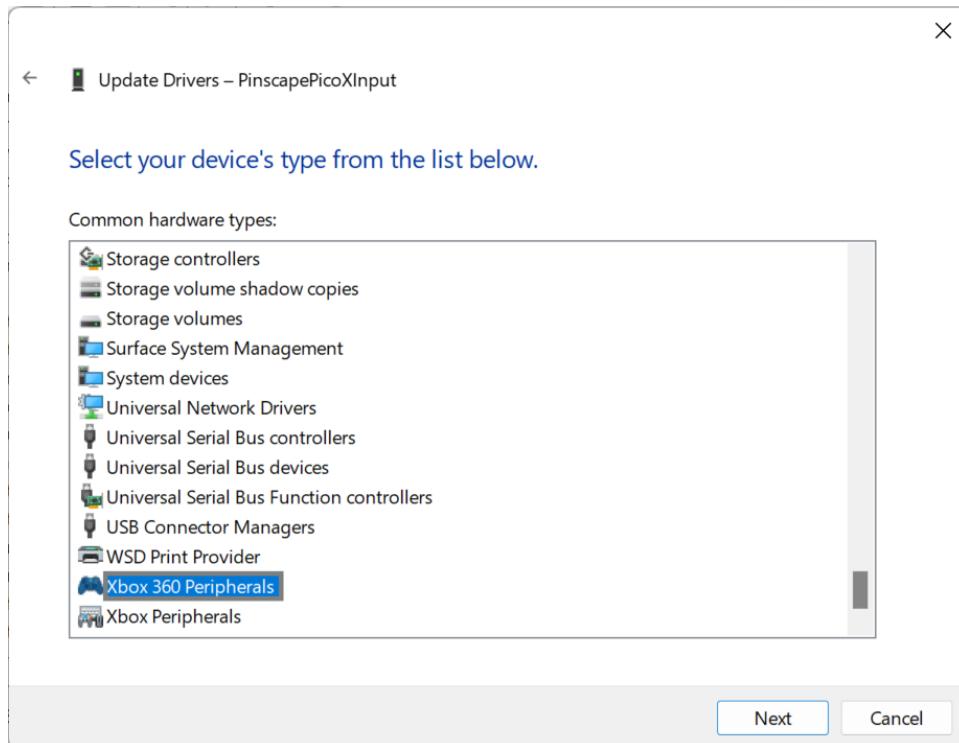
- Click **Browse my computer for drivers**



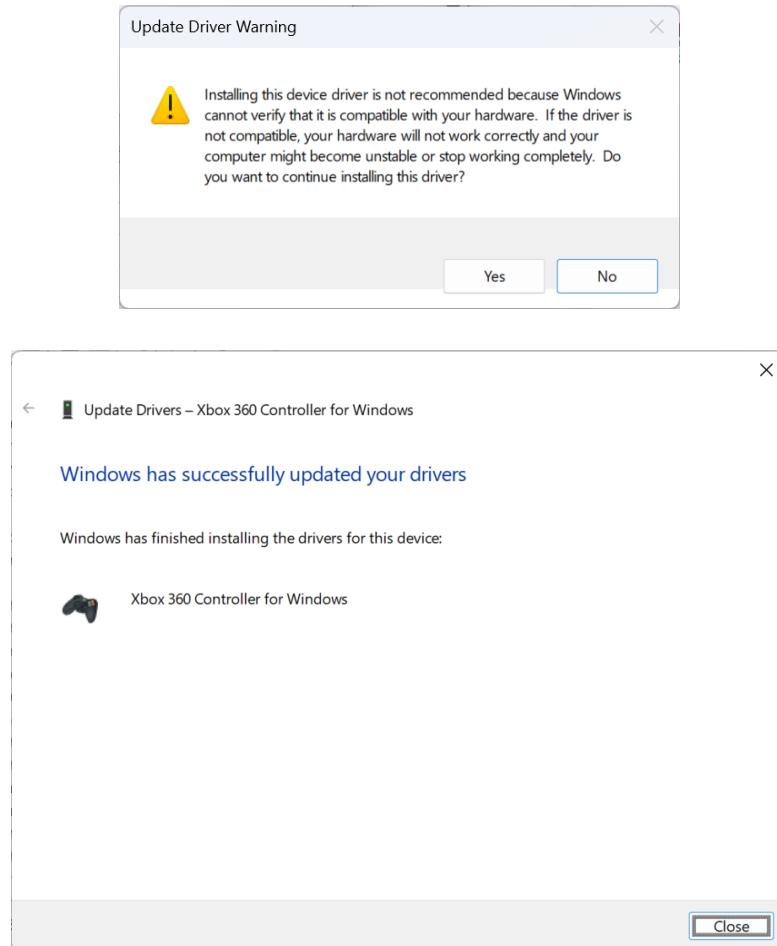
- Click **Let me pick from a list of available drivers on my computer**



