LAB: Raspberry Pi Assembly Lab

Estimated Time of Completion – 1 Hour

INTRODUCTION:

The Raspberry Pi is arguably the most popular Single Board Computer (SBC). Tinkerers, students, and enthusiasts alike all love the low price tag, power efficiency, and ease of use that come with a Raspberry Pi. Kits like these CanaKit versions are very popular, as they bundle everything that you'll need to get started with your Pi.

OBJECTIVE:

This lab will teach students how to assemble their CanaKit Raspberry Pi Starter MAX Kit, Raspberry Pi Camera Kit, and Keyboard, Mouse, and Monitor to use as a Zoom station for class.

Requirements:

CanaKit Raspberry Pi Starter MAX Kit

Raspberry Pi Official Keyboard and Mouse

Raspberry Pi Camera Kit

Portable Monitor

Internet access

Steps

1. Prepping the CanaKit Raspberry Pi Kit
2. Assembling the Raspberry Pi Camera module
3. Putting it all together
4. Setting up keyboard, mouse, and monitor
5. Initial OS Configuration

Please note: Computer parts are very sensitive, please make sure to ground yourself before beginning this lab. The link below walks through a few options of how to do this.

https://www.wikihow.com/Ground-Yourself-to-Avoid-Destroying-a-Computer-with-Electrostatic-Discharge

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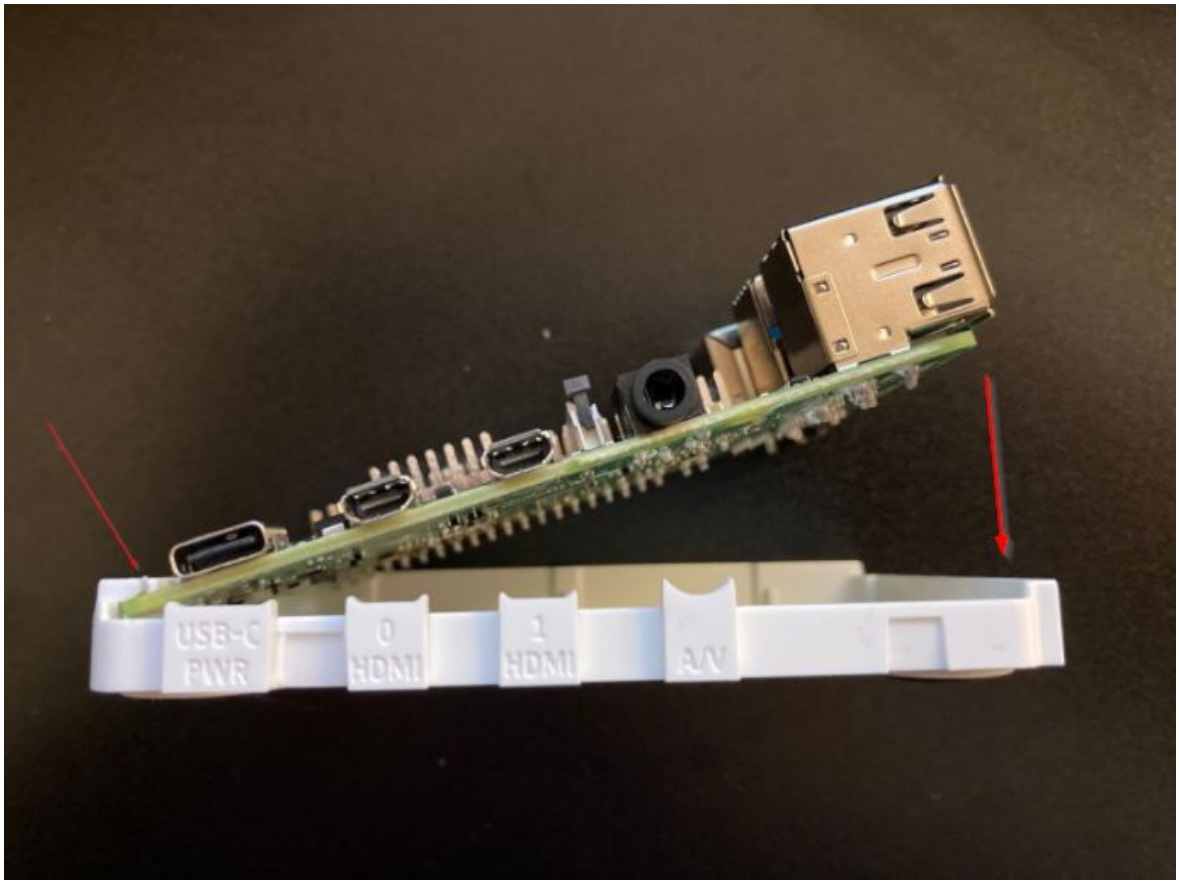
Step 1

- Prepping the Canakit Raspberry Pi Kit

1. Remove all components from their boxes. You'll need quite a bit of space for this. *Note: leave the MicroSD card in the anti-static bag so it's harder to lose.*
    a. Identify the three white pieces that make up the plastic CanaKit case.
    b. Identify the three heatsinks and cooling fan.
    c. Identify the Raspberry Pi itself.

2. Begin assembling the Raspberry Pi
    a. Place the Raspberry Pi into the bottom piece of the case as shown below. There are notches on one end of the case that it slides into, then set it down into the bottom of the case.

Note: MicroSD should NOT be in at this stage



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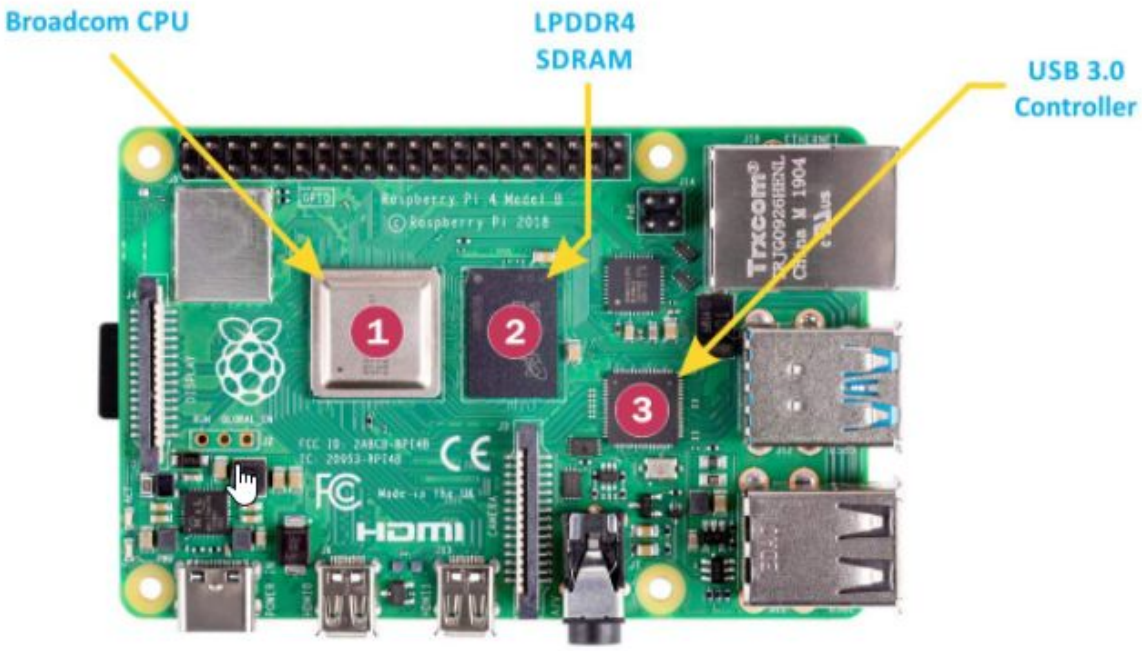
3. **Get familiar with your Pi, before applying the heatsinks in the next step, read some of the labels on top of the components, can you identify what they are?**



