

IoT with MIT App Inventor

Fundamental

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What is IoT?

Bring computing off the screen and into the world of everyday things!

The Internet of Things (IoT) refers to interfaces between everyday objects and the Internet, opening up a universe of new applications, smarter devices, and wider opportunities. With MIT App Inventor IoT, you can enter this universe as a creator, not just a consumer, even if you've never programmed before.

What you can do?

You can develop IoT applications the same way you develop any other MIT App Inventor mobile apps. Now you can program devices, sensors, appliances, instruments, robots— anything that can be connected. Not only that, you can incorporate smartphone capabilities into your IoT creations.

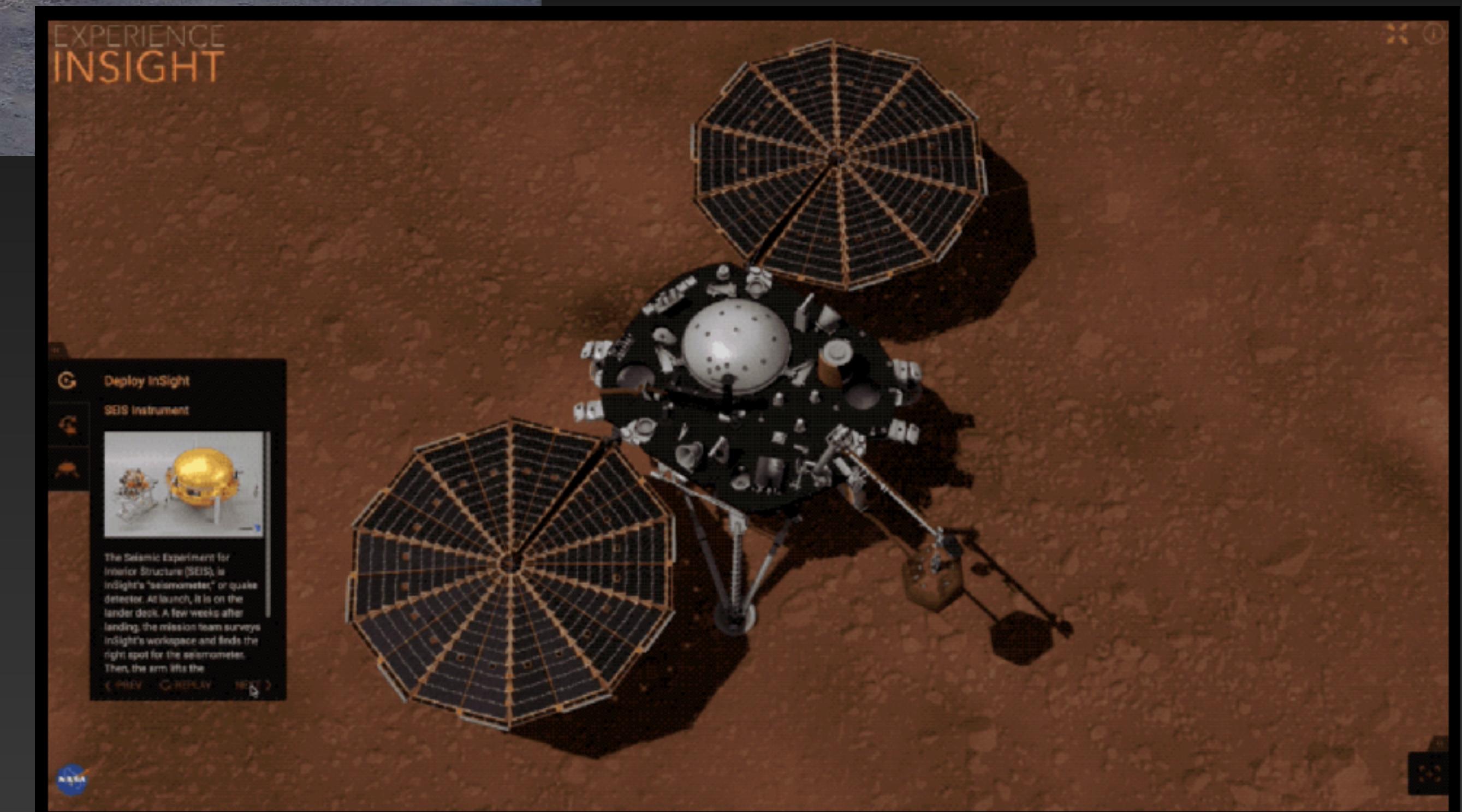
If you build an app that turns a light on and off, you can make the light respond to voice commands.

If you build a heart monitor, you can store the results on the Web or email them to trainers.

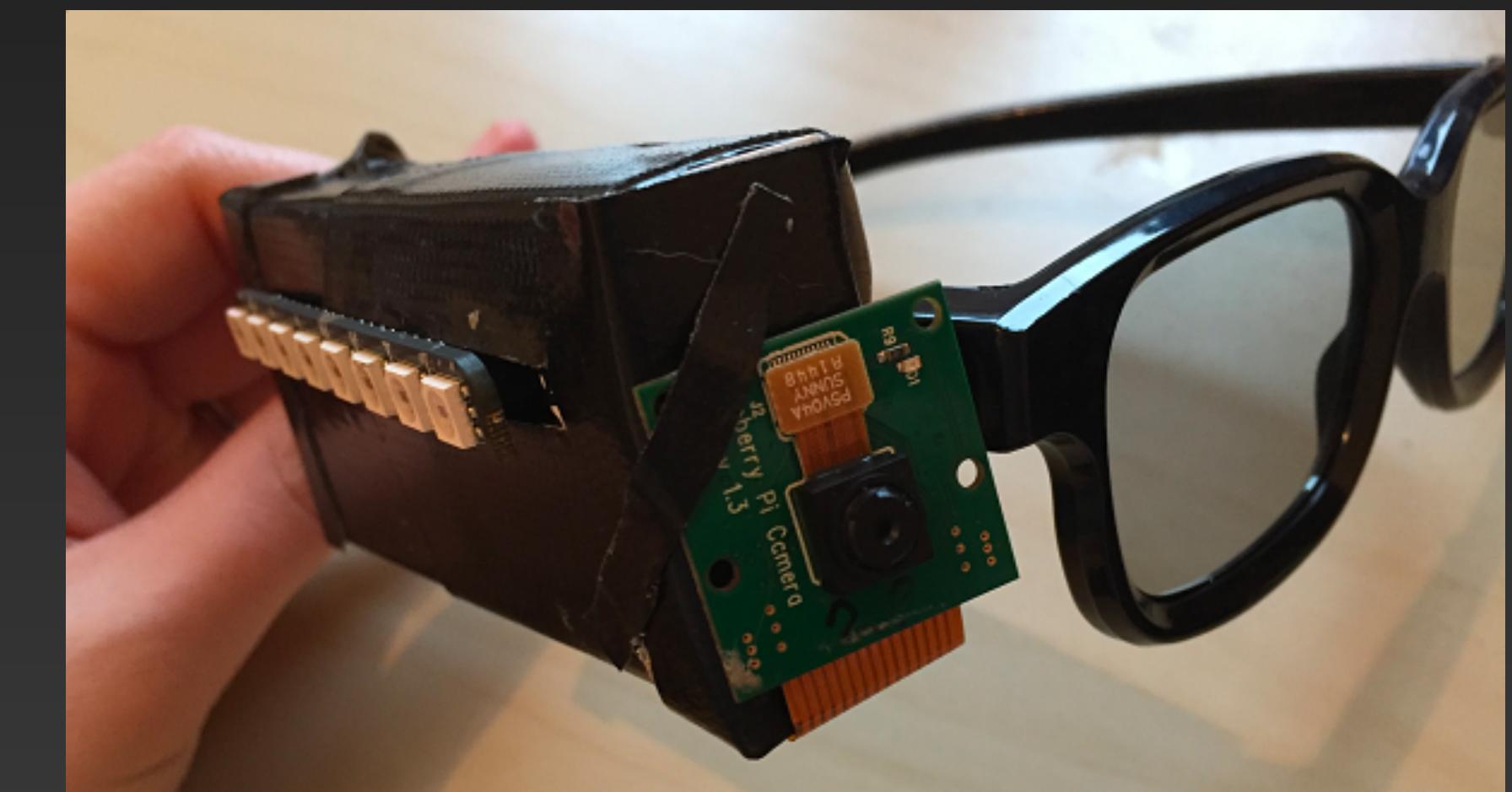
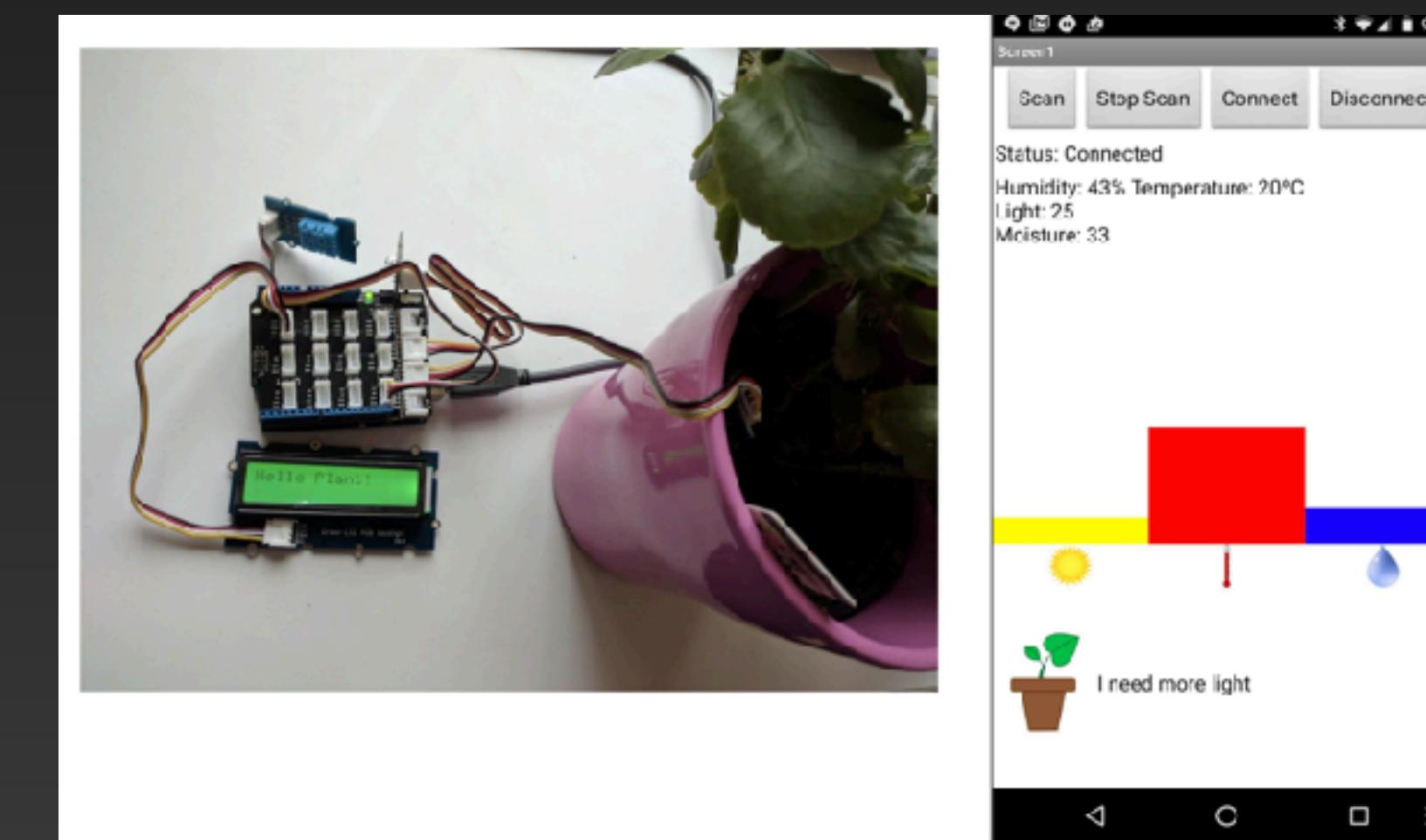
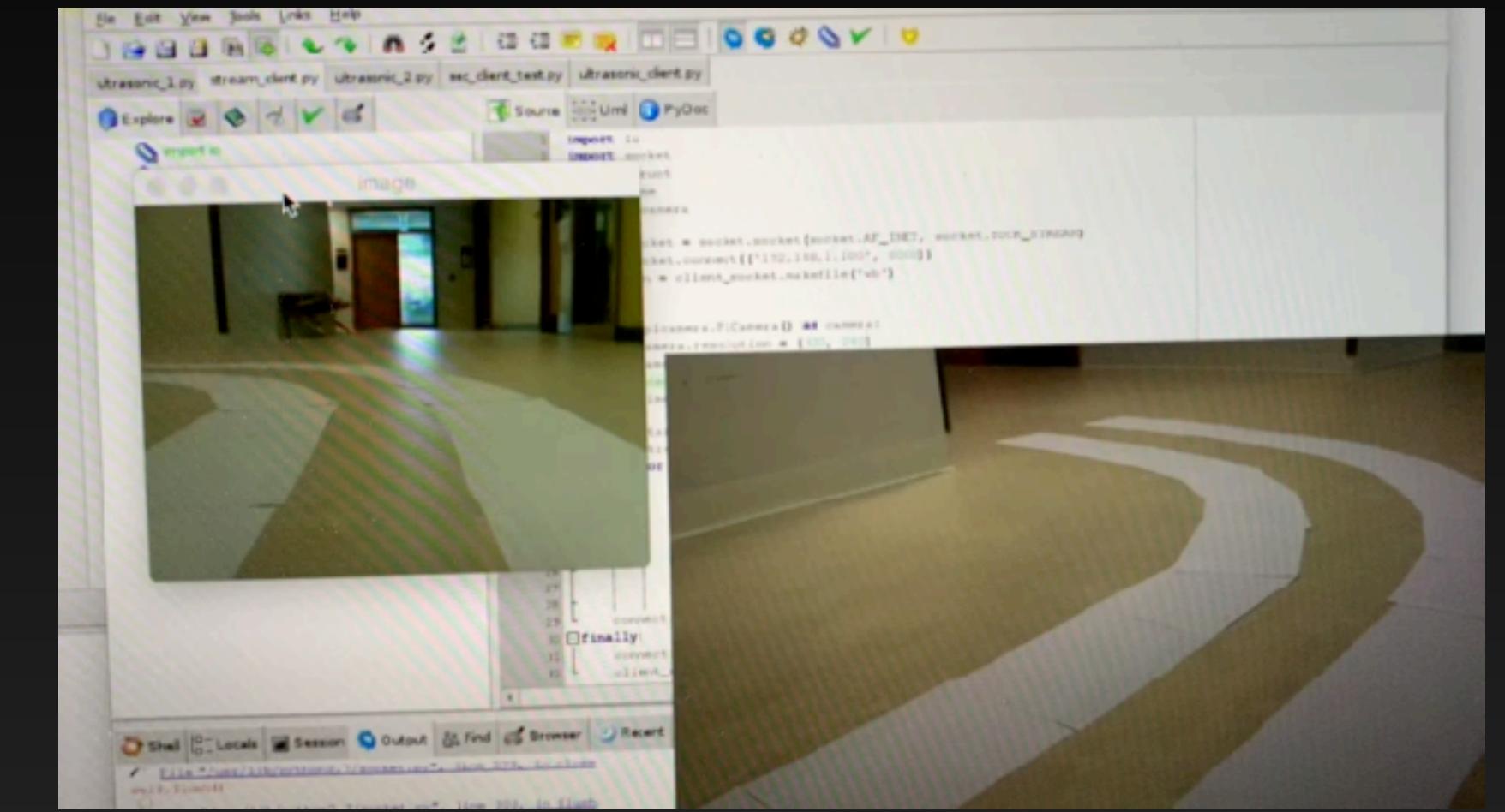
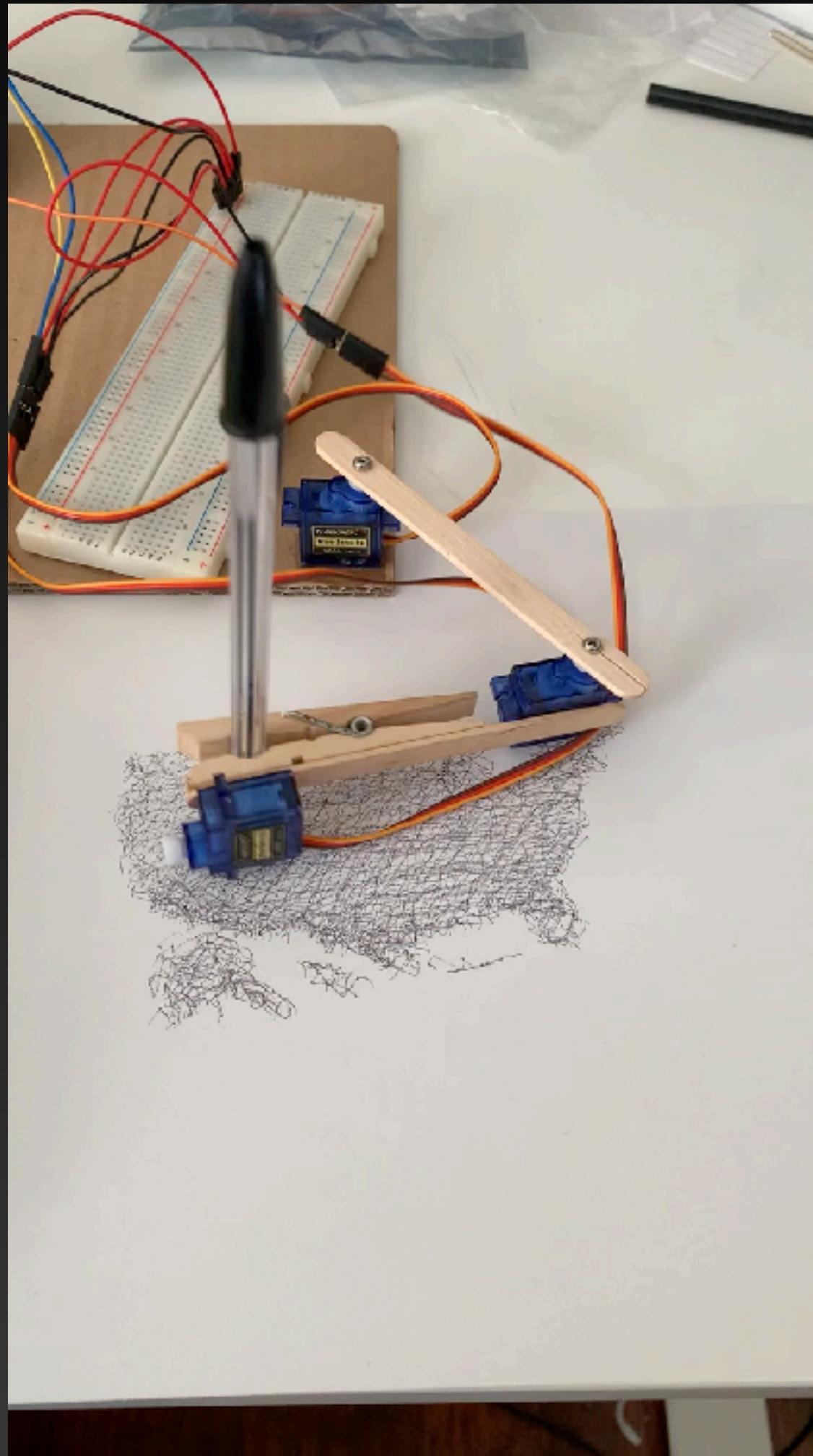
If you program a mobile robot, you can add geolocation to the robot's sensing abilities.