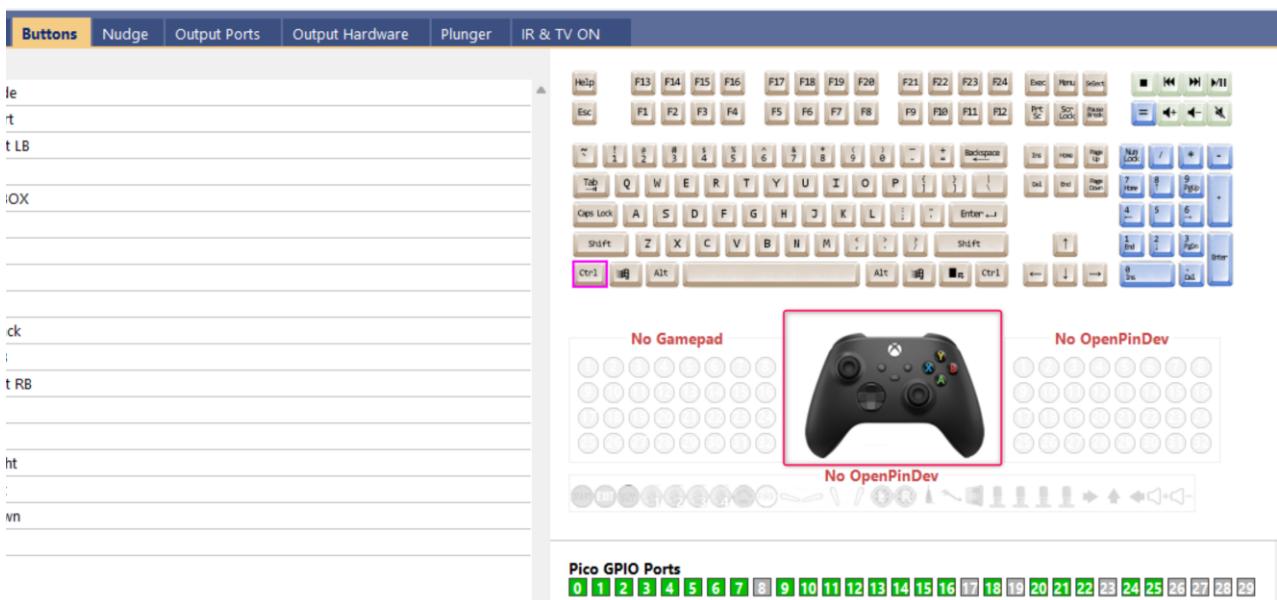
- Find the **Xbox 360 Peripherals** section, and select **Xbox 360 Controller for Windows**



- Click through the warning (this appears because Windows can tell from the USB IDs that this isn't really an Xbox controller)



Check now in Config Tool-->**Buttons** tab that Xbox controller is now active (not greyed-out):



This manual procedure is required because Windows doesn't automatically recognize a Pico as an Xbox controller unit, even when you configure the Pico to perform the emulation. Windows only recognizes an Xbox controller automatically when it uses the official Microsoft USB VID/PID codes, which Pinscape doesn't do because it could create compatibility problems for other software if the Pico claimed to be an Xbox device at the USB level. Fortunately, you can "force" Windows to recognize the Pico as an XInput source using the manual driver setup procedure above.