CanaKit Heat Sink Locations

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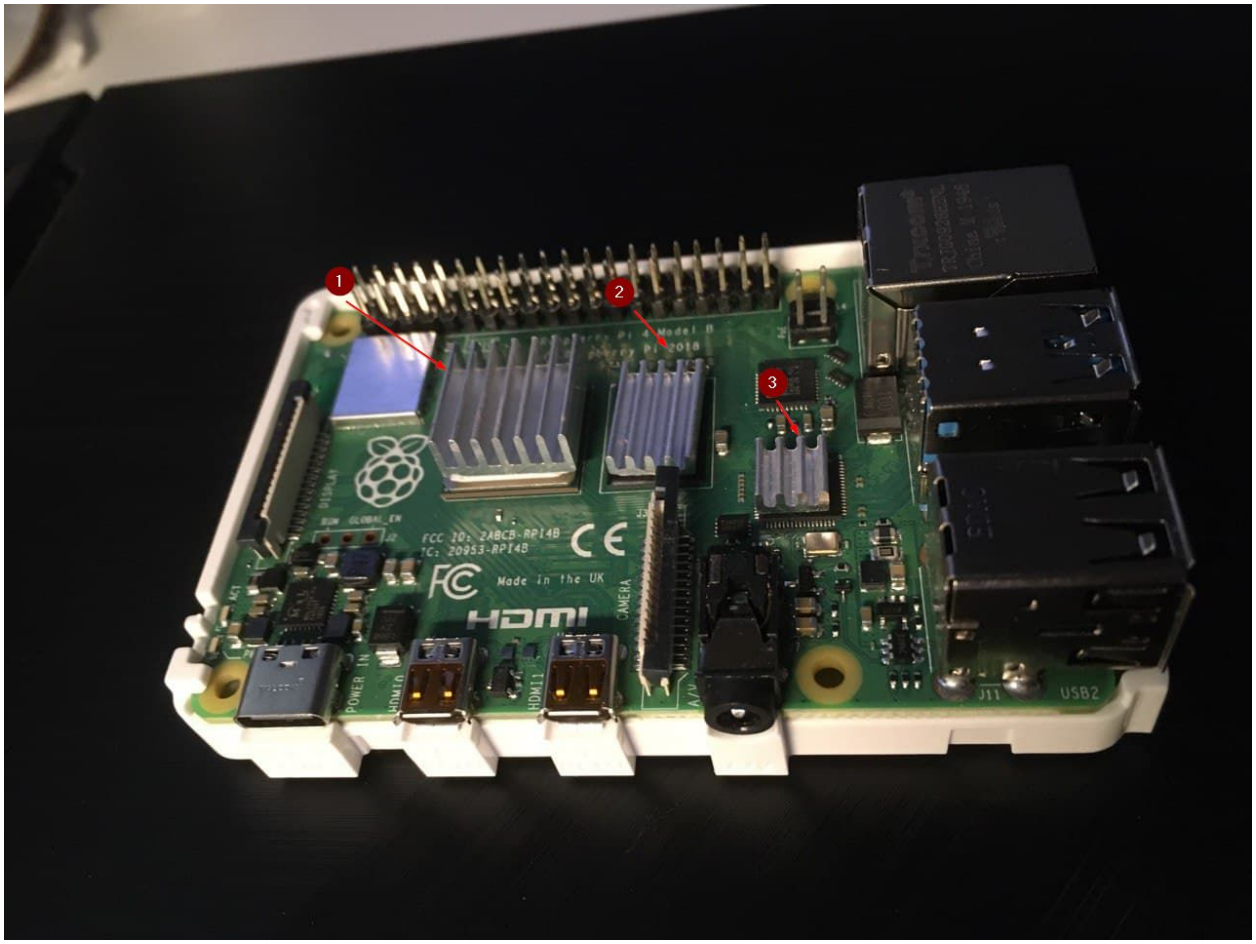

a. **Take the 3 heat sinks, peel the stickers off, and apply them to the corresponding components as shown above. These will help distribute the heat generated by the components.**

We will set this aside for now, for the next step grab the lid of the case and cooling fan.

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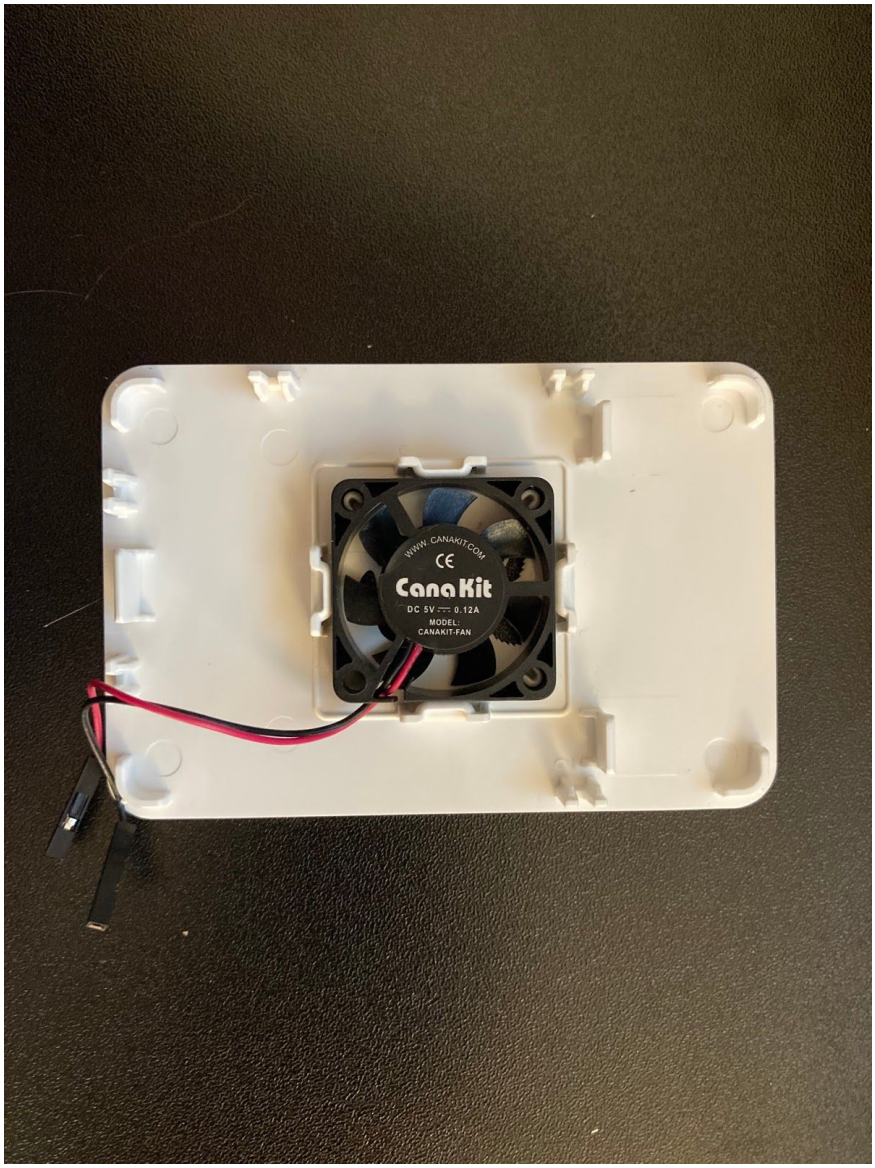

b. Place the cooling fan into the top lid of the case with the words CanaKit facing you as shown above. Leave the wires dangling for now.

We will set these parts aside and assemble our camera next.

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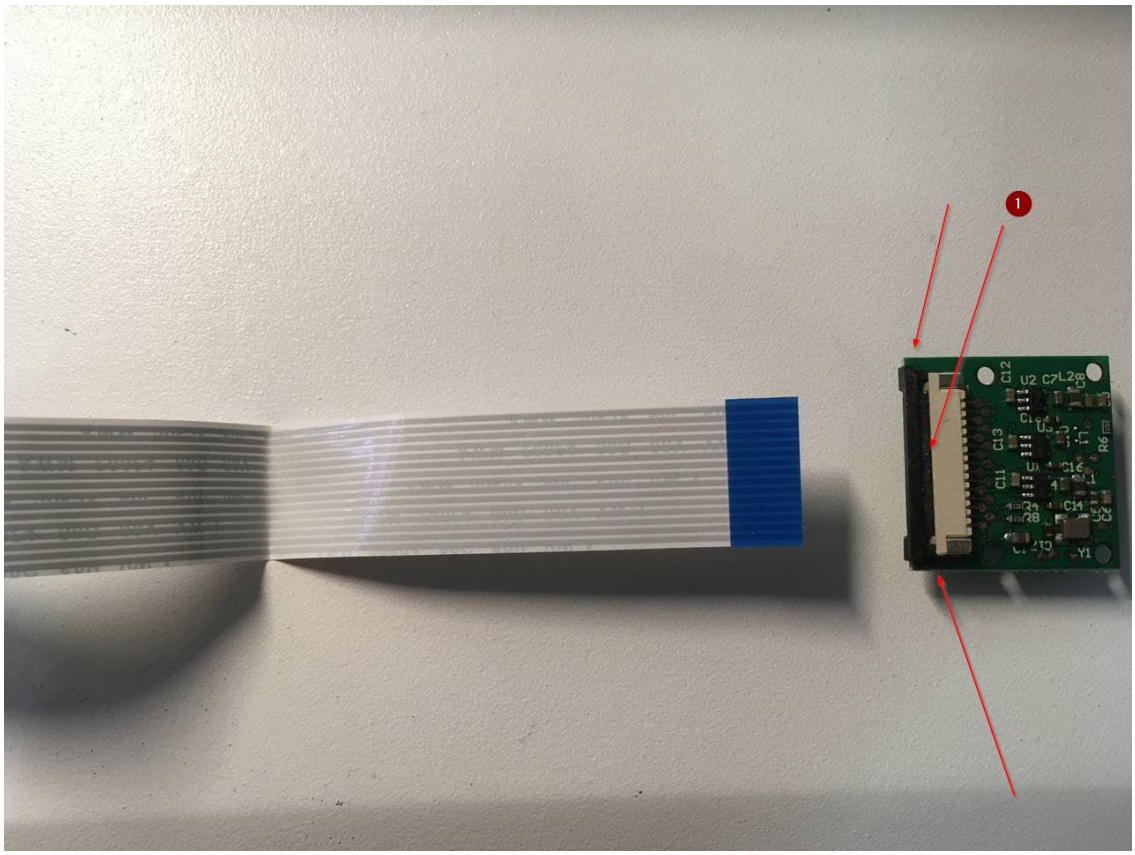
Step 2