And many more...

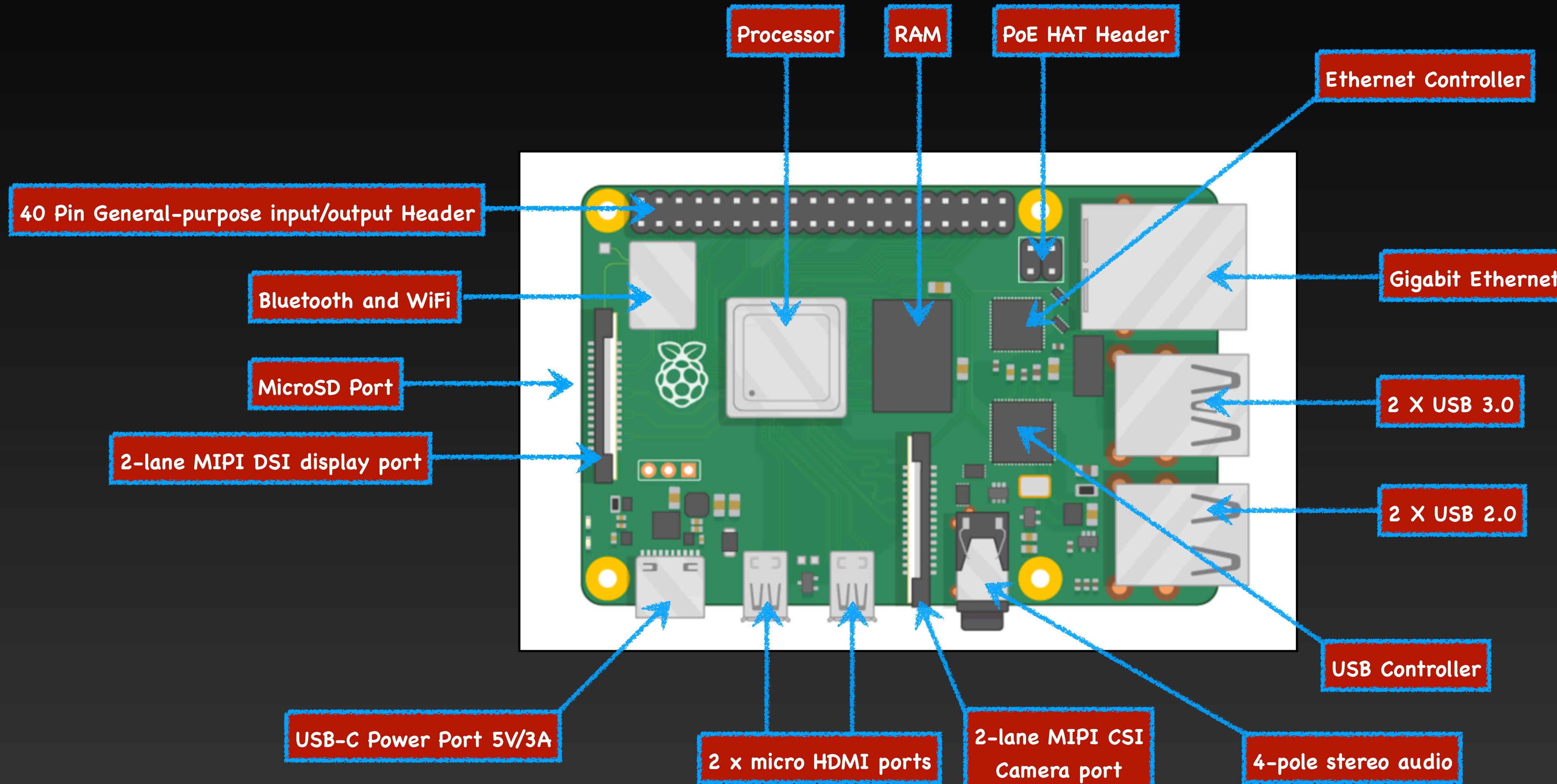
Model 3



Advanced Projects!