You should only have to complete this manual procedure once, during initial setup, **although you might have to repeat it if you ever change the Pinscape configuration in such a way that you add or remove USB interfaces - for example if you enable or disable the USB keyboard or gamepad emulations**. If you're not sure whether you must re-install the device drivers, just check Device Manager for a **PinscapePicoXInput** device flagged with a warning or error icon. **If you see an error icon, repeat the procedure above, and that should clear it up again.**

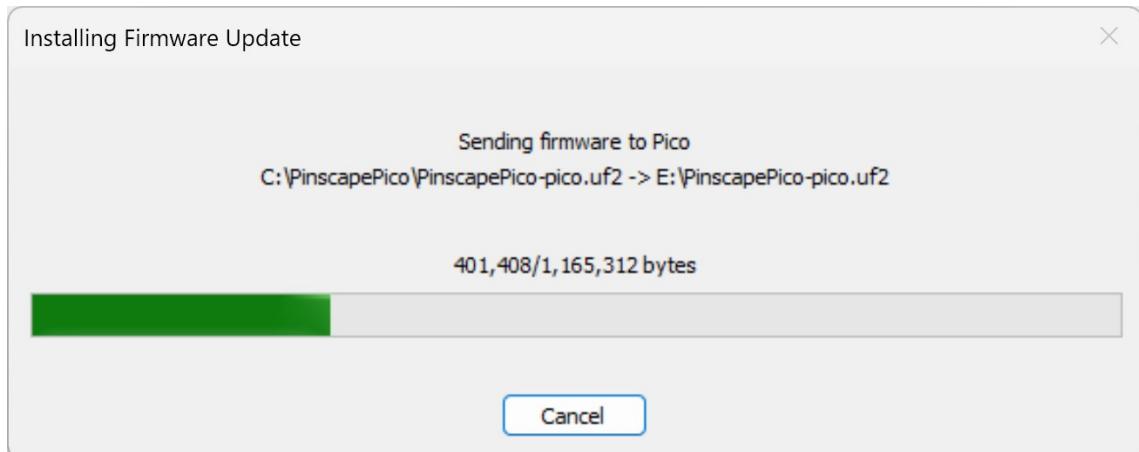
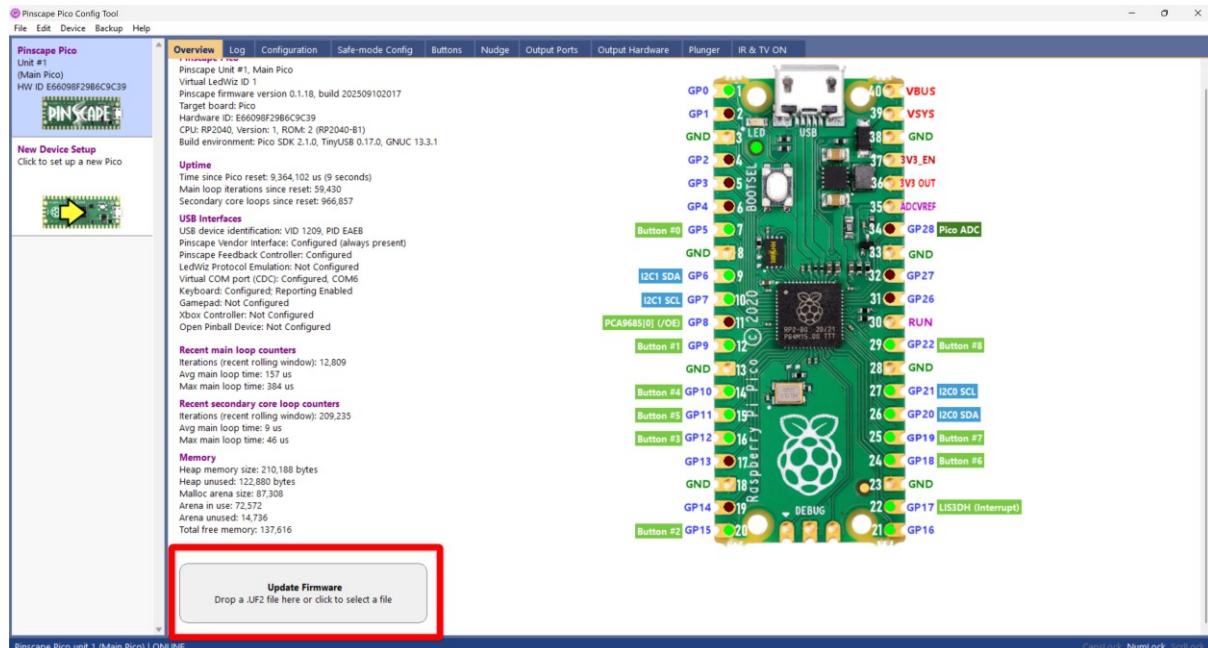
## Troubleshooting Tips

- If you experience USB 3.0 ports disconnecting and reconnecting, [change to an USB 2.0 port directly connected to your PC motherboard \(rear ports\)](#), instead of using front PC ports (connected to motherboard via cable).