- Assembling the Raspberry Pi Camera module

Please note: The camera module is very fragile, please be careful when handling it and make sure to ground yourself as the module can be very sensitive to static.

1. Take off all of the protective plastic coverings from the acrylic pieces. This may take some time.
2. Inserting the ribbon into the camera, if yours came with two ribbon lengths choose whichever one you prefer. (If your camera came pre-attached to the ribbon you can skip this step)

    a. Loosen the black clip by gently pulling on it (Labeled (1) below). Then, firmly insert the ribbon cable into the connector. If there is too much resistance, check your alignment, readjust and try again.



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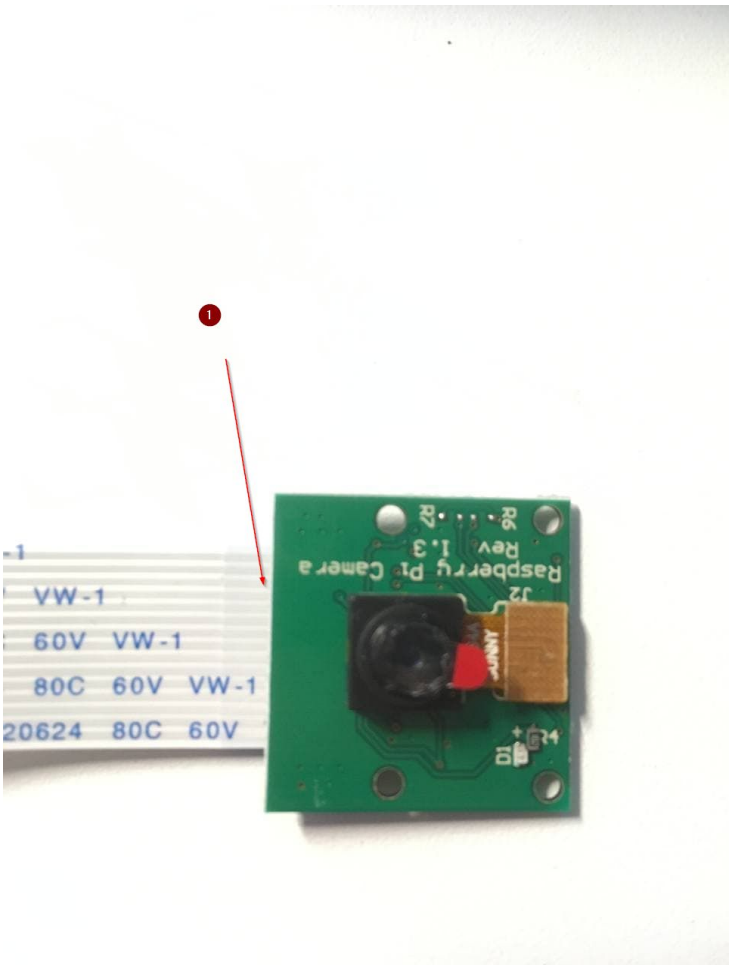
b. Check the other side, is there any silver showing? will know it is all the way in if you flip it to the other side and there are very little or no silver stripes showing.



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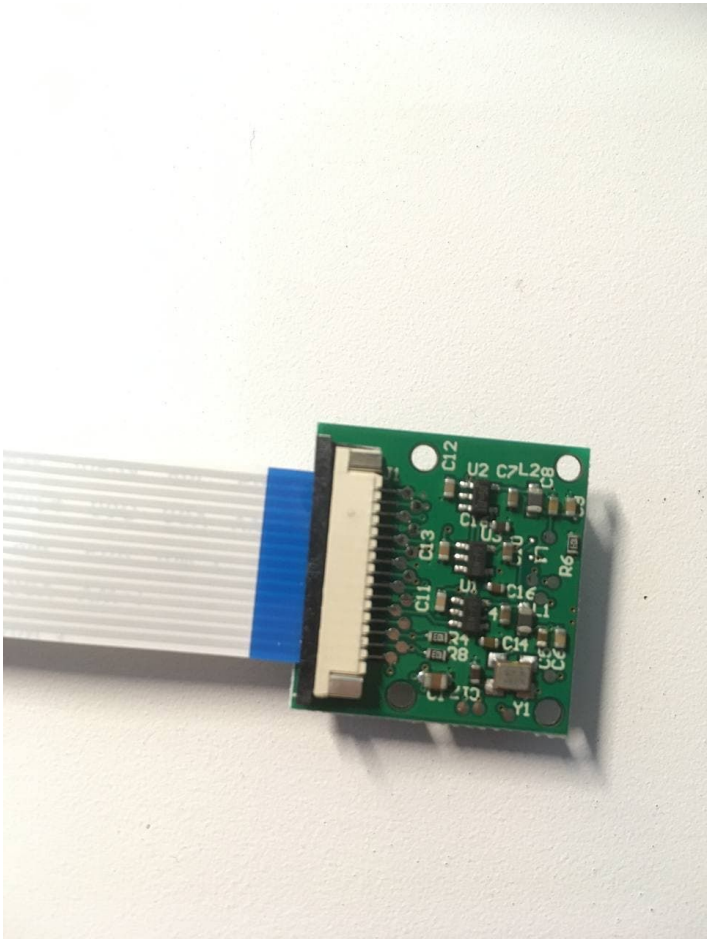
c. **Once you have confirmed that it is in correctly, close the clip by pushing it back into the lock position.**



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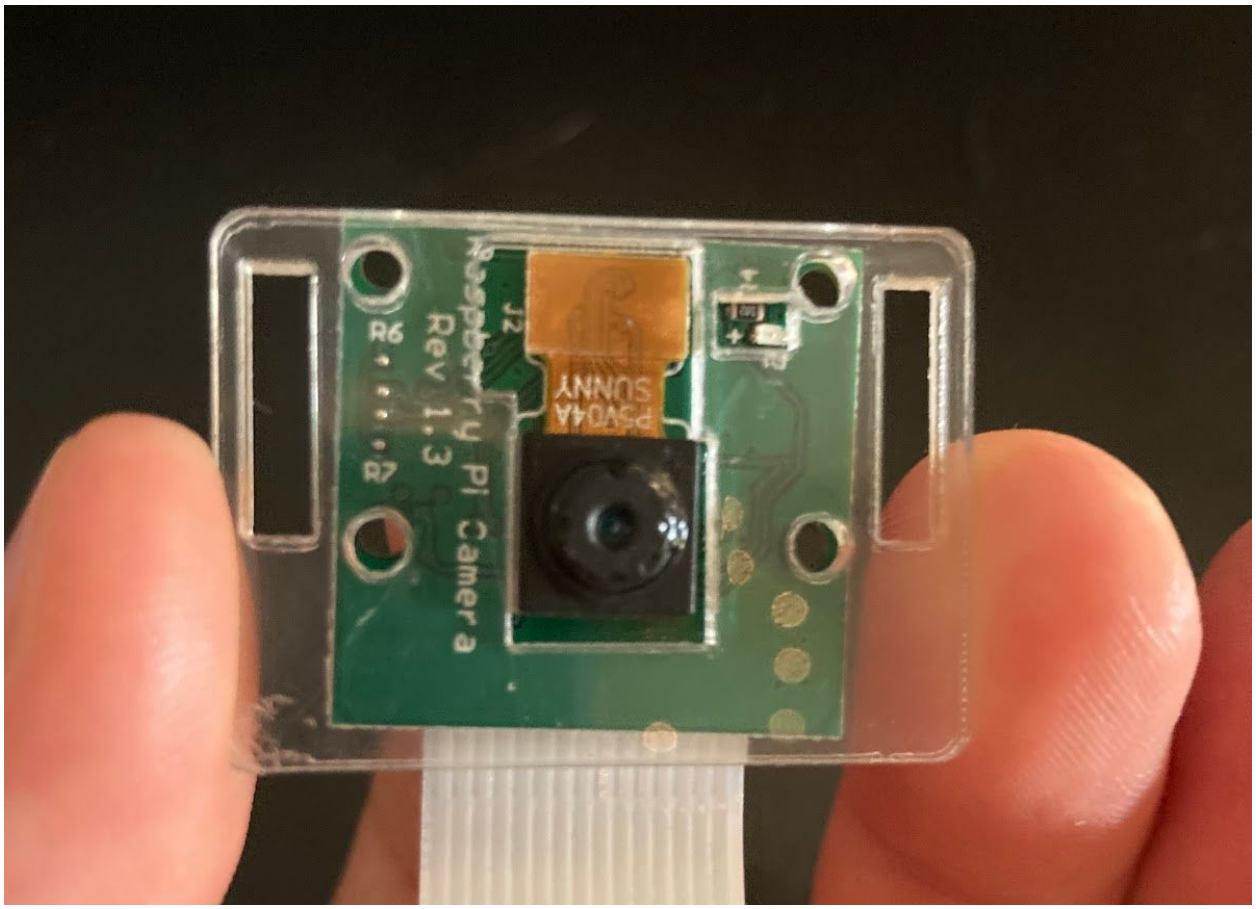
3. Take the camera and apply it to the faceplate as shown below.