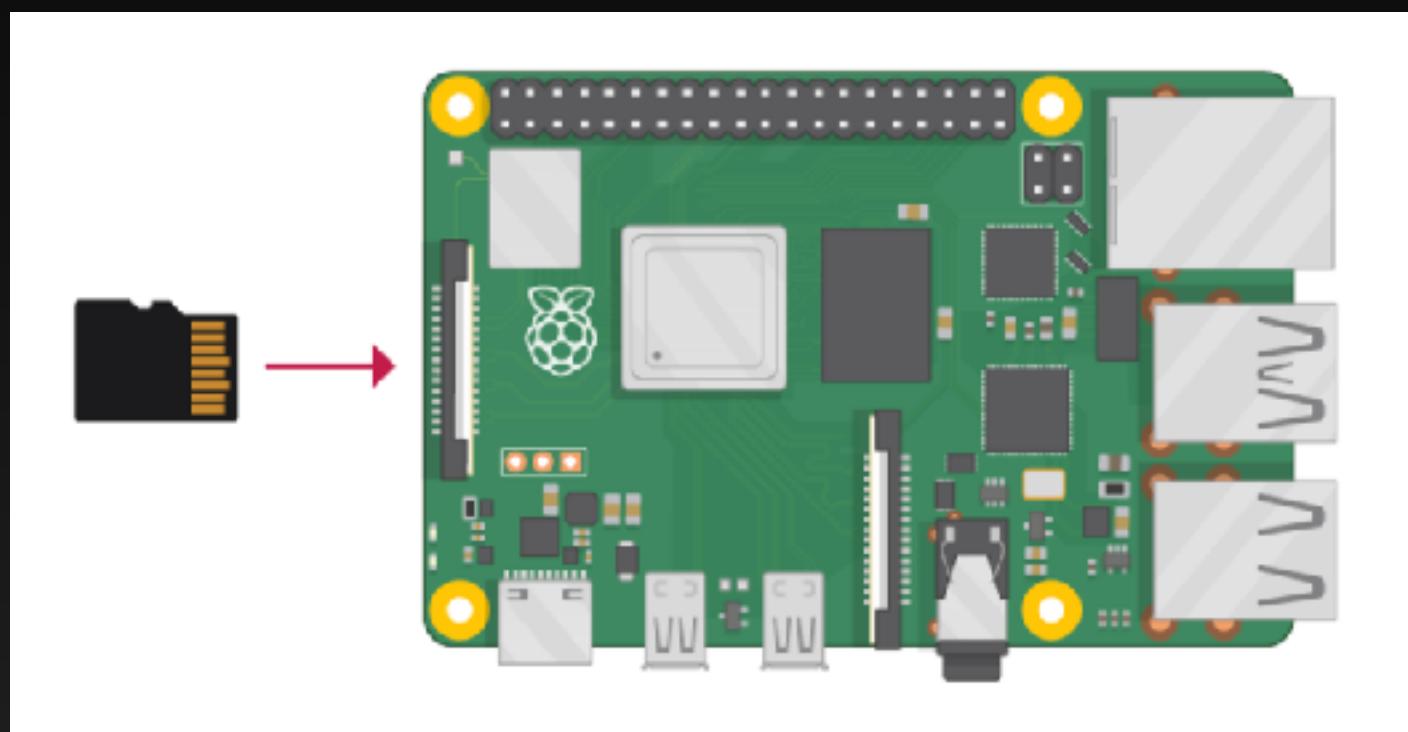


Parts of Raspberry Pi 4

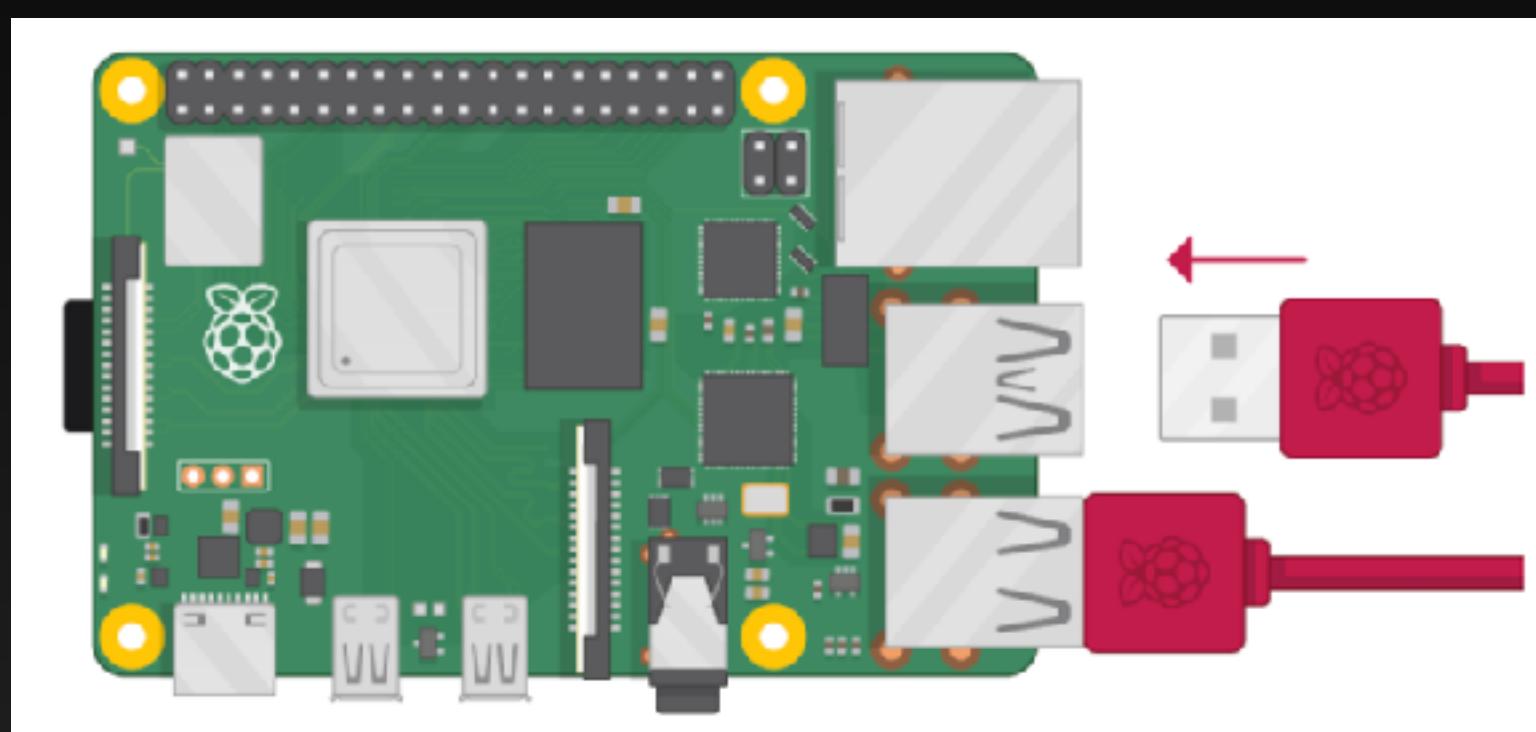


Connect your Raspberry Pi

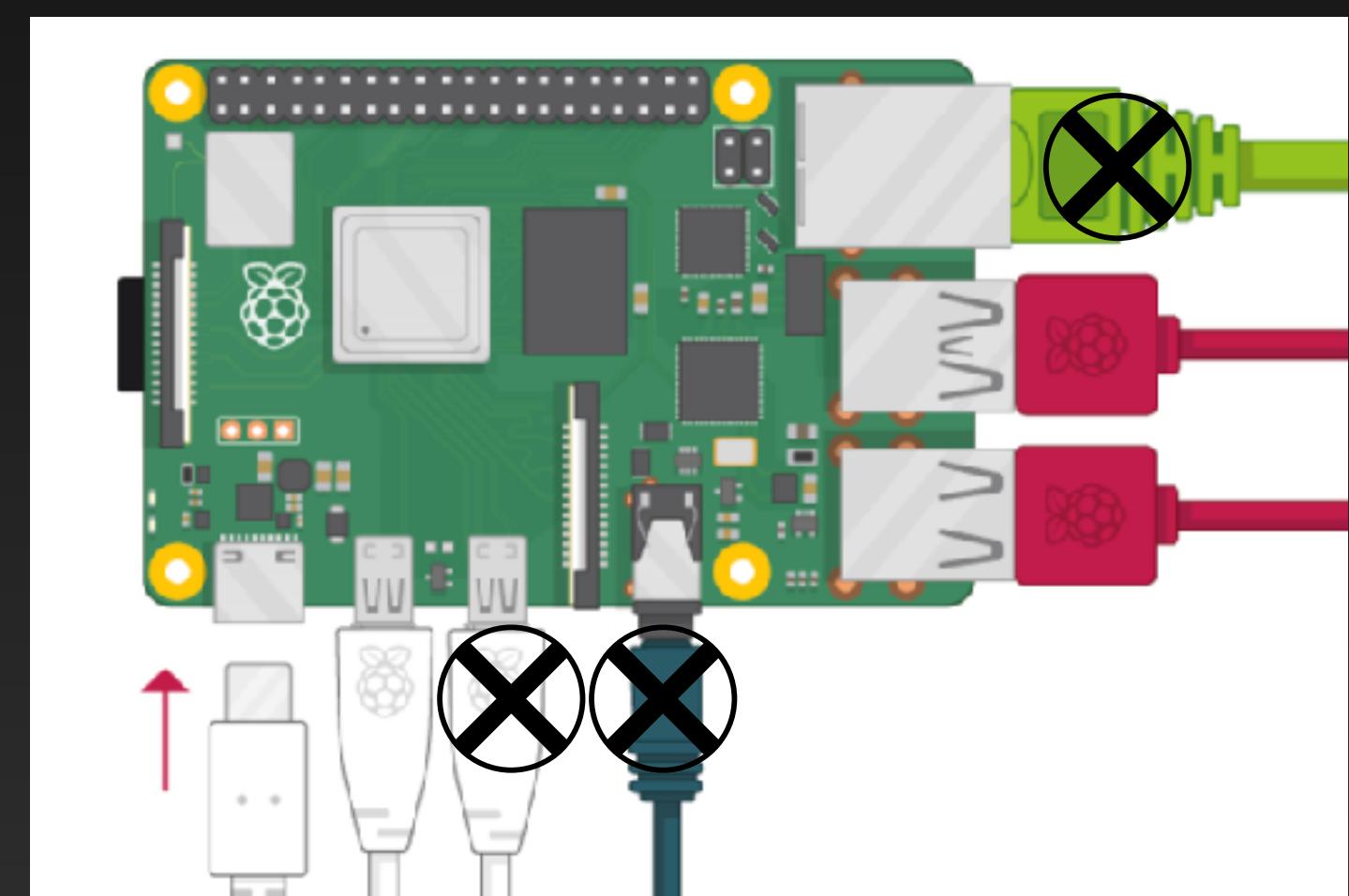
Insert microSD card with OS



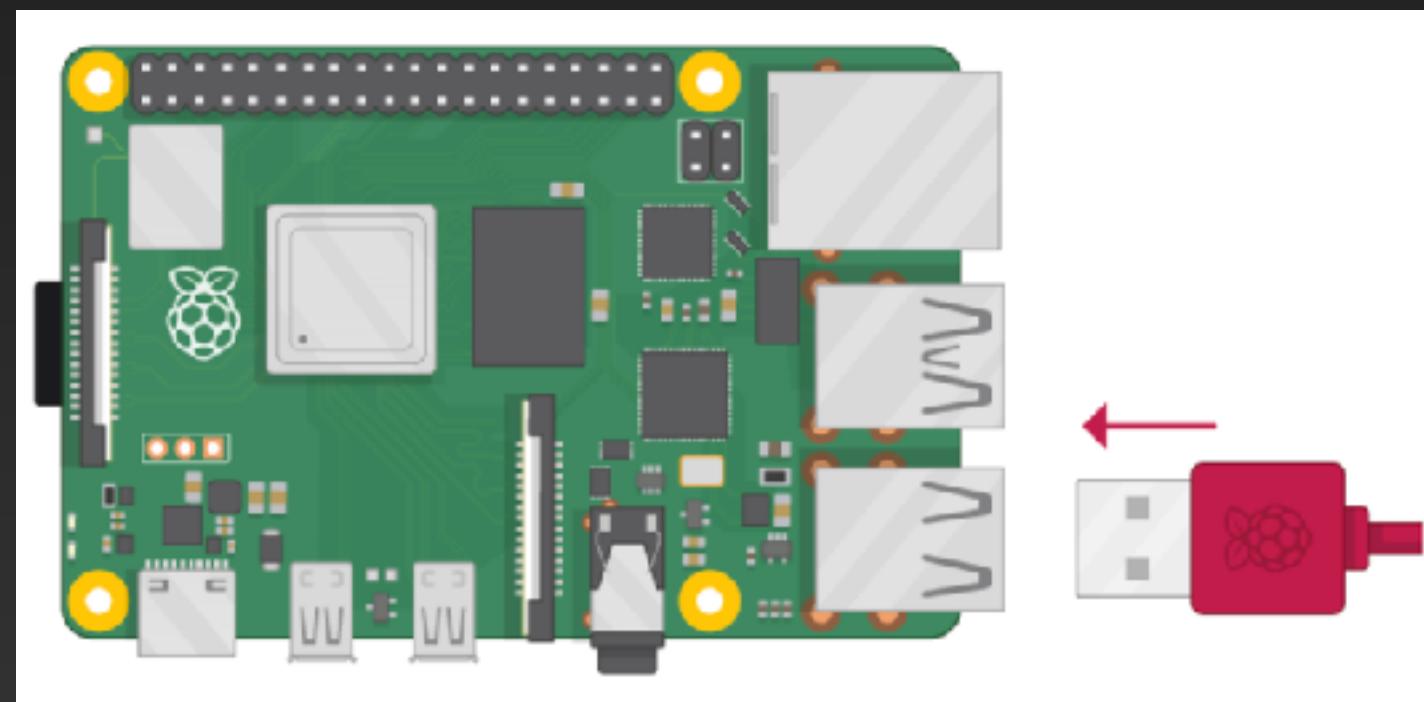
Connect keyboard