## Appendix A: Firmware Update

Your VirtuaTilt comes with latest **Pinscape Pico** firmware already installed. To update firmware, download it from official page: <https://github.com/mjrhg/PinscapePico/releases> then unblock .zip file and extract it to your Pinscape Pico folder overwriting all files.

Open Config Tool, drag and drop **PinscapePico-pico.uf2** from the Pinscape folder onto the Update Firmware area. **Actual configuration profile will not be affected by the update.**

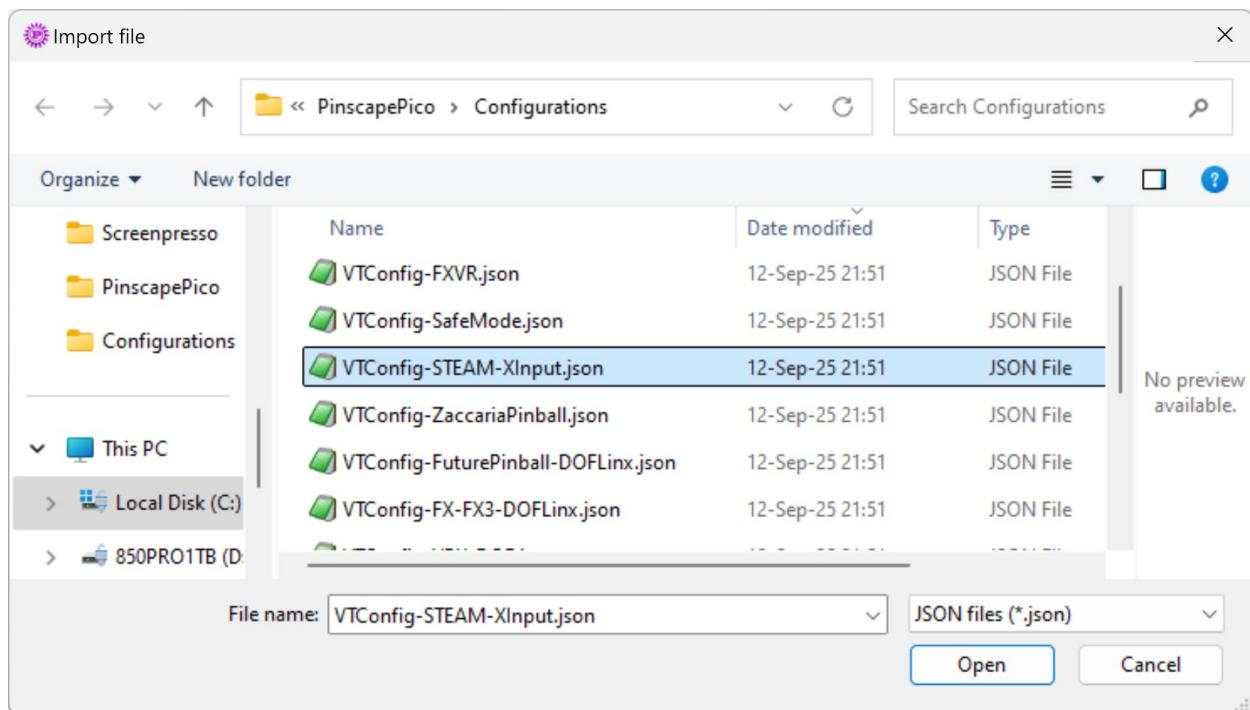
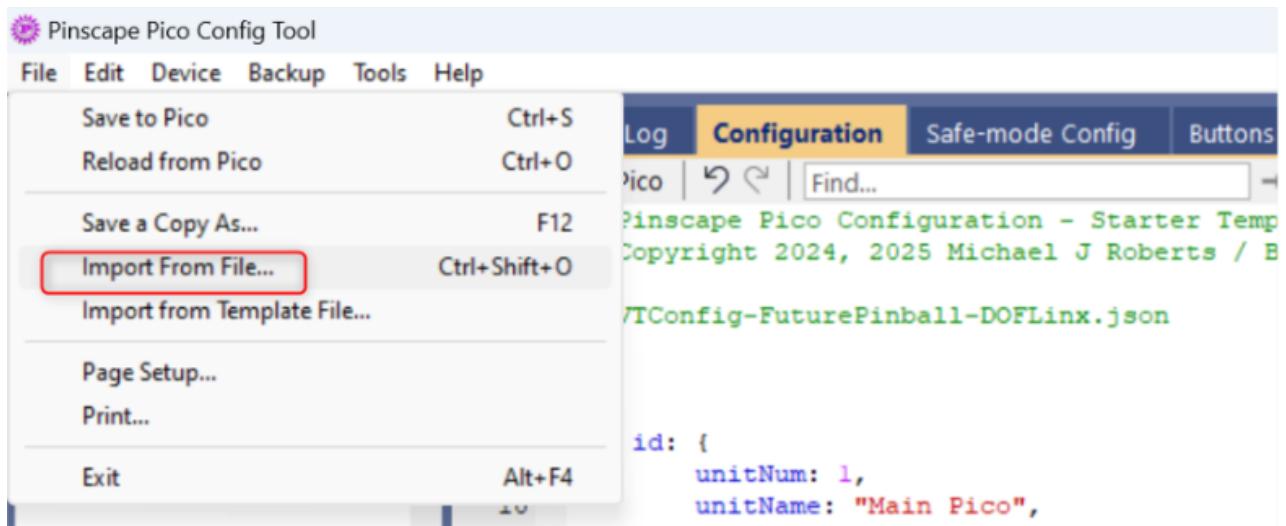