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4. Place the back plate on the back of the camera, making sure to line up the four holes for the screws.

5. Place the four screws into the holes from the front of the camera. Do not screw the retention nuts onto the screws yet.

6. Place the feet into the slots alongside the camera. You may need some practice to hold everything together.

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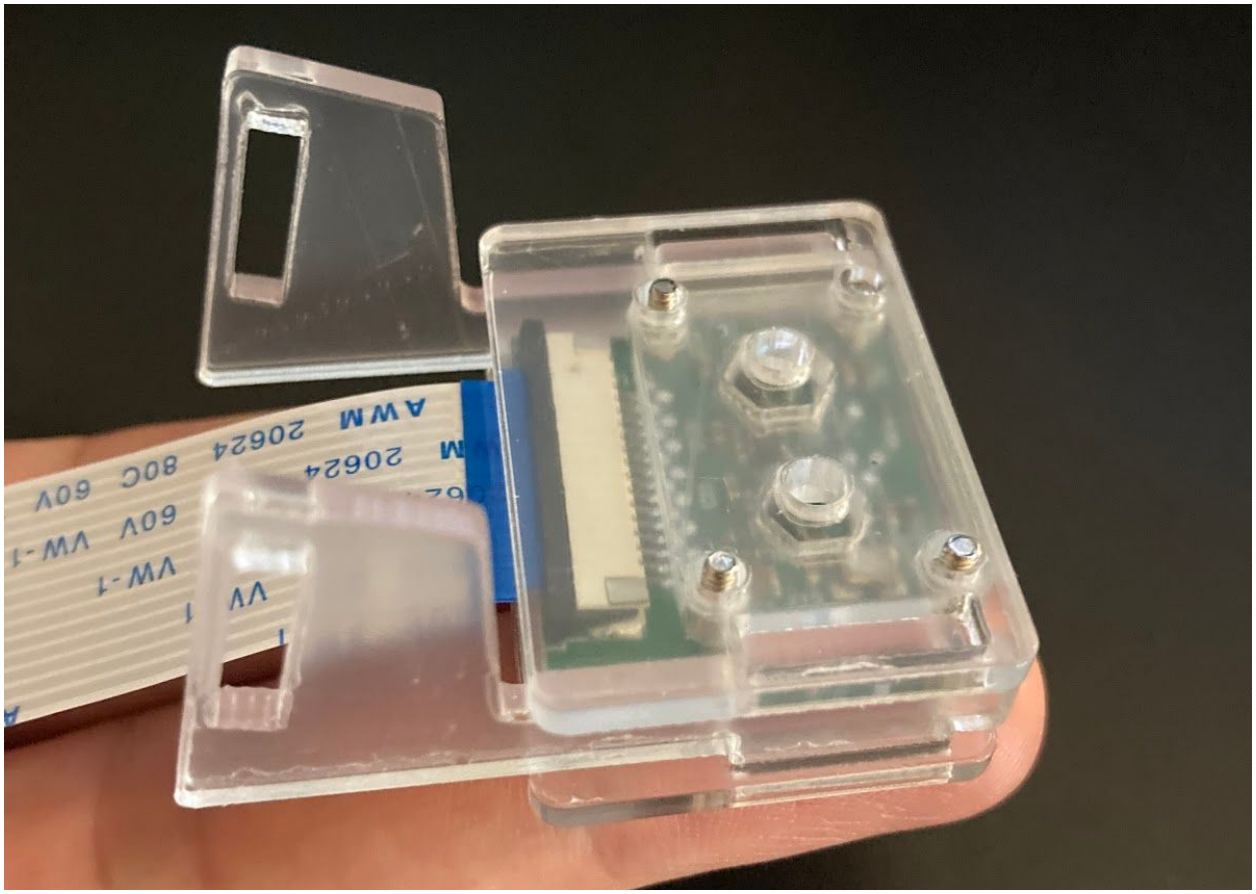

7. Place the final back plate onto the assembly. Now you can hold everything together by just the front and back pieces of acrylic.
8. Screw the retention nuts onto the 4 screws.
9. Place the bottom brace into the slots on the feet of the acrylic stand.

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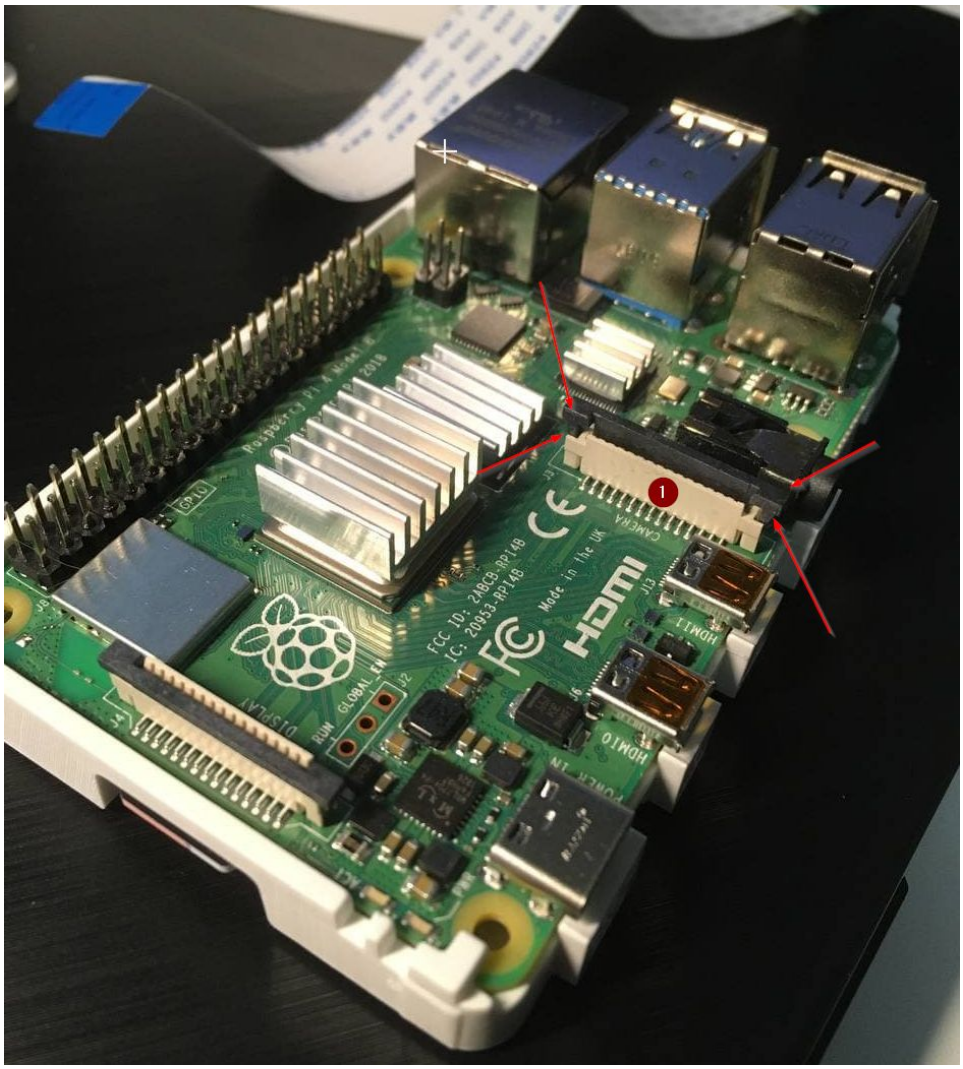
Step 3