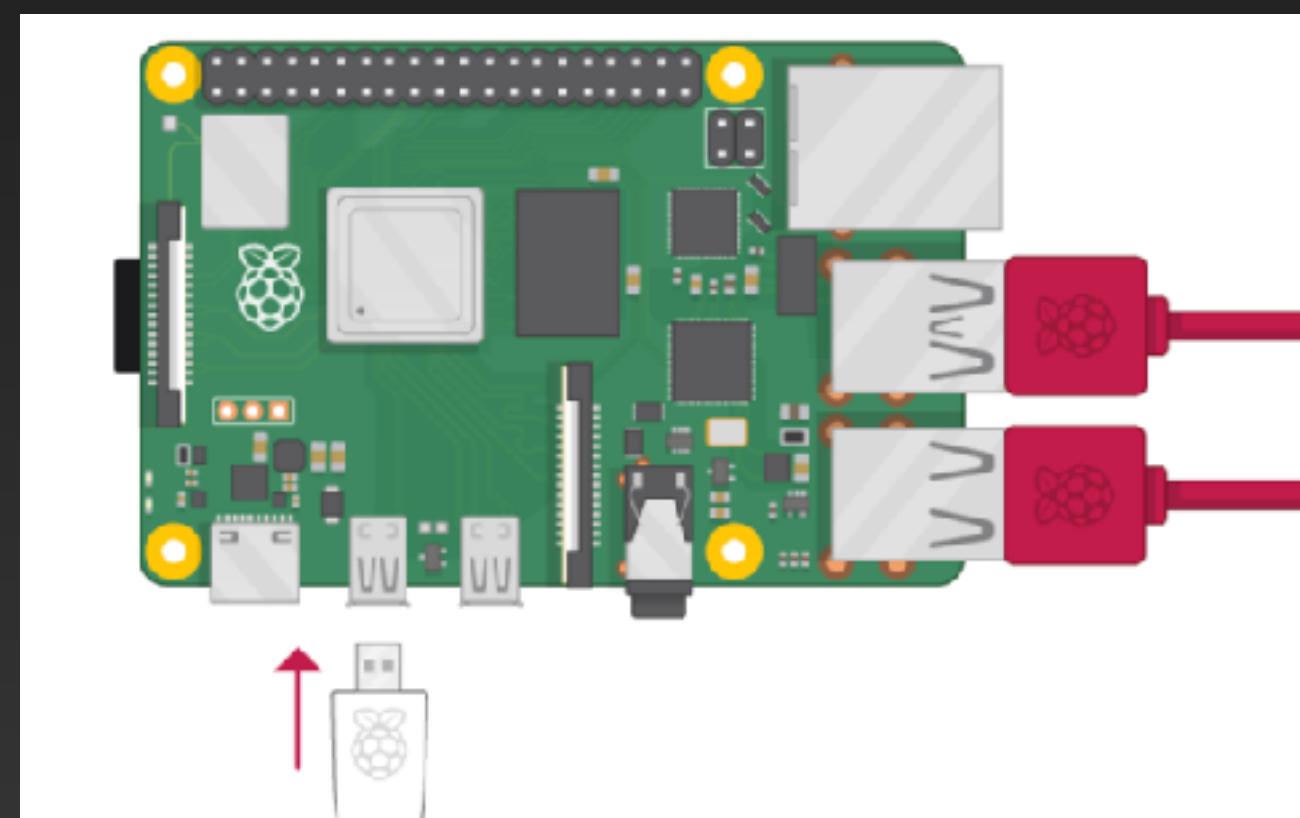
Connect Power



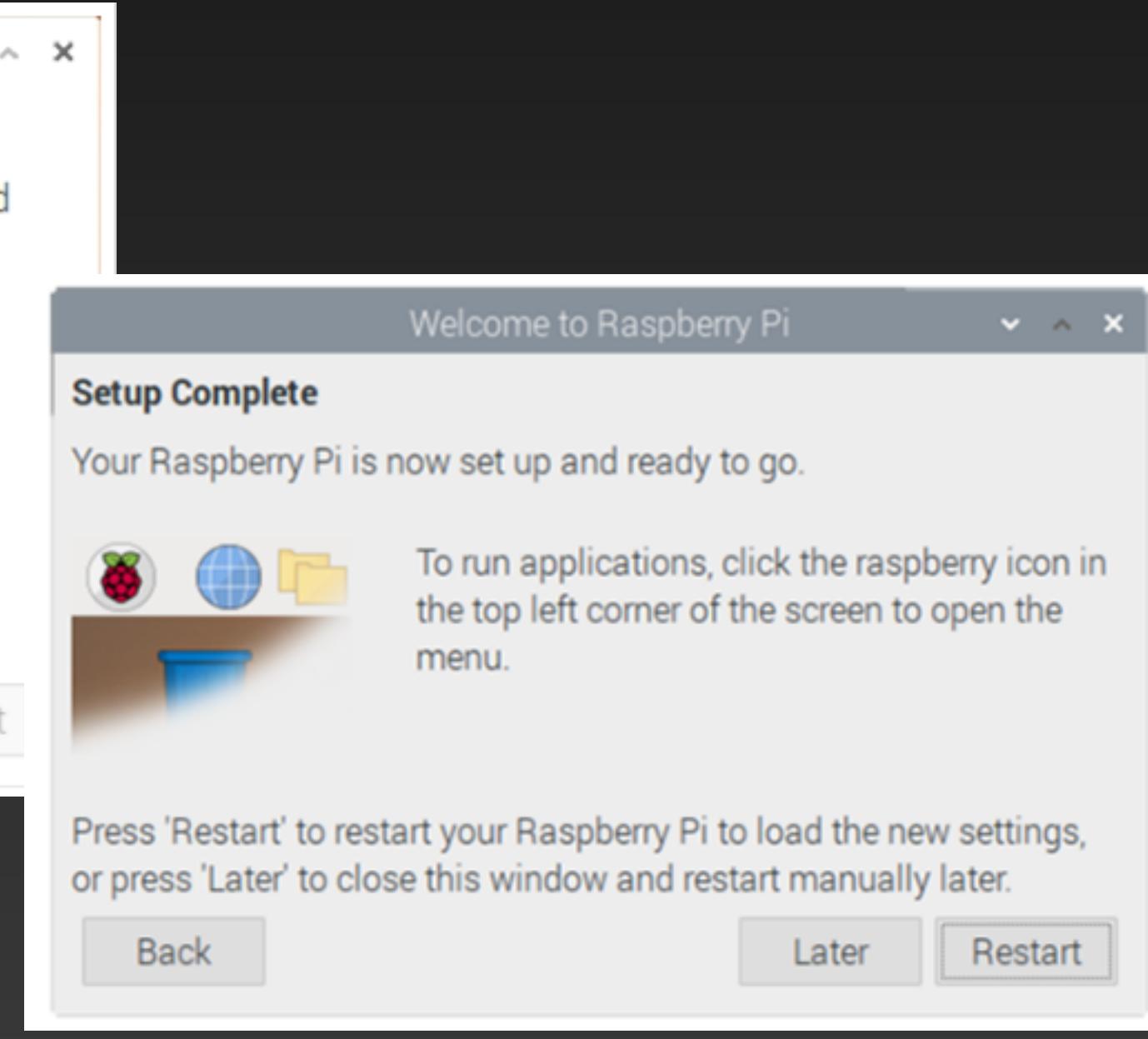
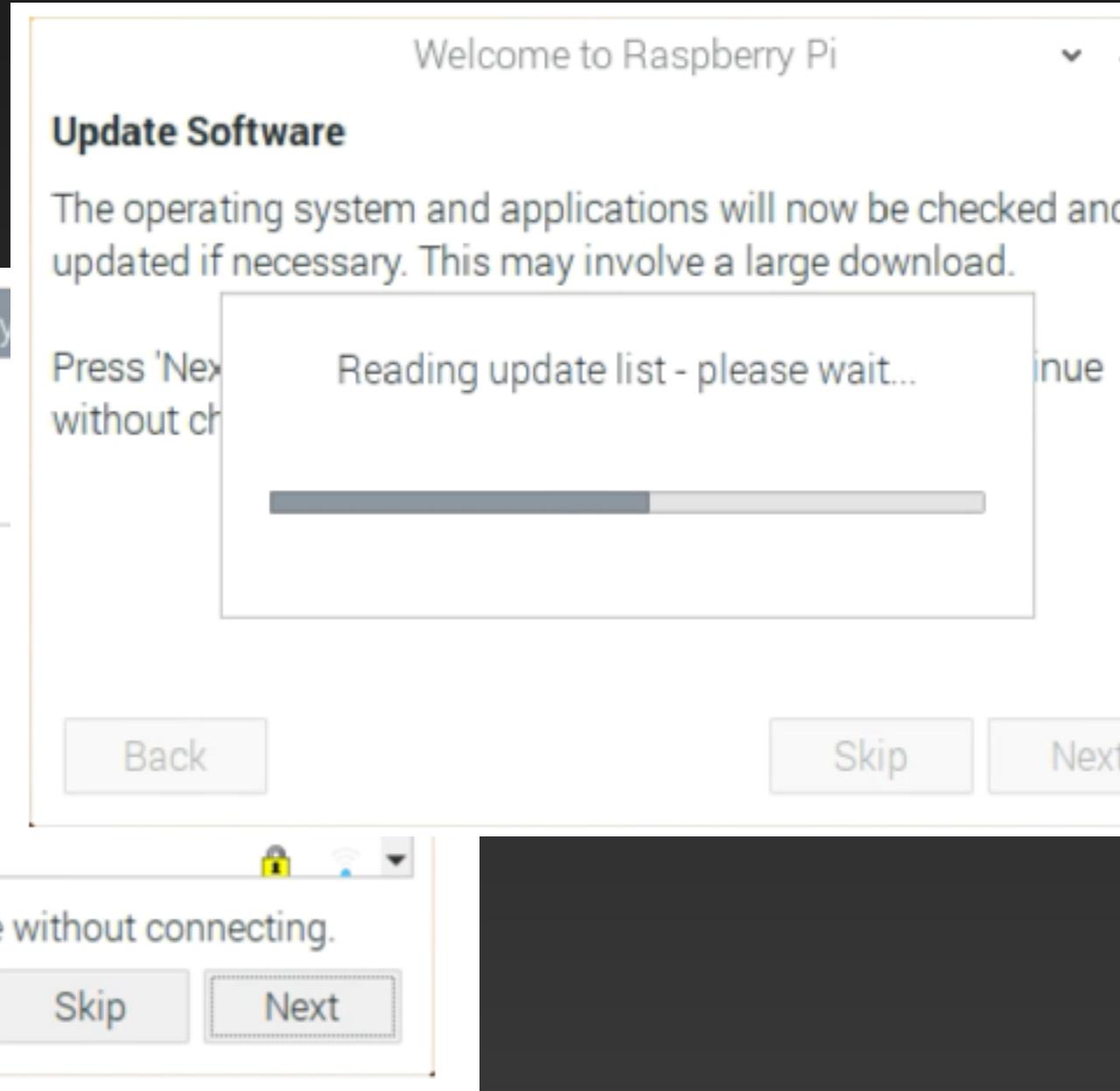
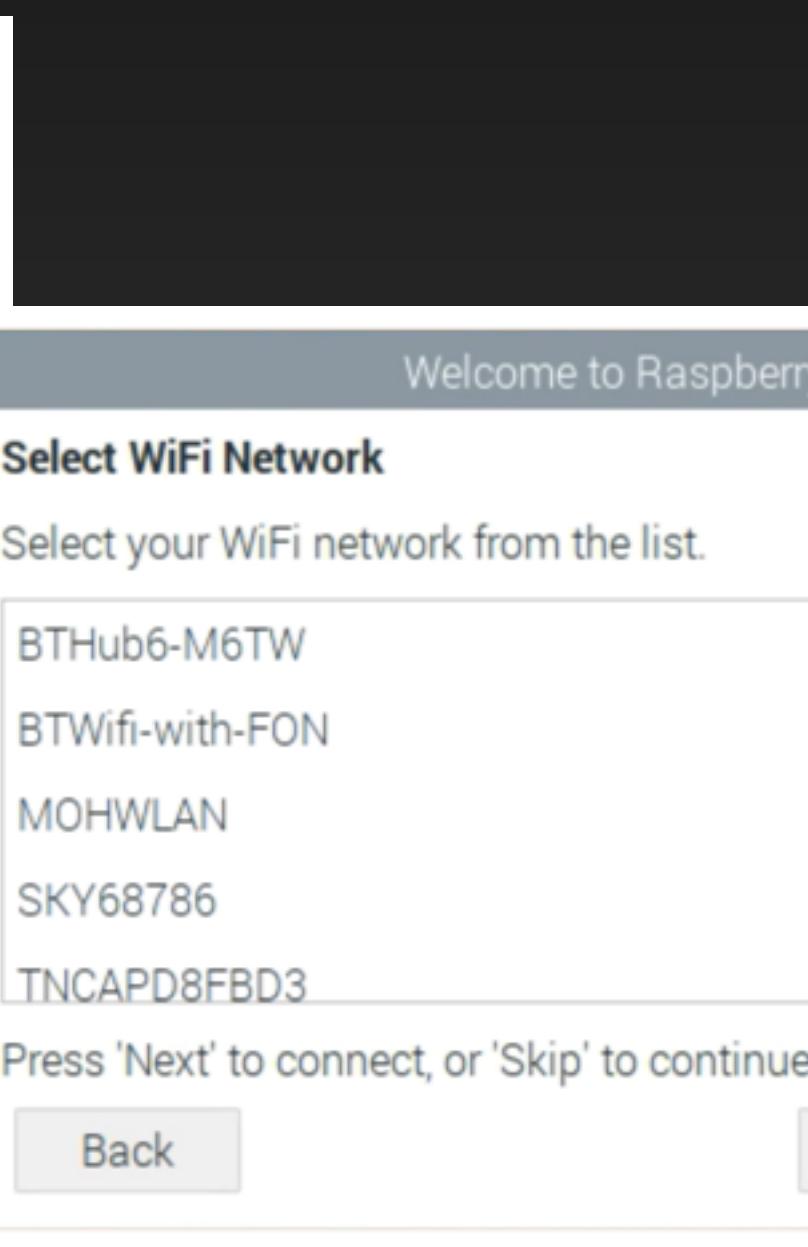
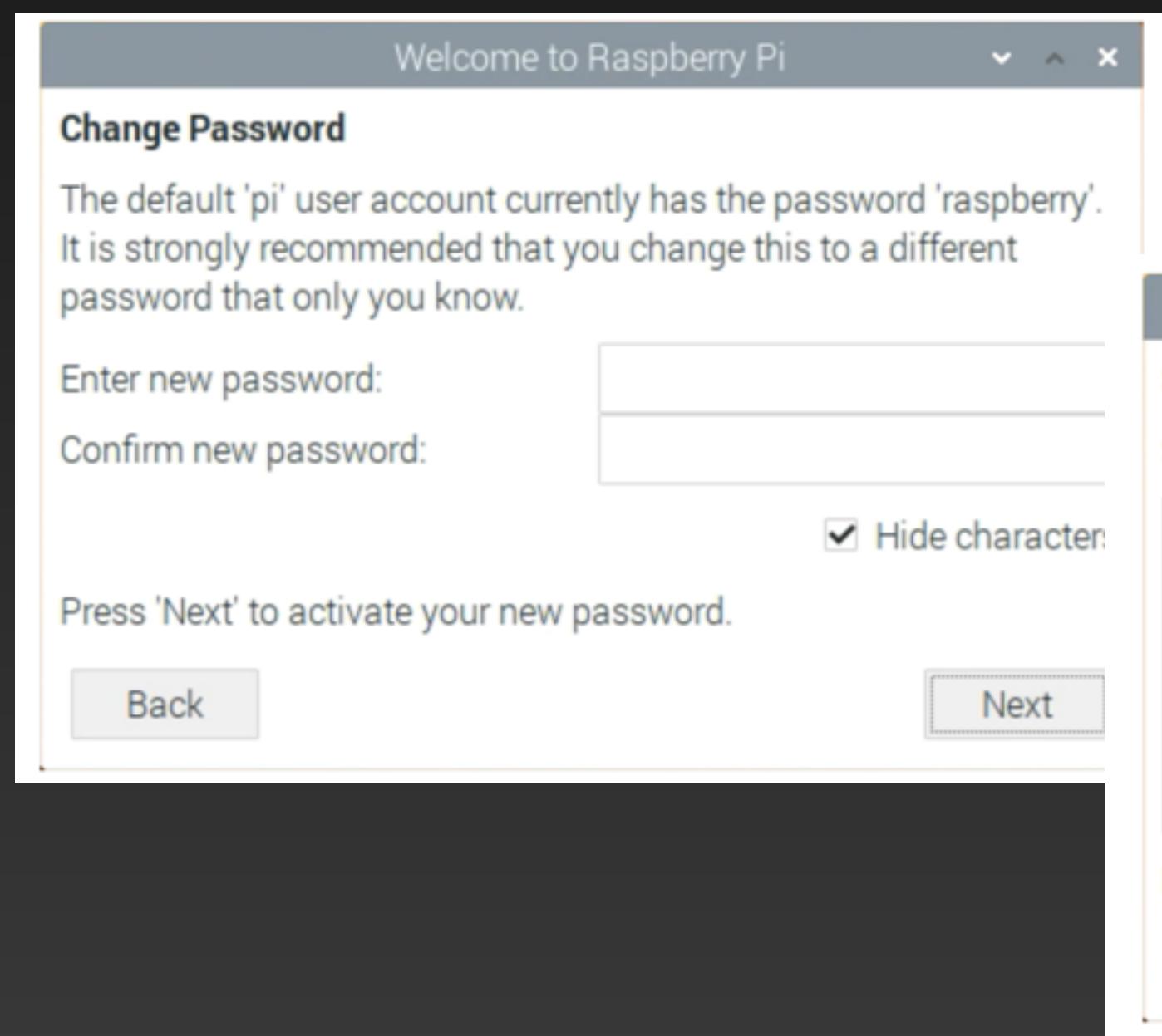
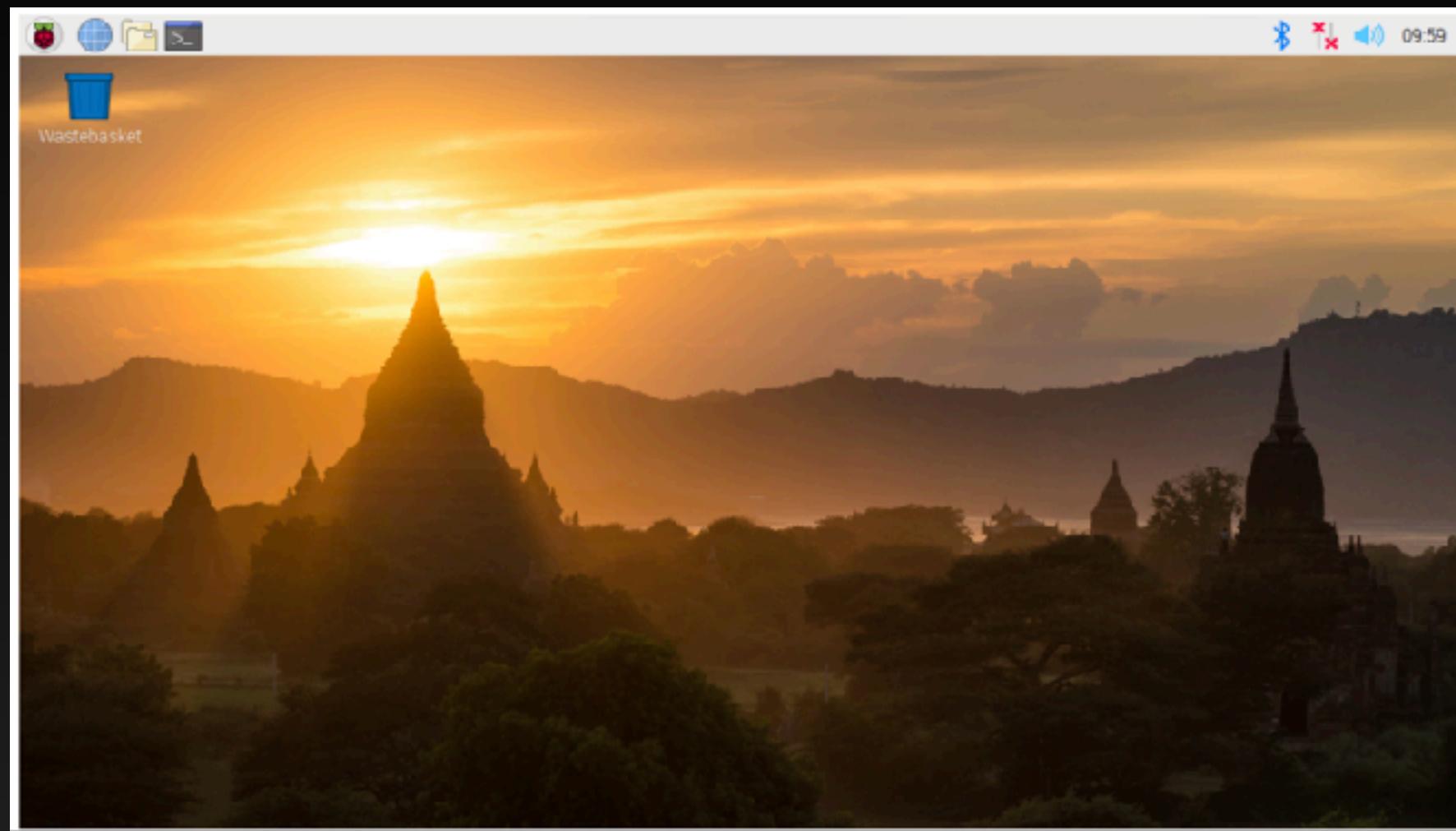
Connect mouse cable