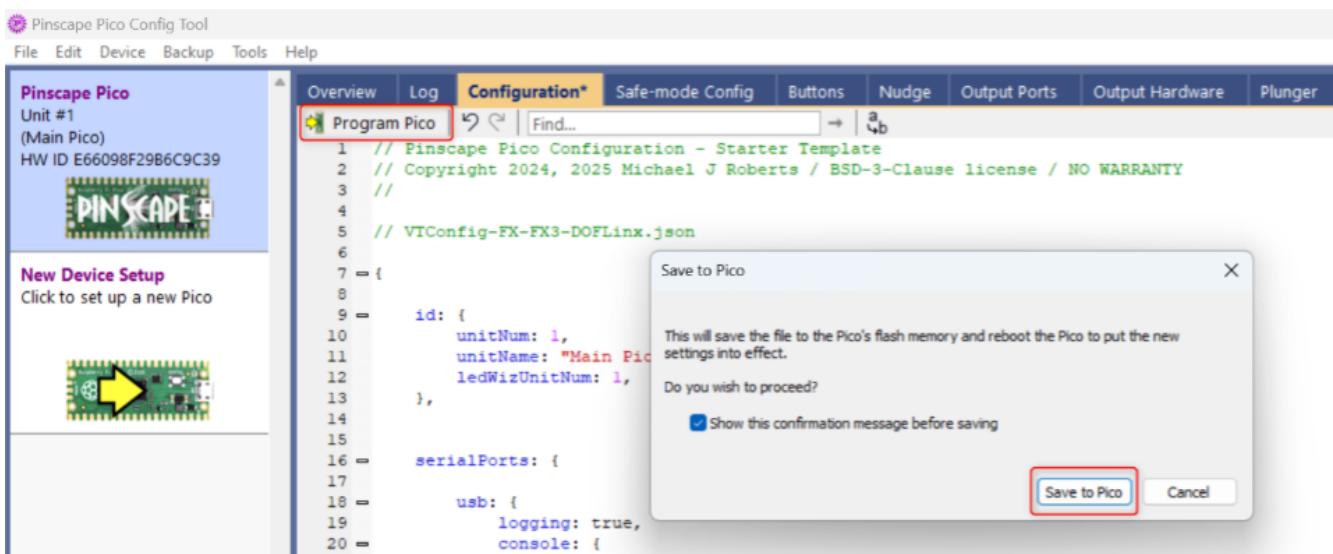
## Appendix B: Use VirtuaTilt without DOF/DOFLinx

One of the main features of the new VirtuaTilt is the possibility to use it without going into DOF/DOFLinx configurations and benefit of feedback from solenoids and shaker motor, as well as analog plunger and accelerometer nudging. Just Plug&Play !

