

How to turn the TV into a Retro gaming system with the Raspberry Pi Zero

Today's article will show you how to convert an old TV into a retro game console and build your own Raspberry Pi Zero game system as simple as possible.

The Raspberry Pi Zero, a compact, cheap, low-cost (minus \$ 5) mini computer, has proven to be much more flexible than its 'predecessors'.

Today's article will perform a regular Raspberry Pi project - transform an old TV into a retro game console and step by step, giving you all you need to build a Raspberry Pi Zero gaming system. own, in the simplest way possible.

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Build a simple Retro gaming machine



You may have seen online projects like this elsewhere. The goal is simple: Make a Raspberry Pi fit for a TV, and enjoy retro gaming. However, there is one problem: Almost all of these projects are quite complicated.

This tutorial will fix that by helping you:

1. Choose TV
2. Open it safely
3. Find space for your Raspberry Pi Zero
4. Identify the connections you need to make
5. Add power and sound
6. Play retro games

What you need

Before you start, you will need to prepare the following:

1. 1 old TV
2. Raspberry Pi Zero
3. Compact USB hub
4. HDMI-to-VGA adapter for audio output or USB sound card
5. 5mm stereo-audio-to-RCA-Y cable
6. Game controller with USB port

Depending on the complexity of installing Pi Zero on the TV you choose, you may also need:

1. Dremel or similar portable cutting machine
2. Glue Guns

The decision to use an old TV will be very difficult. But whatever you do, the TV you use must be an LCD TV - not only because it's easy to work with, but also for safety reasons.

The dangers of DIY with CRT TVs

If you choose a CRT TV, note that splitting the back will expose you to dangerous high voltages, even if the TV is turned off and unplugged.

In addition, destroying tubes may cause an explosion, large enough to puncture the wall in some cases.

If you have experience working with TV sets removed later and if you are extremely confident that you won't hurt yourself, then use a CRT TV. If not, you should use an LCD TV device. It can be a bit more expensive (costs about \$ 25), but it's much safer.

LCD screens often come with compartments making it easier to mount the Raspberry Pi Zero in practice. Take advantage of that!

RetroPie and Raspberry Pi Zero

Before you start, you should also download and flash the RetroPie image into the microSD Raspberry Pi Zero card.

Make sure you are using the correct version of RetroPie. Download the build for the Raspberry Pi Zero instead of the Raspberry Pi 2 or 3! You will find it at **retropie.org.uk/download**.

Setup process

The setup process takes place as follows:

Step 1: Open the TV

Take optimal safety precautions when opening your TV. Make sure to disconnect the TV from all power sources.

Modern portable devices often have back doors that you can take advantage of. They help you not to cut your TV case with a portable cutter.



When you open the TV, you will usually find the screws you need to open, marked with an arrow or a circle. Loosen these screws to remove the back cover of the TV. If your TV has a battery, remember to remove it.

When the back is removed, determine the space you will fit in the Raspberry Pi Zero. Consider the space for the adapters you will use and any cables that need to run outside the TV enclosure (for example, the Pi power cable or USB port).

Step 2: Determine your video connection

If you're lucky enough to have a portable TV with HDMI port, it's best to connect Pi Zero's HDMI adapter and cable loop around the HDMI port.

Again, keep in mind the space you need for this. Where you will install Pi will include space not only for the adapter, but also for the HDMI cable connector.



You can also use the option to permanently solder a pair of wires to Pi Zero's RCA video output, the rest of the wires are soldered to the RCA connector.

Step 3: Attach the USB Hub and the Raspberry Pi Zero

You will need a USB hub for the game controller and keyboard. With the limited size of the Raspberry Pi Zero, there is only room for a micro USB connector.

Although the micro-USB-to-full-USB adapter is also included, this will still require you to add a USB hub to multiple devices. You can find a good USB hub quite easily on Amazon.

You should connect your hub to easily plug in the cable. This means cutting off some frames on the TV and sticking the hub into it, the ports are facing out.

For the Raspberry Pi Zero, you can install it with screw holes. If screws cannot be used, use brackets to attach Pi Zero to the chassis (or connect them to the structural support or glue them to the glue). Make sure the Raspberry Pi Zero is pasted close to the USB hub!

Step 4: Add power

Normally, you will not be able to use the TV's power source. Instead, use the power cable of the Raspberry Pi Zero, probably in parallel with the USB hub's power supply, ensuring that both devices have enough power to meet the demand.

Then, the USB power cable can run through the TV chassis to the appropriate adapter, so you are powering the Pi device independently of the TV (like a standard game console).

Note: If Pi is improperly turned off, the microSD card may be damaged. A strong enough power source is important.

If the TV you are using has a USB port, you can use it as a power source for your Raspberry Pi Zero. For good results in the long run, do not use this port because you will not have enough energy from the device.

Step 5: Add sound

Unlike other Raspberry Pi devices, Pi Zero has no analog sound, so to enjoy the background music from the games you are about to play, you need to use the HDMI audio output port. The most effective way to do this is to use an HDMI-to-VGA adapter with an audio socket.

Another option is DAC pHAT, which can be mounted on the Raspberry Pi Zero with GPIO header (included). This is not ideal if you lack space inside the TV, but it is a useful set of tools to have.

USB audio output port is also an option, especially if you lack space. Or you can completely do it yourself and use it to add audio ports to the Raspberry Pi Zero.

After connecting and equipping Pi Zero, connect the audio cable to the audio port in the TV. Adapter may be needed.

Step 6: Replace the back cover of the TV

With everything connected, a power supply for Pi, USB hub and HDMI adapter has been added and the hardware is stuck in place, it's time to install the back cover on your TV. Be careful with this, because there may

be some new hardware equipped, which distorts the exact location.



Screw the back cover of the TV again, and place it on the desk. Be sure to have a keyboard to use in case of problems when starting Raspberry Pi.

Step 7: Boot with RetroPie

Everything is ready, it's time to start your Raspberry Pi. If the RetroPie image is recorded correctly, the Raspberry Pi operating system will start and take you to the GameStation user interface.

You don't need a keyboard at this stage: The game controller you connect will be discovered and after a short time of configuration, you have everything you need to start playing retro games!



Just remember to turn off the Raspberry Pi safely when you're done, to maintain the integrity of the SD card data.

Building a regular Retro gaming system can be too complicated. If you are looking for a simpler way, using the old LCD TV in this way is the best option. After that, you can change the build later, if needed.

When you finish this work, you can continue with other retro game projects for the Raspberry Pi Zero.

Good luck!

See more:

1. How to transform Raspberry Pi into SNES Classic
2. Raspberry Pi Zero vs Model A and B, how are they different?
3. 20 great applications from micro-Raspberry Pi computers

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