Connect HDMI



Initial setup

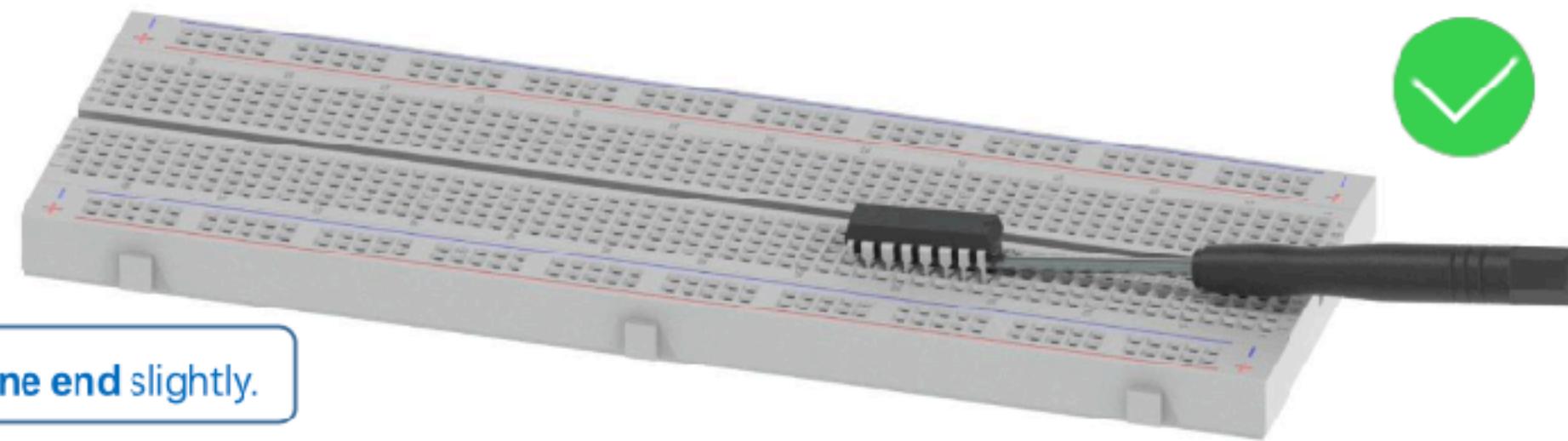


Remove the Chips

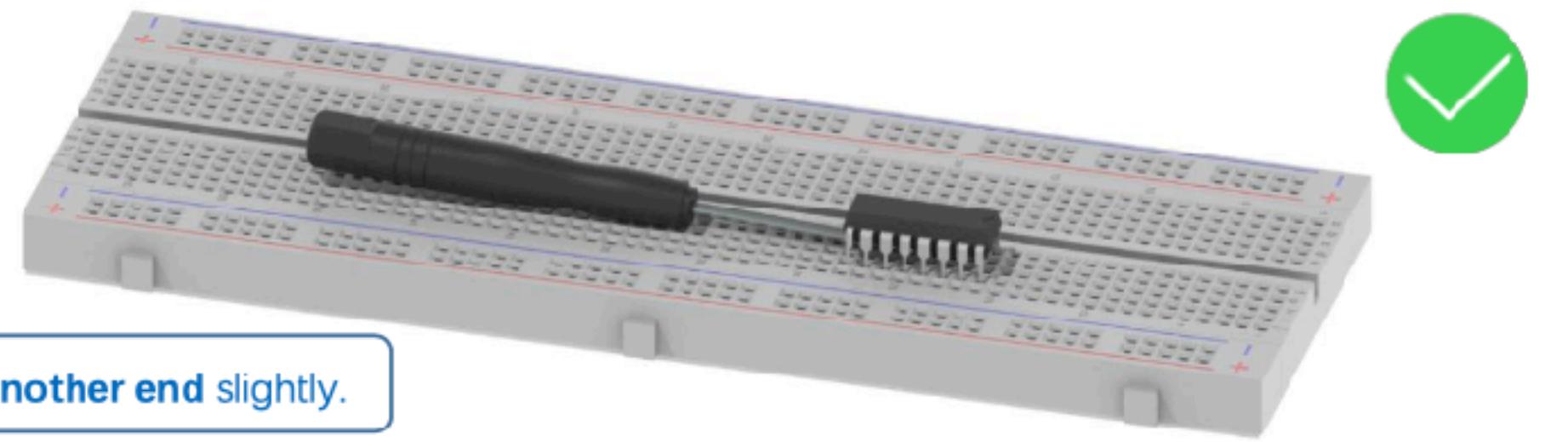
Some chips and modules are inserted into the breadboard to protect their pins.

You need to remove them from breadboard before use. (There is no need to remove GPIO Extension Board.)

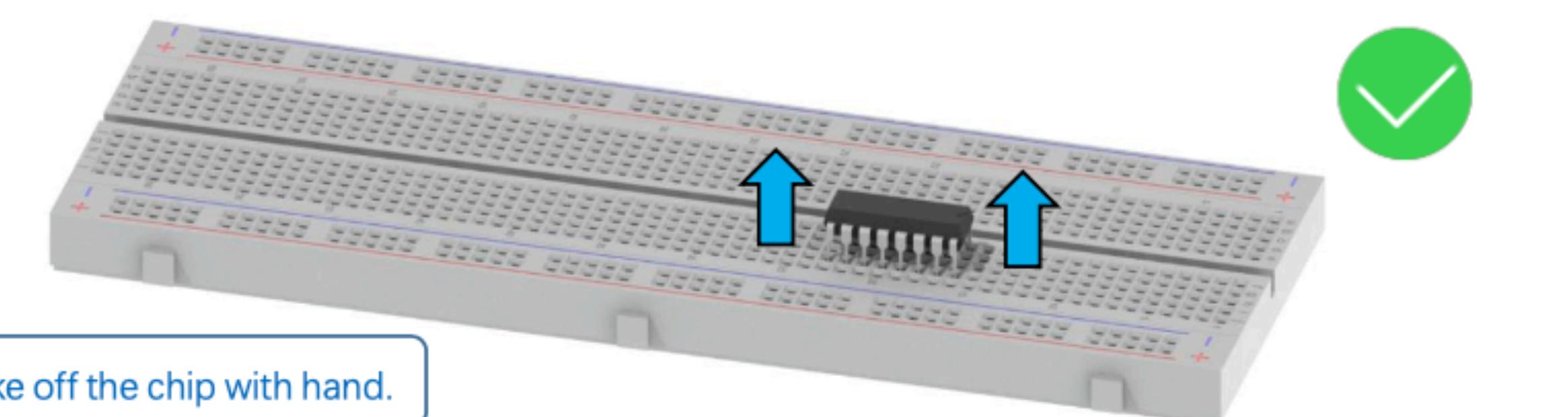
Please find a tool (like a little screw driver) to handle them like below:



Step 1, lift **one end** slightly.

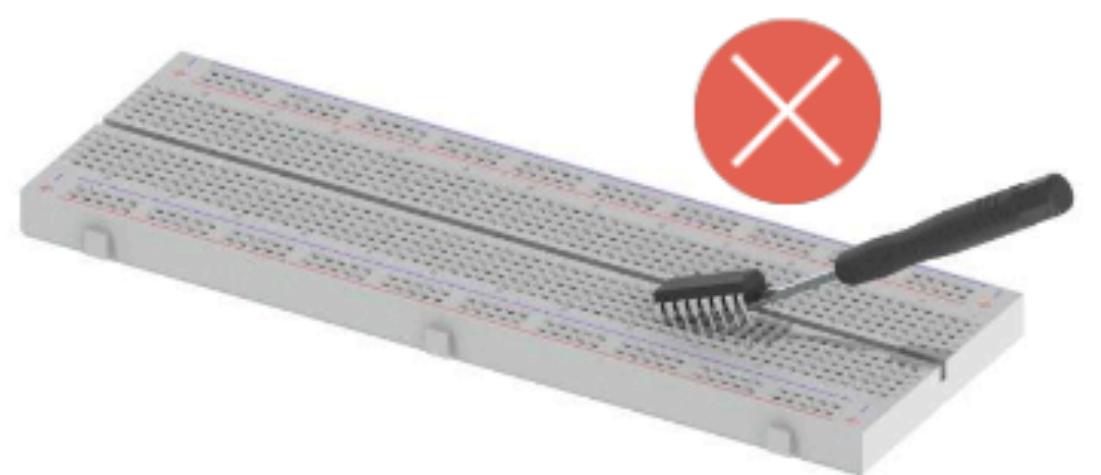
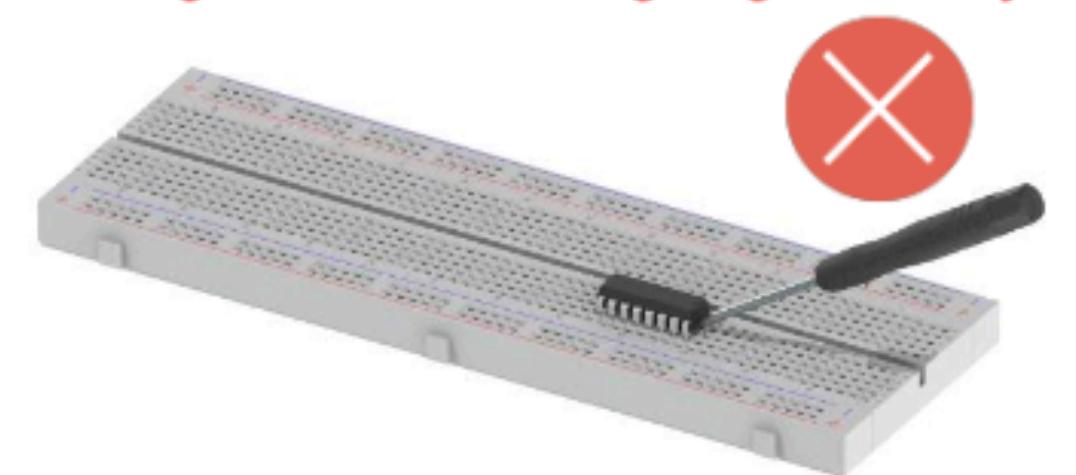


Step 2, lift **another end** slightly.