- Putting it all together

Now back to our Pi

10. Unlock the black brace, similarly to unlocking this on the camera.



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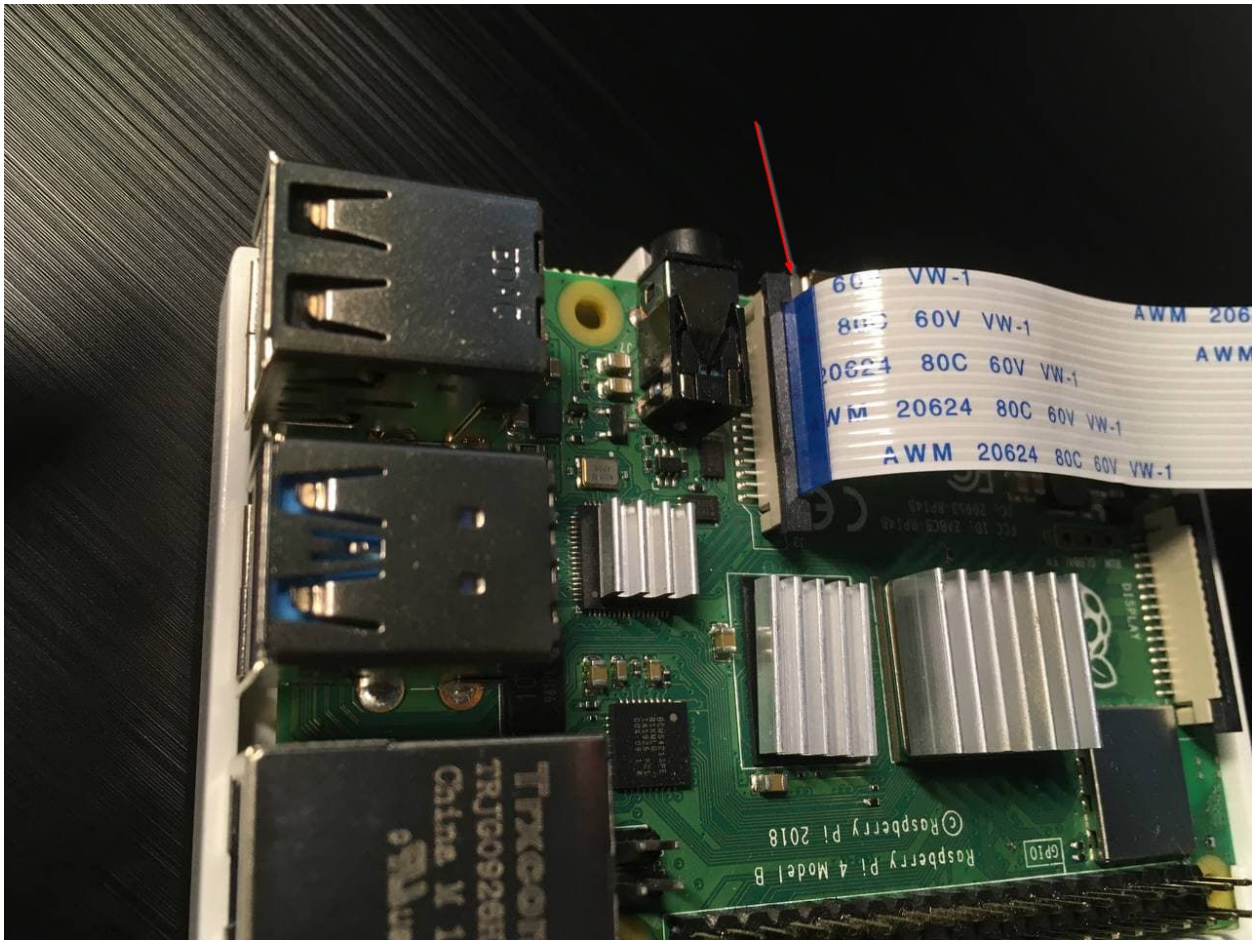

11. **Insert the camera cable in with the blue side facing the USB ports.**

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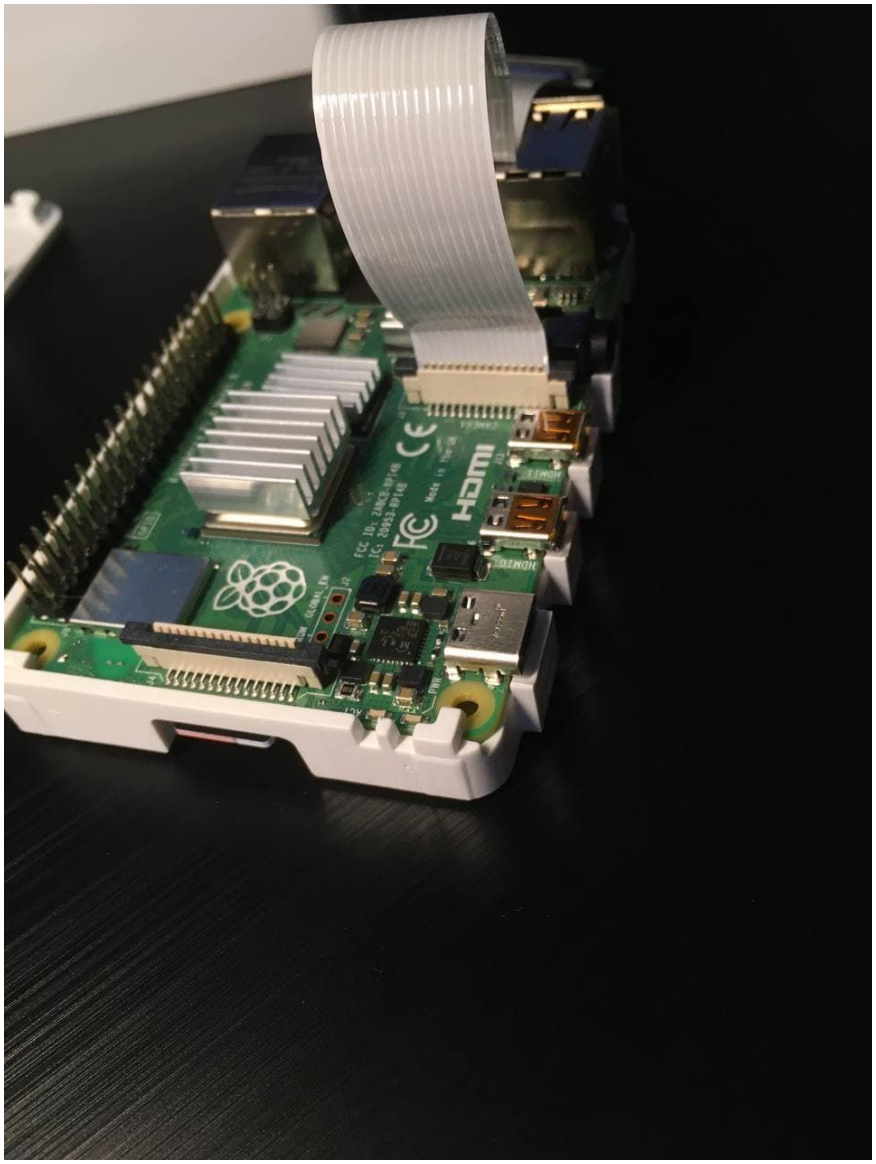

12. Double check the other side, if the cable is in all the way, the other side should barely show any silver stripes. Once this is confirmed, push the black brace down to lock it in just like before.

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13. **Now take the middle plastic piece of the CanaKit case, make sure the camera ribbon is somewhere in the middle as shown below. Line up the middle piece with all the I/O ports, and gently push it into the bottom piece from all sides until it is nice and snug.**

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c. Grab your Pi lid that has the fan installed and dangling.
d. Identify the parallel rows of pins towards one side of the Pi. These are called GPIO pins, and they're used to connect hardware that doesn't have a port. For our case, we'll be connecting the fan to the second and third pins from the left in the back row, with the red wire on 2 and the black wire on 3.