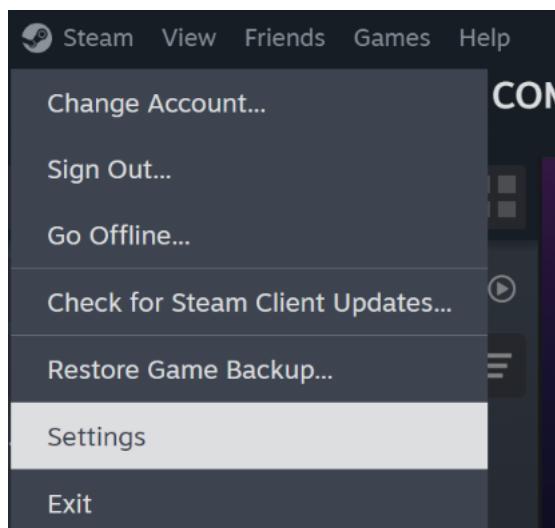
The **XInput mode** is used in Pinscape Pico firmware to achieve that.

What you need to do is load **VTConfig-STEAM-XInput.json** profile in **Pinscape Pico Config Tool** :

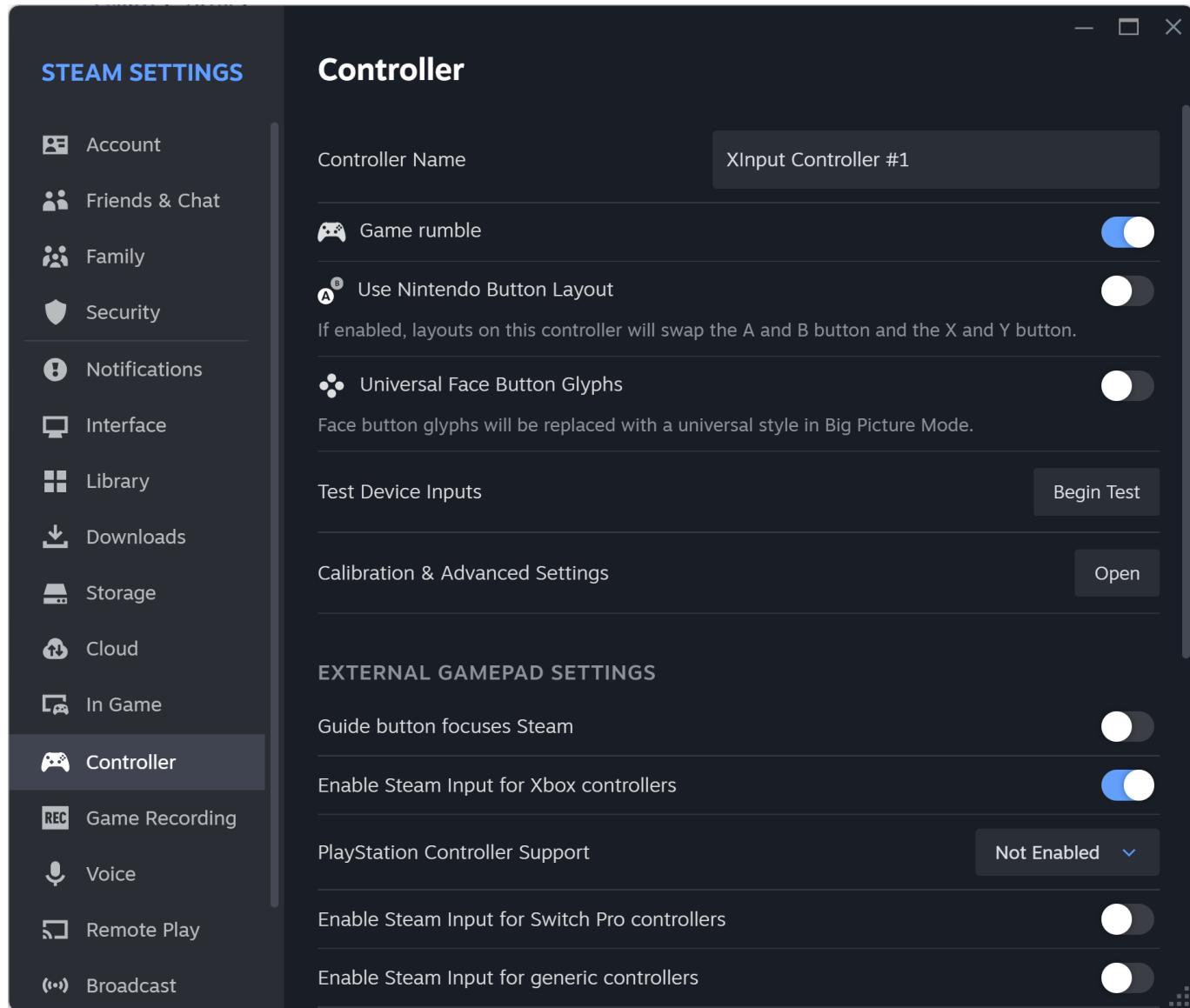




Start **Steam** and go to **Settings → Controller**



Disable everything under "External Gamepad Settings" with the exception of "**Enable Steam Input for Xbox controllers**" and "**Game rumble**":



That's it! Launch your favorite Virtual Pinball game and have fun.

**IMPORTANT NOTE:** Xbox drivers for Windows installation is required (see [Xbox Drivers Installation](#) chapter).

## Appendix C: VirtuaTilt Compatibility Matrix

VP EMULATOR / GAME	DOF/DOFLINX	X-INPUT	FEEDBACKS	NUDGE	PLUNGER
Visual Pinball X (PC)	YES	YES	YES	YES	YES
Future Pinball (PC)	YES	YES	YES	YES	YES
Pinball FX (PC - Steam)	YES	YES	YES	YES	YES
Pinball FX3 (PC - Steam)	YES	YES	YES	YES	YES
Pinball M (PC - Steam)	YES	YES	YES	YES	YES
Zaccaria Pinball (PC - Steam)	N/A	YES	YES	With Buttons	YES
The Pinball Arcade (PC - Steam)	N/A	YES	YES	YES	YES
Infected Mushroom (PC - Steam)	YES	YES	YES	YES	YES