Step 3, take off the chip with hand.

Avoid lifting one end with big angle directly.

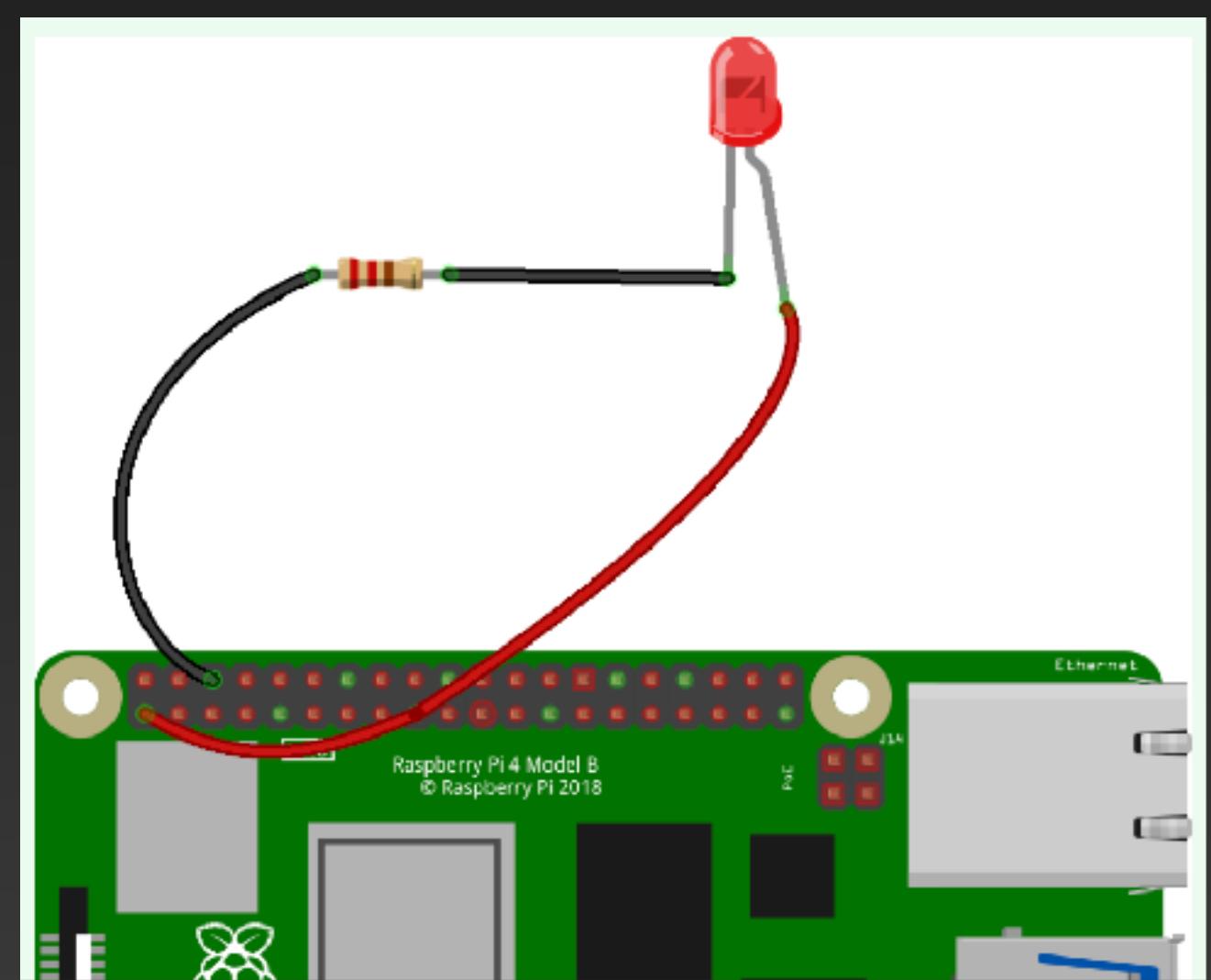
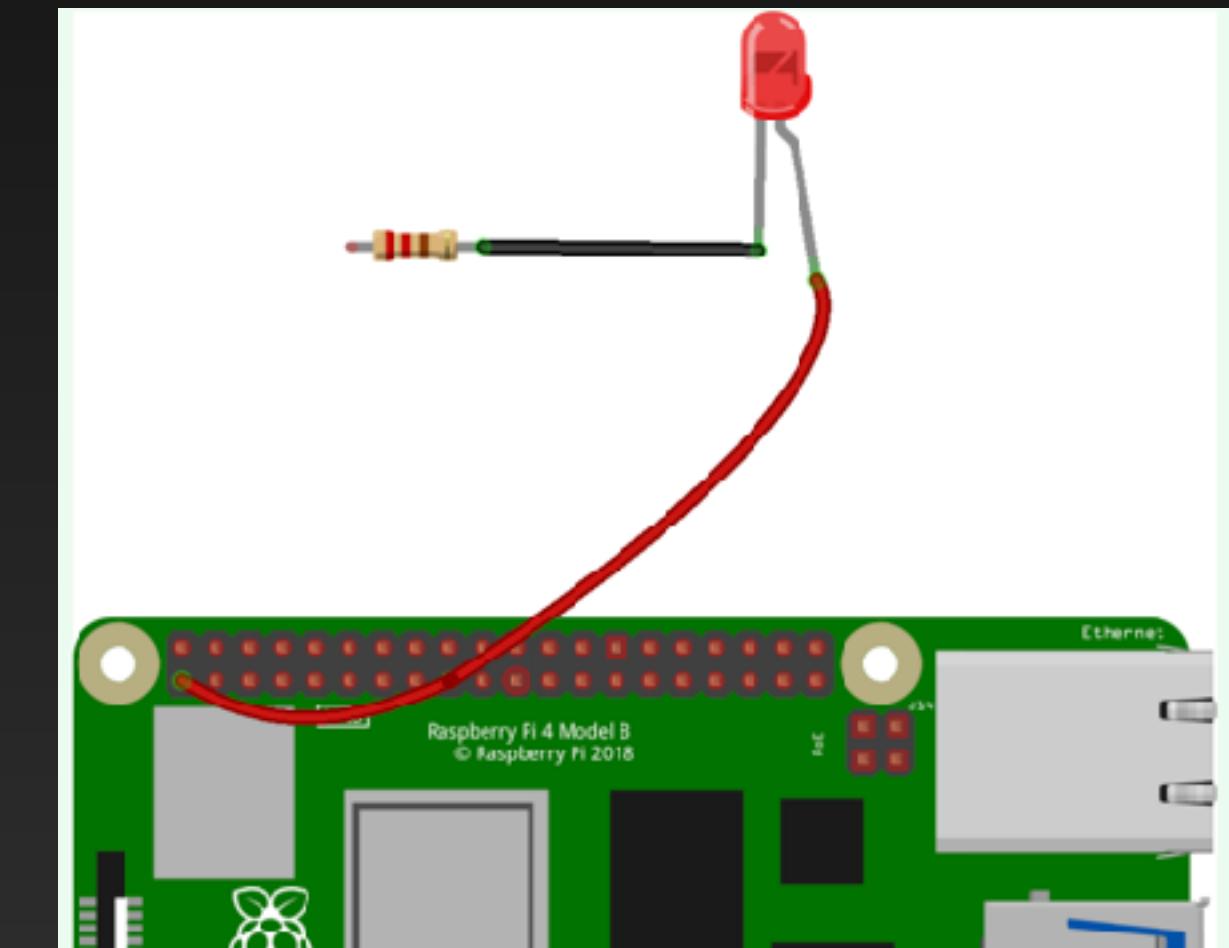
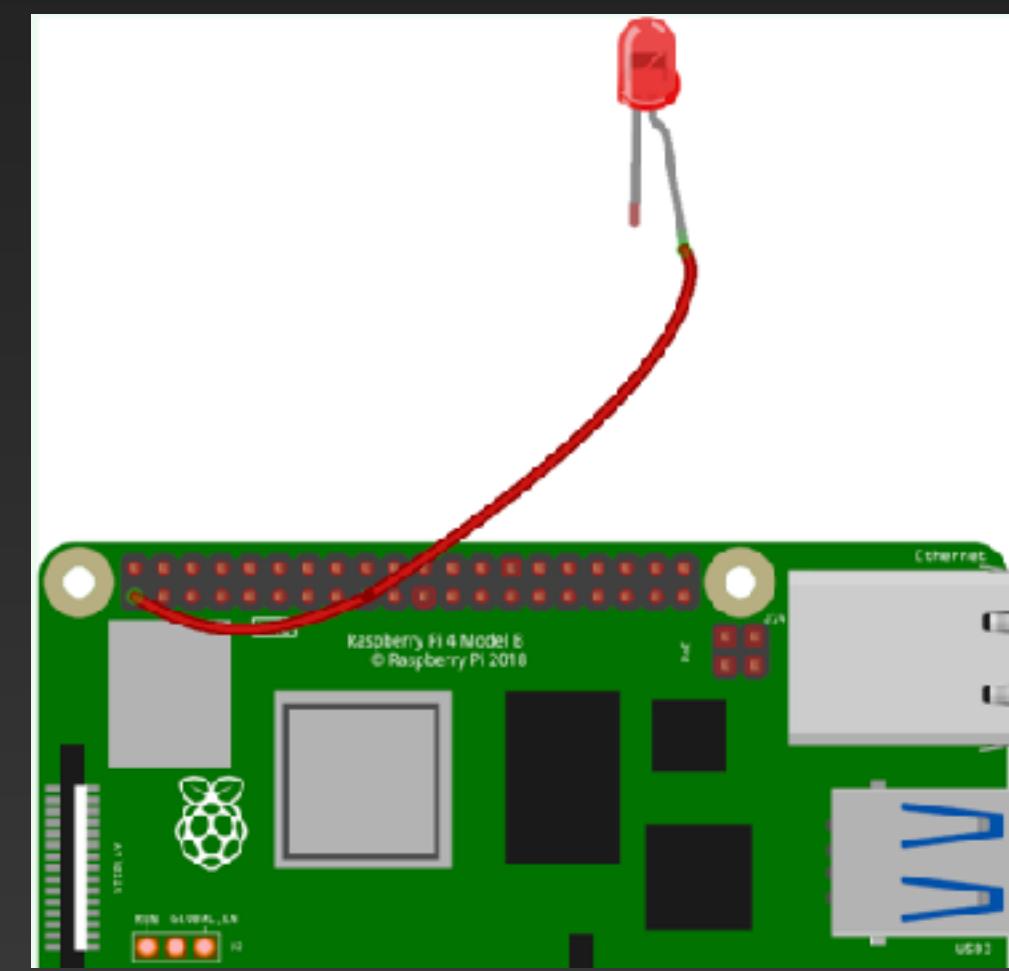
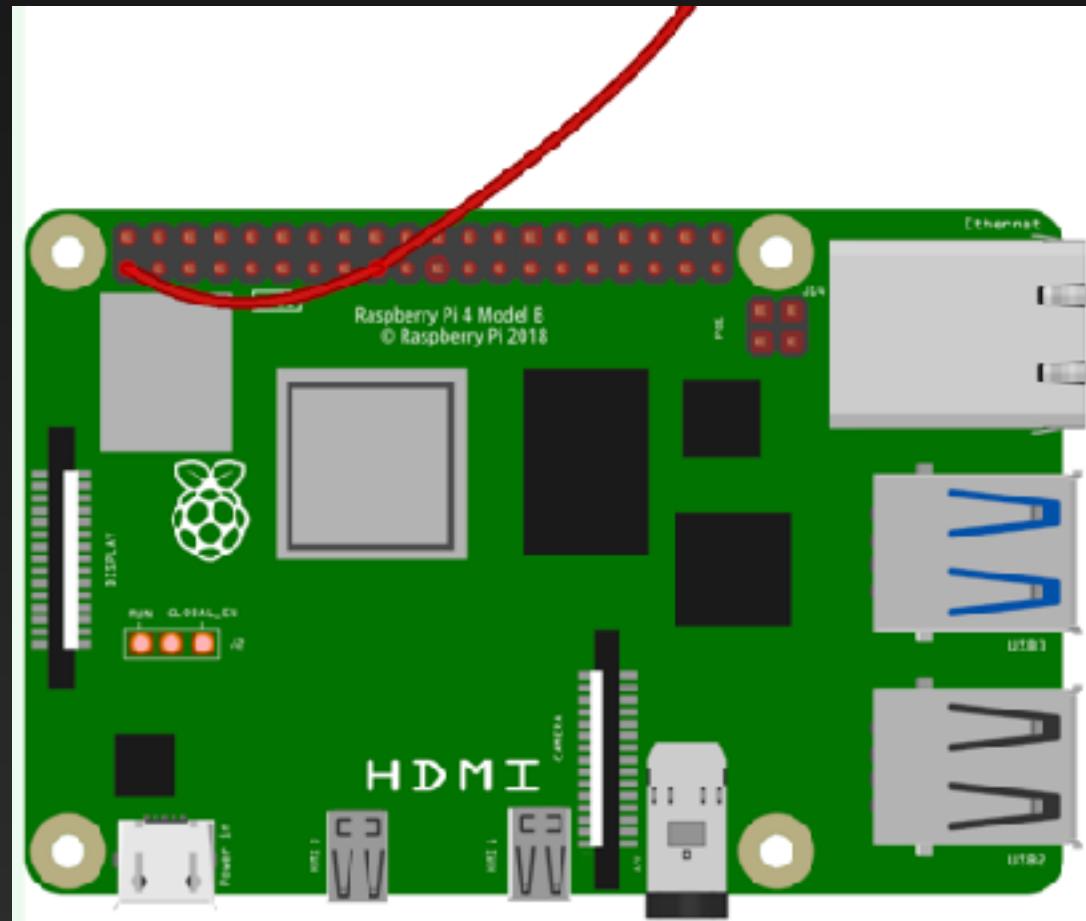