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e. **Take the lid of the case and place it on top. Make sure the ribbon cable has a way to escape. The lid can only fit in one direction, the proper direction is shown below. Gently push the lid in to secure it.**

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14. **Your Pi Camera is now assembled! In the last step of this document you will go through enabling the camera from within the OS. Remove the plastic protective covering with the red ribbon sticking out when you are ready to use it.**

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Step 4

- **Set up the Keyboard, Mouse, and Monitor**

1. **Plug the MicroUSB cable into the back of the Keyboard.**
2. **Plug the Mouse into the back of the keyboard. The Raspberry Pi keyboard has a built-in USB hub, which means that you can plug the Mouse straight into that.**

4. **Plug the keyboard into the Raspberry Pi in one of the back USB ports.**

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5. Now, plug one of the included Micro-HDMI to HDMI cables into the 0 HDMI port on the Pi, and plug one of the HDMI to Mini-HDMI adapters onto the end of it.

6. Plug the other end of the cable into the HDMI port on your monitor.

   Depending on the monitor you've received, this will either be an HDMI port or come with an HDMI to mini display port adapter.

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Step 5

- Initial OS Configuration

1. Power everything on
    a. Plug the Raspberry Pi power supply into the wall, then into the only USB type-C port on the Pi, next to the HDMI cable.

    b. Plug the USB type-C power supply into the wall, then into the bottom type-C port of your monitor.

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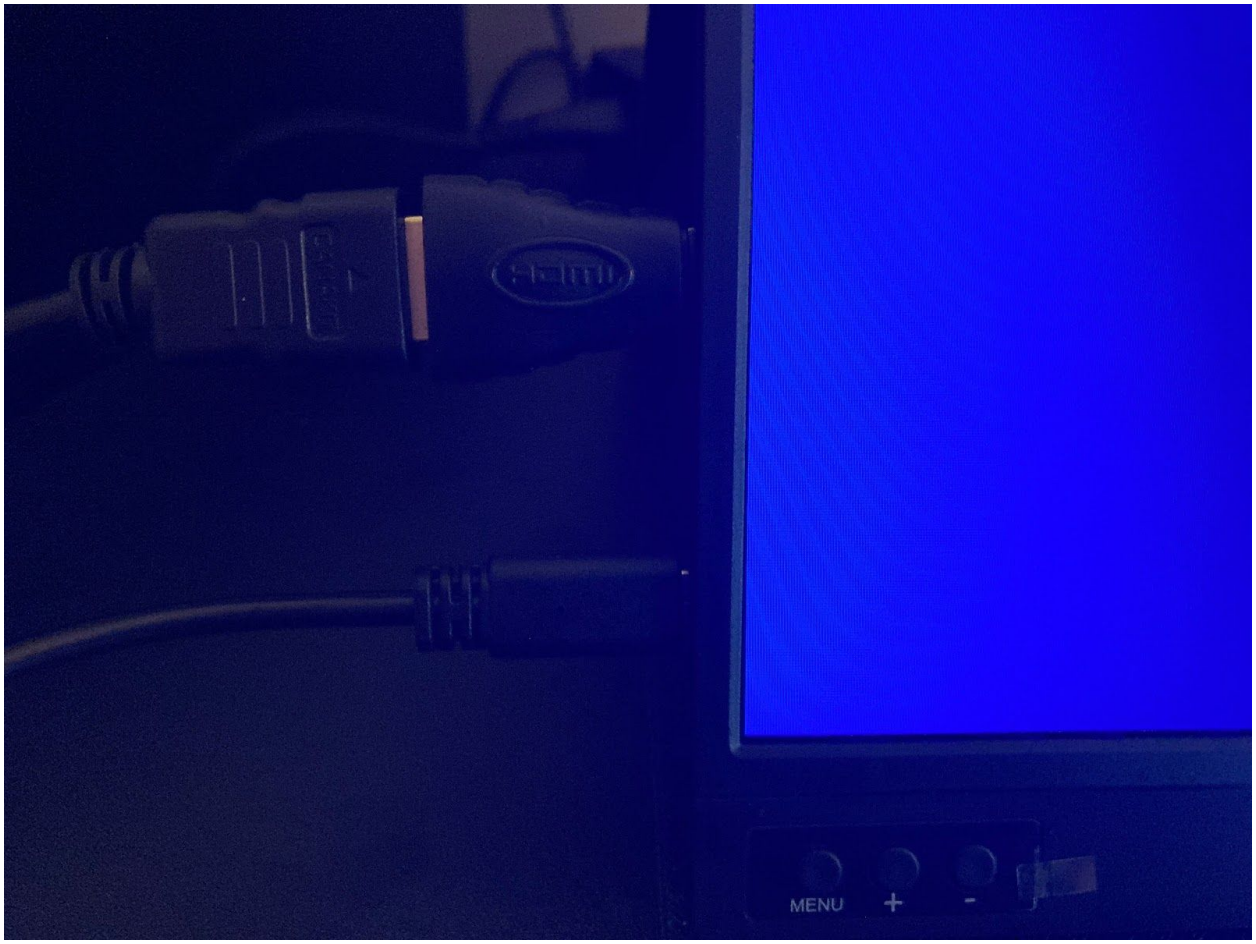

c. **Press the button on your Pi Switch and watch everything boot up.**

(Monitor shown above is the one that will come with an adapter)

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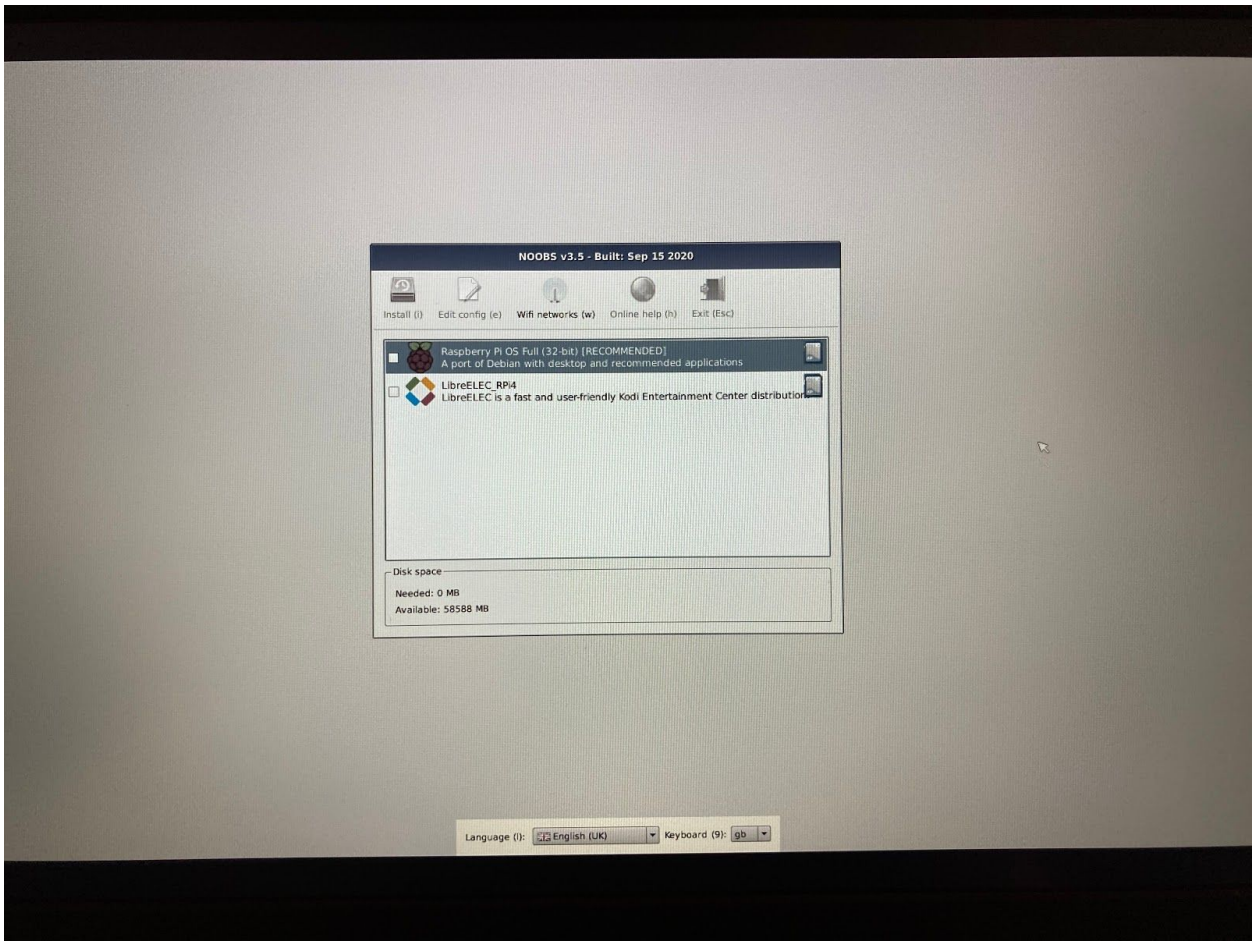
2. Configure the Operating System
    a. When everything boots up, you'll be greeted with a menu screen. This is called NOOBS, or New Out Of Box Software. It will walk you through installing and configuring your system.



        i. The Operating System here is called Raspberry Pi OS. It's a version of Linux, which is an incredibly powerful and flexible operating system. You'll learn more about Linux at some point in your IT career, but for now just know that it is a freely-available OS that you can tinker with on your Raspberry Pi.
    b. At the bottom of the screen, select your language and keyboard layout. Once you choose your language as English (US), your keyboard layout will automatically update.
    c. From here, check the box next to Raspberry Pi OS Full (32-bit) (RECOMMENDED), then click Install.