Pinball FX VR (Meta Quest)	N/A	N/A	YES	YES	YES
Pinball VR Classic (Meta Quest)	N/A	YES	YES	YES	YES
Star Wars Pinball VR (Meta Quest)	N/A	YES	YES	YES	YES
Visual Pinball X (iOS/Android)	N/A	YES	YES	YES	YES

## Appendix D: Profiles to load into Pinscape Pico Config Tool

VP EMULATOR / GAME	PROFILE
Visual Pinball X (PC)	VTConfig-VPX-10.8.X-DOF.json or VTConfig-VPX-NODOF.json
Future Pinball (PC)	VTConfig-FuturePinball-DOF-NODOF.json
Pinball FX (PC - Steam)	VTConfig-FX-FX3-DOFLinx.json or VTConfig-STEAM-XInput.json
Pinball FX3 (PC - Steam)	VTConfig-FX-FX3-DOFLinx.json or VTConfig-STEAM-XInput.json
Pinball M (PC - Steam)	VTConfig-FX-FX3-DOFLinx.json or VTConfig-STEAM-XInput.json
The Pinball Arcade (PC-Steam)	VTConfig-STEAM-XInput.json
Zaccaria Pinball (PC - Steam)	VTConfig-ZaccariaPinball.json
Infected Mushroom (PC -Steam)	VTConfig-STEAM-XInput.json
Pinball FX VR (Meta Quest)	VTConfig-FXVR.json
Pinball VR Classic (Meta Quest)	VTConfig-VRClassic-StarWarsVR.json
Star Wars Pinball VR (Meta Quest)	VTConfig-VRClassic-StarWarsVR.json
Visual Pinball X (IOS/Android)	VTConfig-IOS-Android.json