Test your circuit! An LED project

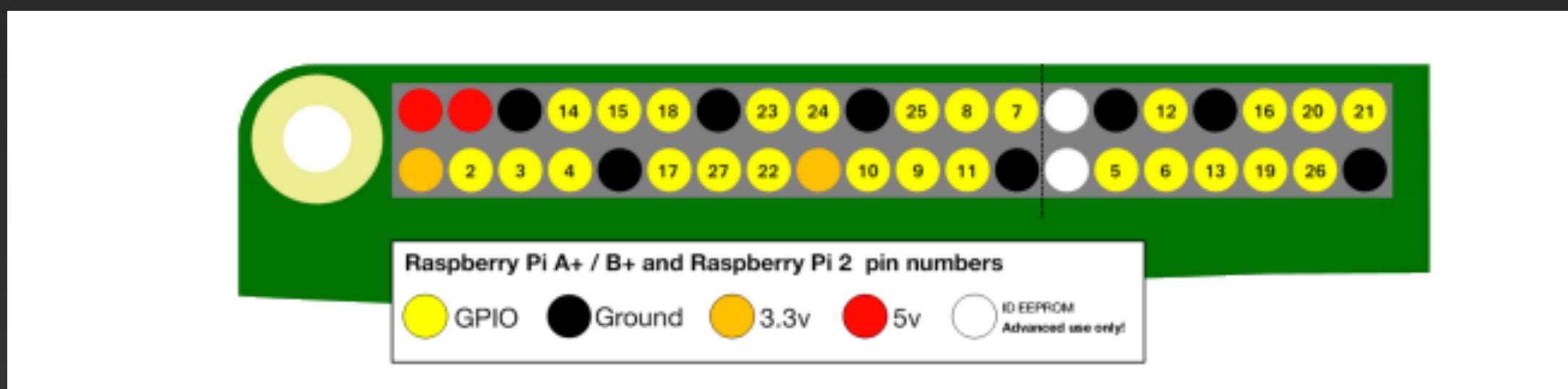
Hardware

- A Raspberry Pi computer
- 3x F-F jumper cables
- an LED (usually volt 1.8V)
- a resistor (the lower resistance, the better!) $\Omega = V/A$ $\Omega = (3.3V - 1.8V) / 3mA = 500$

○



GPIO Basic on Raspberry Pi



3V3	3.3 volts	Anything connected to these pins will always get 3.3V of power
5V	5 volts	Anything connected to these pins will always get 5V of power
GND	ground	Zero volts, used to complete a circuit
GP2	GPIO pin 2	These pins are for general-purpose use and can be configured as input or output pins
ID_SD/ ID_SD/ DNC	Special purpose pins	

Remote access

- \$ sudo raspi-config
- config P2 SSH and P3 VNC to YES under Interface Options
- Reboot
- SSH access. Windows, download Putty. [Https://www.putty.org/](https://www.putty.org/)
- MAC, SSH pi@IP
- Windows, Remote Desktop or <https://www.tightvnc.com/download.php>
- MAC, app store, windows remote desktop

Hack the Raspberry Pi's Terminal

Introduction

Hack the Raspberry Pi's terminal and learn basic cybersecurity skills through a Pac-Man–themed treasure hunt.

You will take the first steps towards being an awesome ethical hacker! This project will take you on a journey through your Raspberry Pi's terminal and you'll learn to navigate the terminal and protect your computer against nasty attackers.

During the treasure hunt, you will:

- Be introduced to your mission: hack the terminal to find all the Pac-Man ‘ghosts’
- Learn how to run a script to start the treasure hunt
- Find the ghosts and then quarantine them by creating your own safe directory
- Learn more about malware by inspecting the ghost files and getting rid of them
- Collect enough treasure points to complete the treasure hunt

You will learn some basic hacking and find out about basic cybersecurity concepts and threats.

You will also learn how to do these things in the terminal:

- Download and run a script
- Navigate your computer
- Create a directory
- Copy and move files around your computer
- Delete files



Pac-Man treasure hunt project

This is the situation: there is a huge problem with your computer system — it's being attacked by nasty viruses. These viruses are the Pac-Man ghosts:



Your goal is to catch and get rid of all of these ghosts! Once you have caught all the ghosts, you can go about collecting your treasure. To catch the ghosts, you will need to navigate the maze that is your computer. You can navigate your Raspberry Pi computer by using **the command line**.

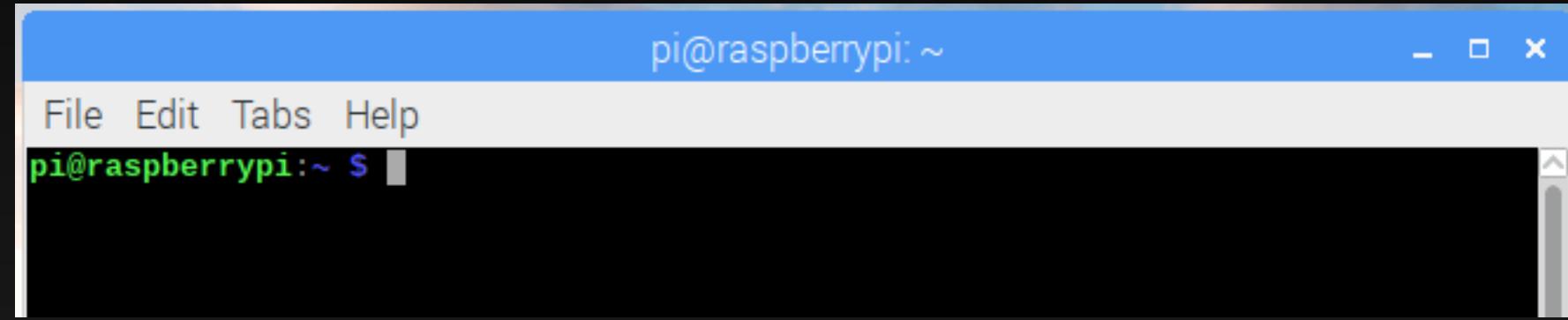
So, to complete the treasure hunt you must:

- Find the ghosts
- Trap the ghosts
- Collect your treasure

Pac-Man treasure hunt project

To access bash, make sure you have opened a terminal window.

In the terminal, you will see \$. This is called a **shell prompt**. It appears when the terminal is ready to accept a command.



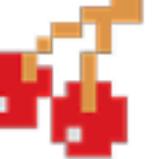
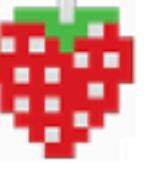
Next to the \$ (the shell prompt), type or copy and paste:

```
$ wget -O - http://rpf.io/pacmanstart | bash
```

- ls
- pwd
- cd
- cd ..
- mkdir quarantine/
- cp sp00ky.txt ~/quarantine/. Or mv sp00ky.txt ~/quarantine/
- rm sp00ky.txt

Time to catch all ghosts! (Hint, 7 in total)

Pac-Man treasure hunt project

Treasure	Points
	Cherry 100
	Strawberry 300
	Peach 500
	Apple 700
	Grapes 1000
	Galaxian Boss 2000
	Bell 3000
	Key 5000

Navigate to your `quarantine/` directory, and then list the contents of the directory to see all the ghosts you have caught

Pac-Man treasure hunt project

Navigate to your **quarantine/** directory, and then list the contents of the directory to see all the ghosts you have caught

Collect your treasure!

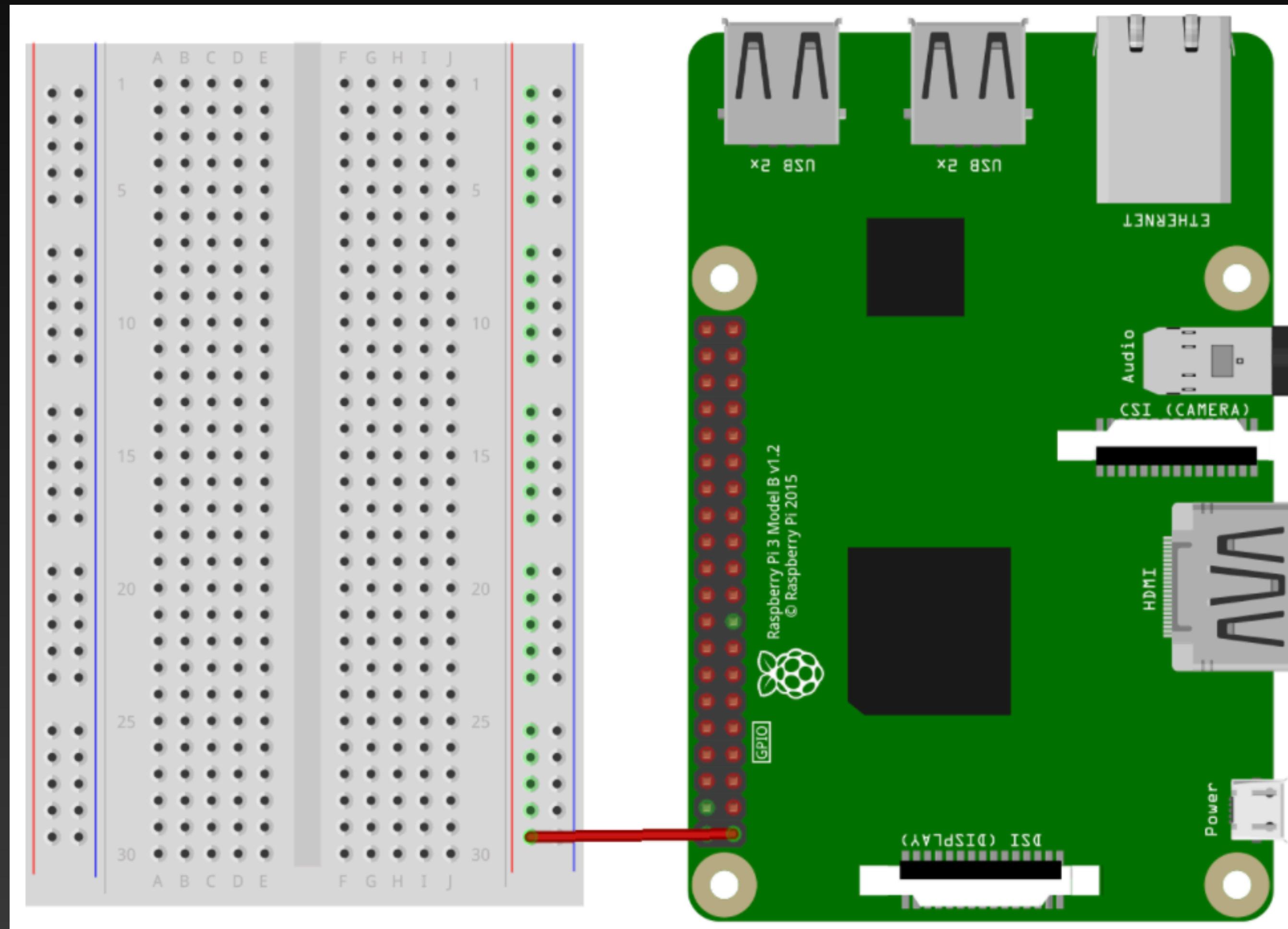
- cat

Delete the whole **quarantine** folder without copying any of the files in it.