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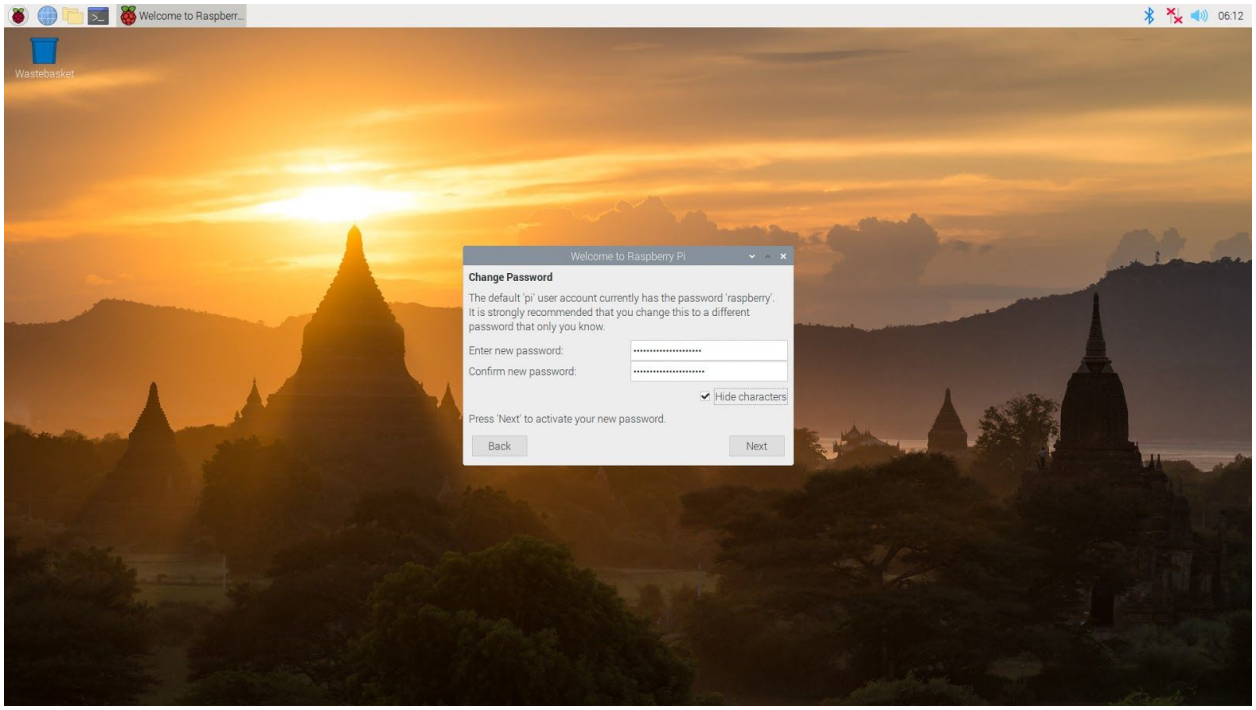
i. Alternatively, you can choose to set up a WiFi network on your system. To do that, click “WiFi networks (w)” in the top menu.
ii. Choose the WiFi network, type in the password, and away you go. You’ll have access to a bunch more OS images that might be useful to you later. For now, just go with Raspberry Pi OS as stated above.

d. Wait for the installation to finish, and click “Ok” to reboot once it does. You’ll then be greeted with a welcome screen that will walk you through making your user, setting your password, setting up WiFi, and adjusting the resolution of your display to make sure it all looks right.
i. Click Next.
ii. Set your country (United States), your Language, and your Timezone. Click Next.
iii. Set a new password. Make sure it’s a long, complex password that you don’t use for anything else. Pis are easy to steal, so if you do end up keeping something personal here, someone could get it pretty easily.



iv. Next, check the box saying “This screen shows a black border around the desktop” if you see that border. I have never not had that happen to me. Click Next.

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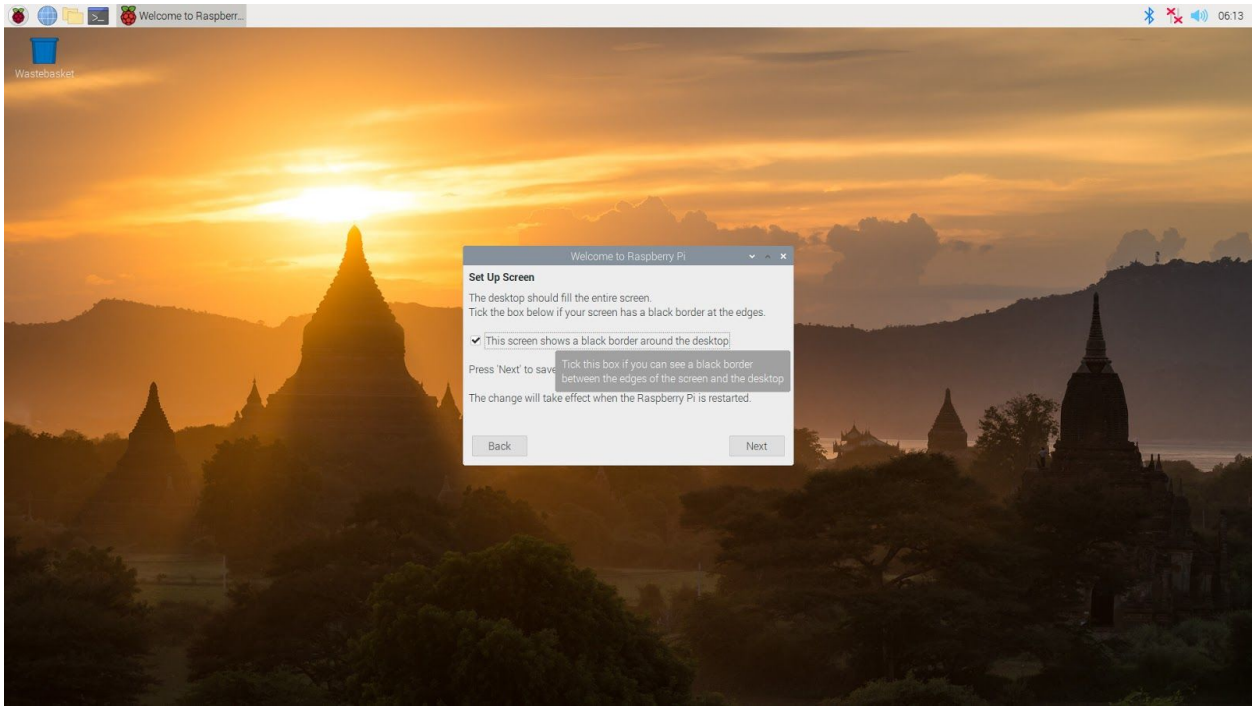

v. **Choose a WiFi network. Click Next. Enter the Password. Click Next. (You can also directly plug an ethernet cable in if you have one nearby)**