- rm -r quarantine

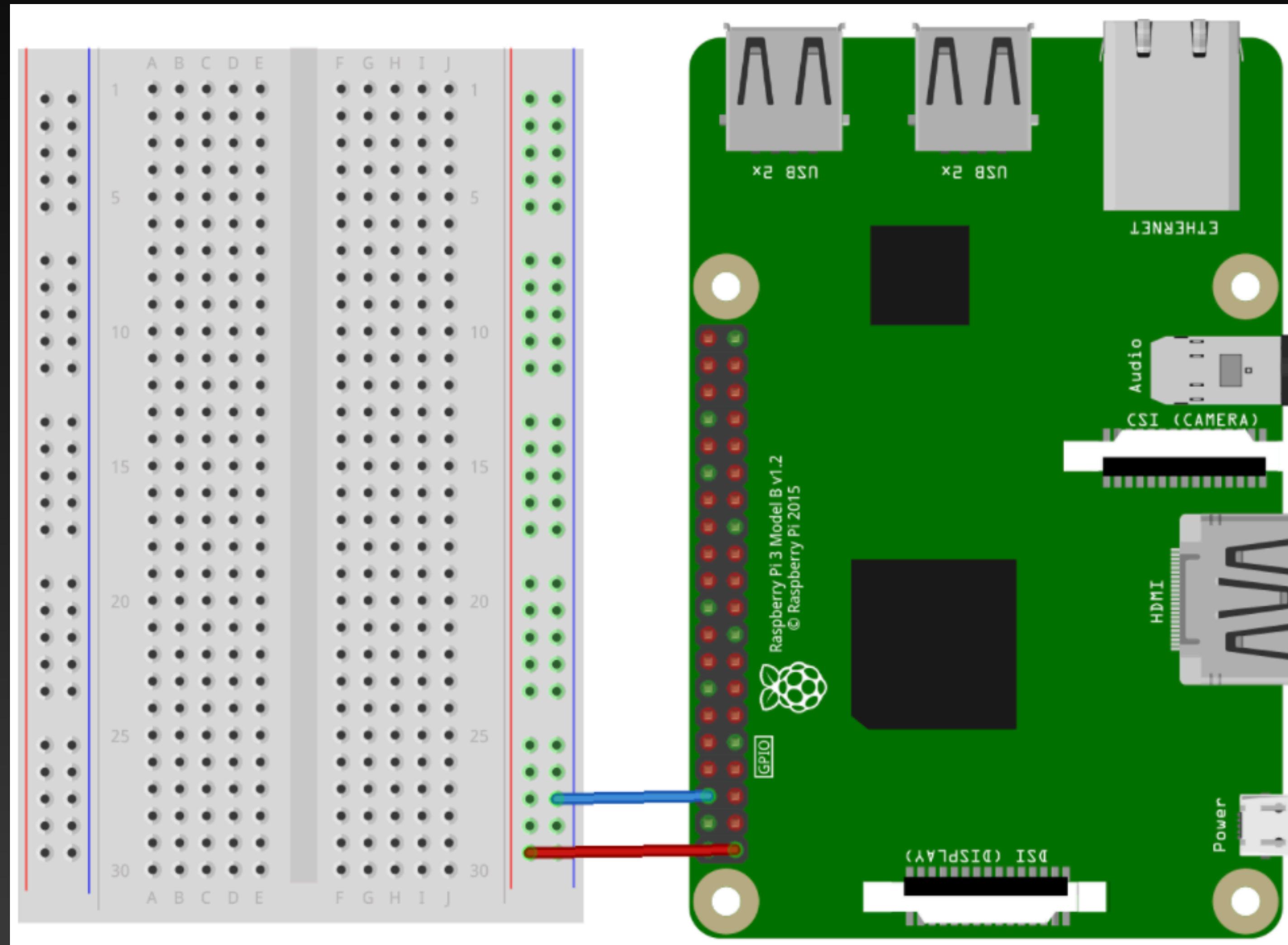
Test your circuit! An LED project

- Using a breadboard. Breadboard, LED light, Resistor, Male-to-female jumper leads, Male-to-male jumper leads



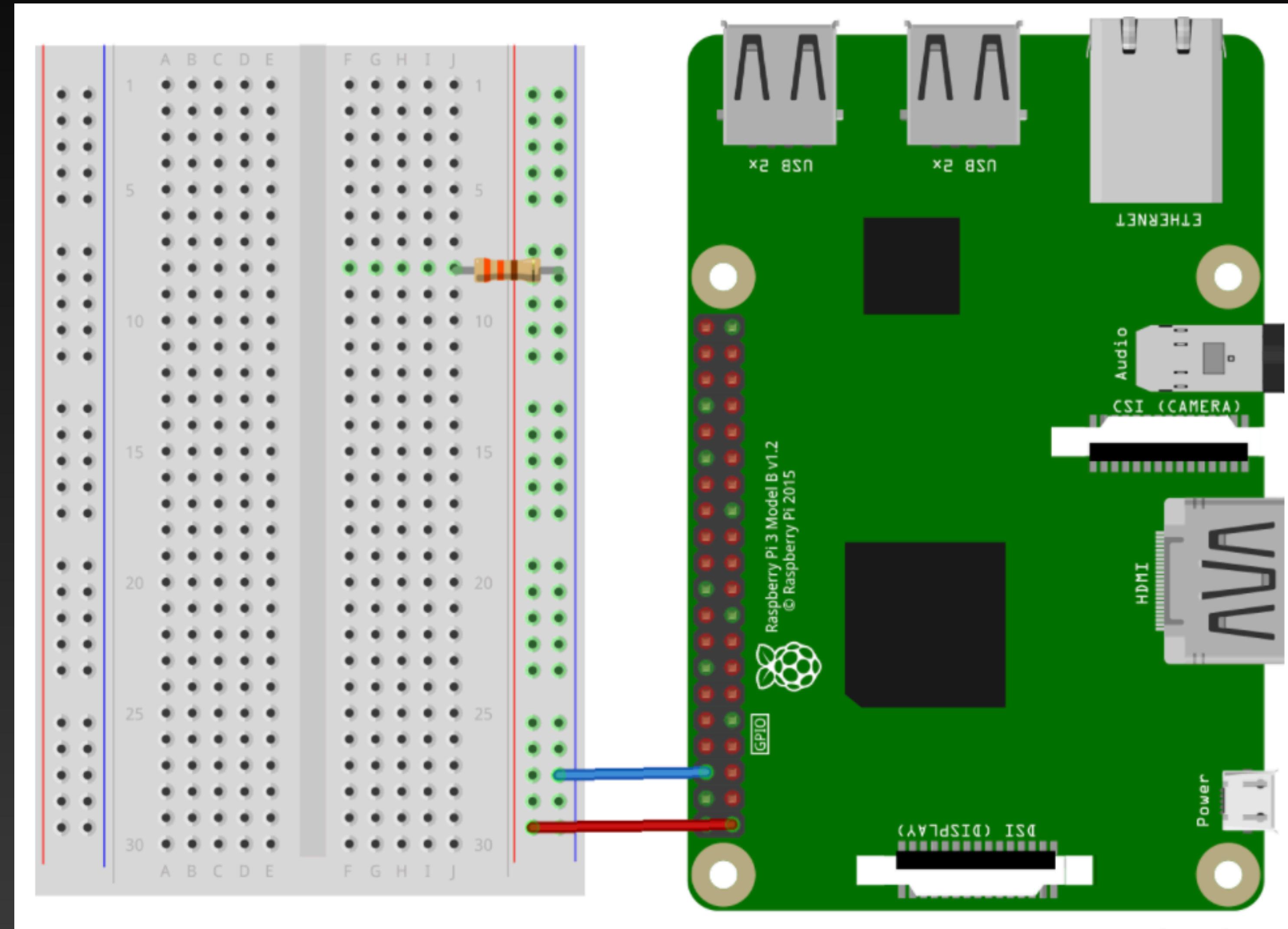
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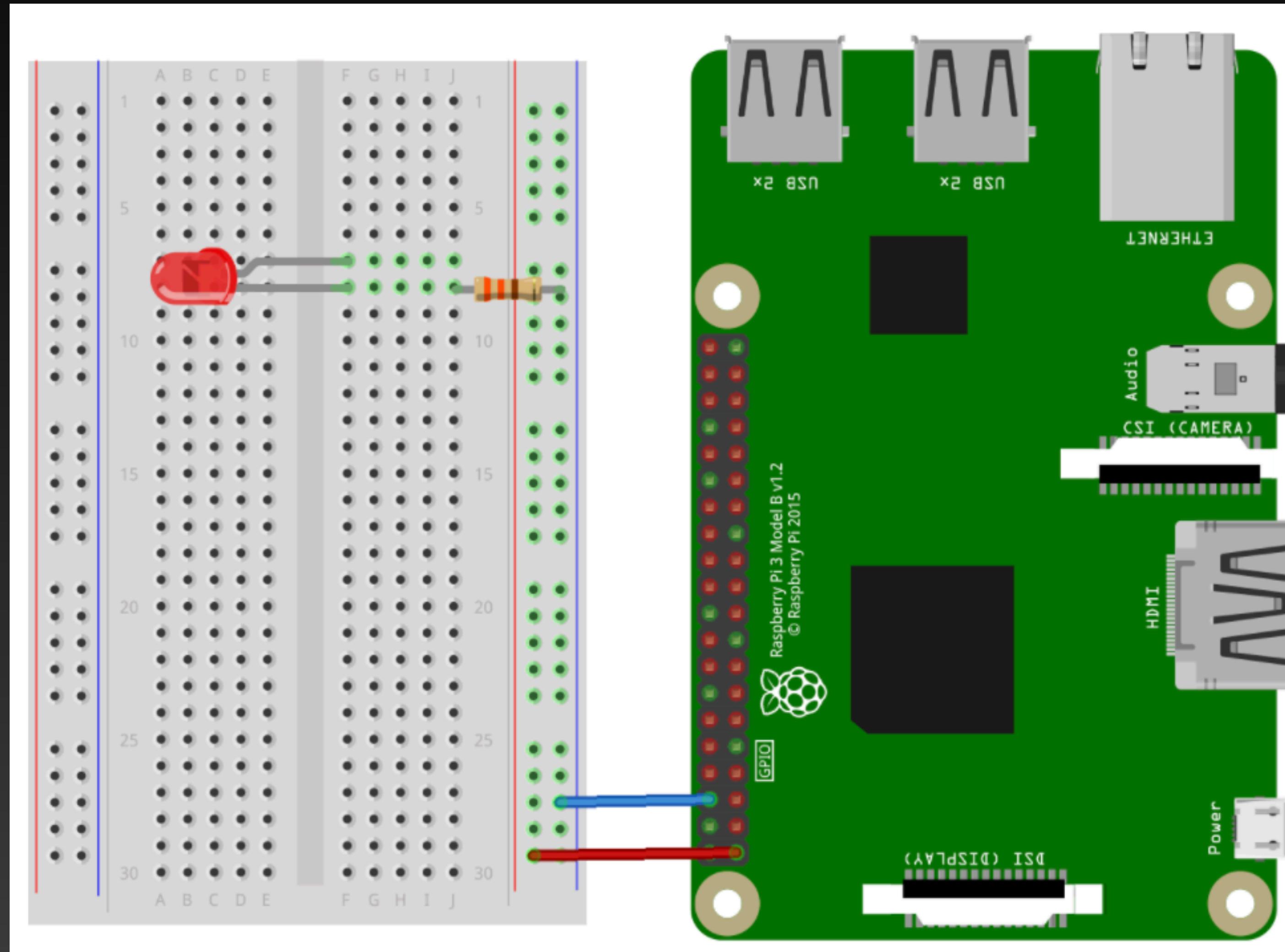
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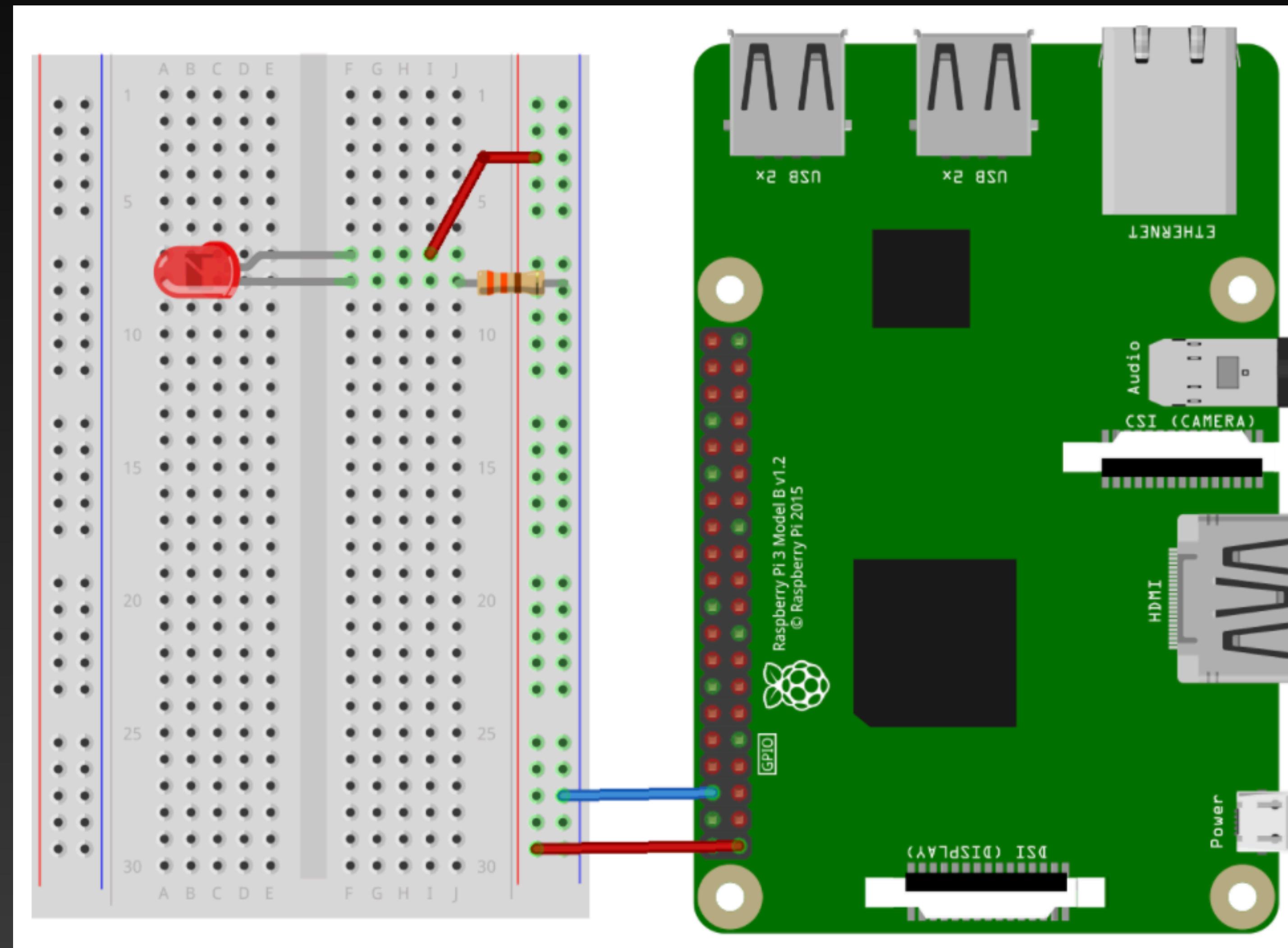
Test your circuit! An LED project

- Using a breadboard. Breadboard, LED light, Resistor, Male-to-female jumper leads, Male-to-male jumper leads



Test your circuit! An LED project

- Using a breadboard. Breadboard, LED light, Resistor, Male-to-female jumper leads, Male-to-male jumper leads



Home project

1. Please redo “Test your circuit! An LED project”.
2. Connect three LEDs use your breadboard, control them through Python LED Library.