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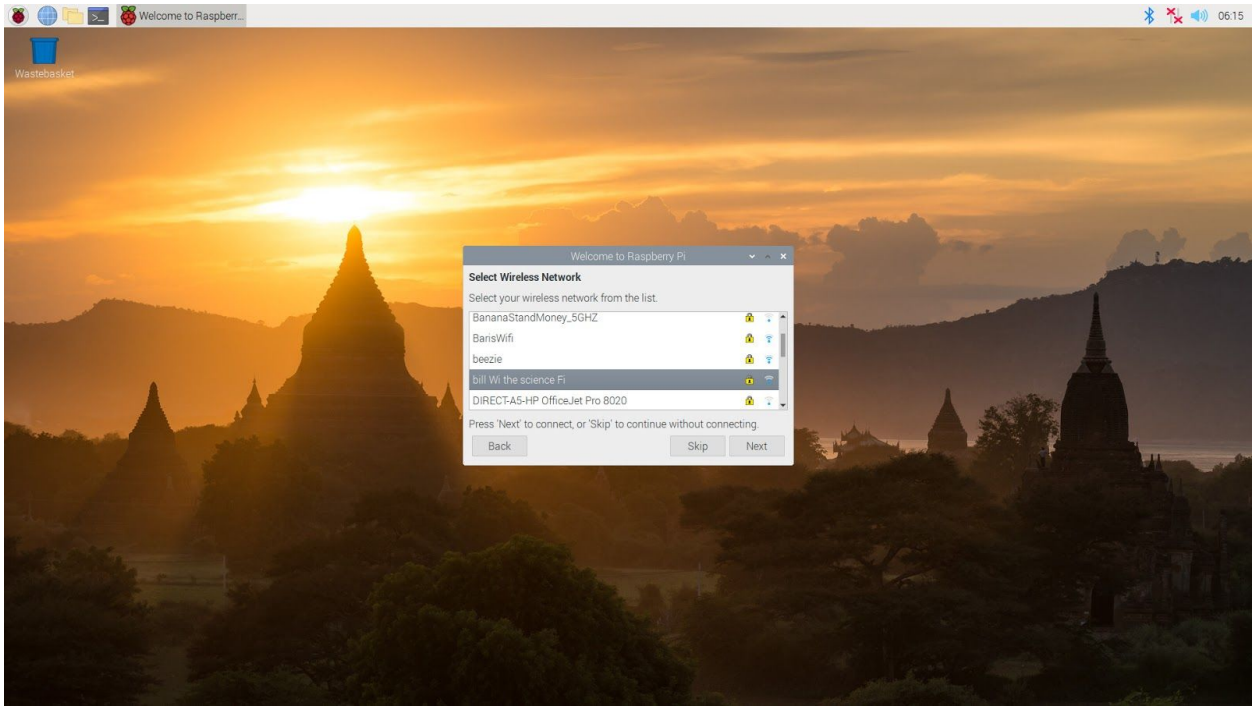

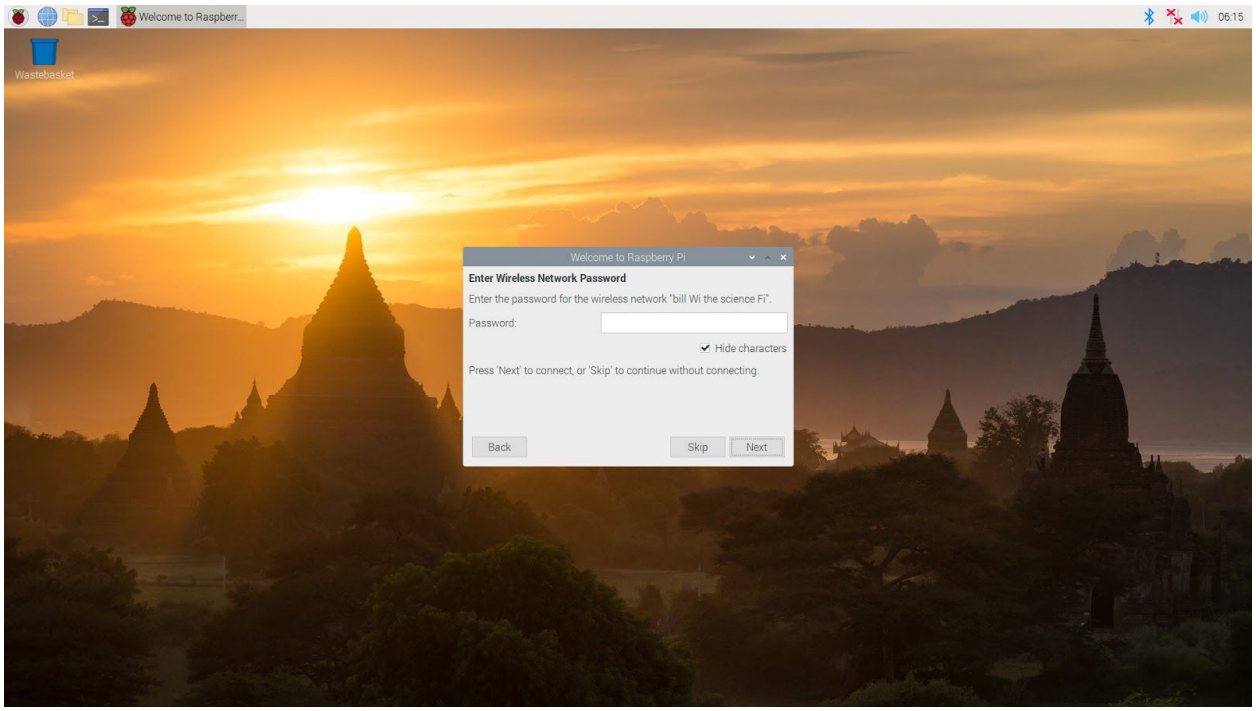

vi. **Click Next to download and install OS updates. This is important to do, as it will install the newest versions of software and security fixes to your system. This may take a long time.**

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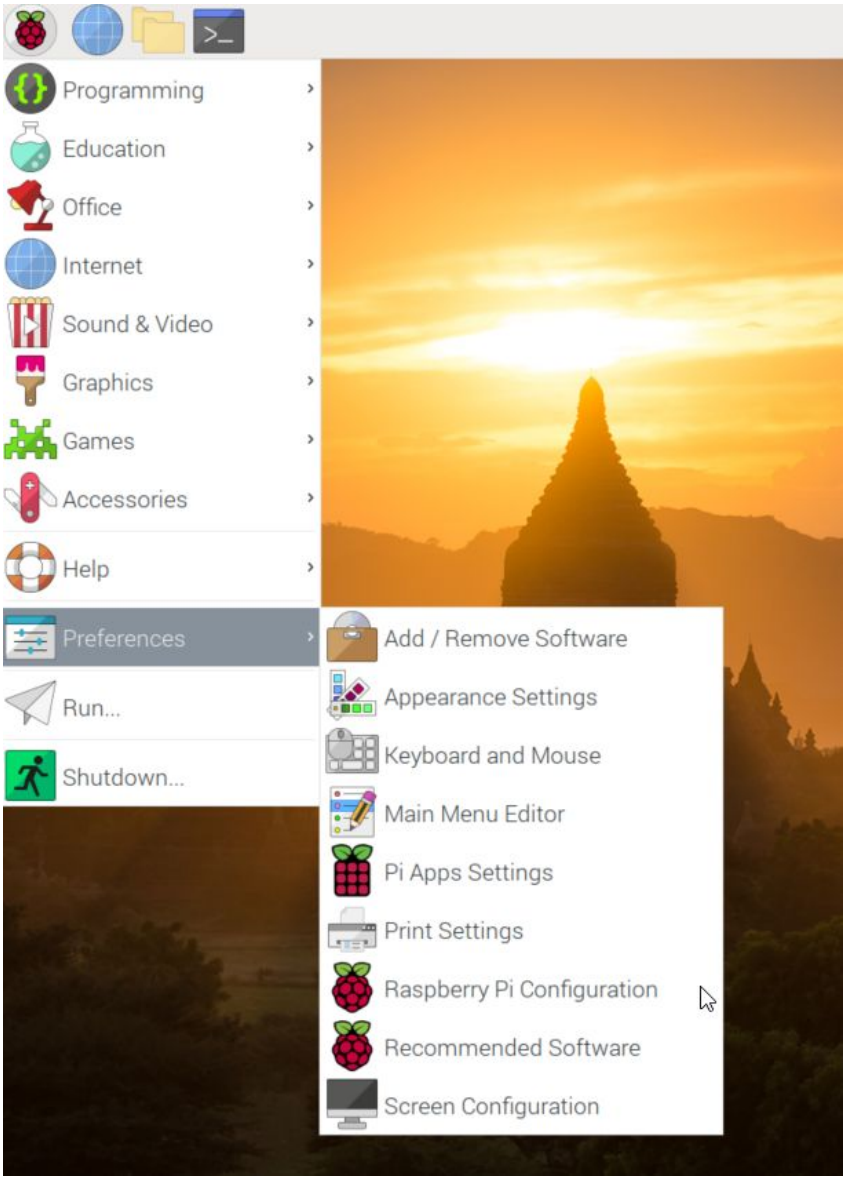
vii. Once the updates are complete, reboot your Pi. Once it boots, you're able to tinker and learn with your Raspberry Pi.

3. Activate the camera in the OS
   a. In the upper left hand corner, click on the Raspberry Pi logo. Hover over "Preferences", then click on "Raspberry Pi Configuration".



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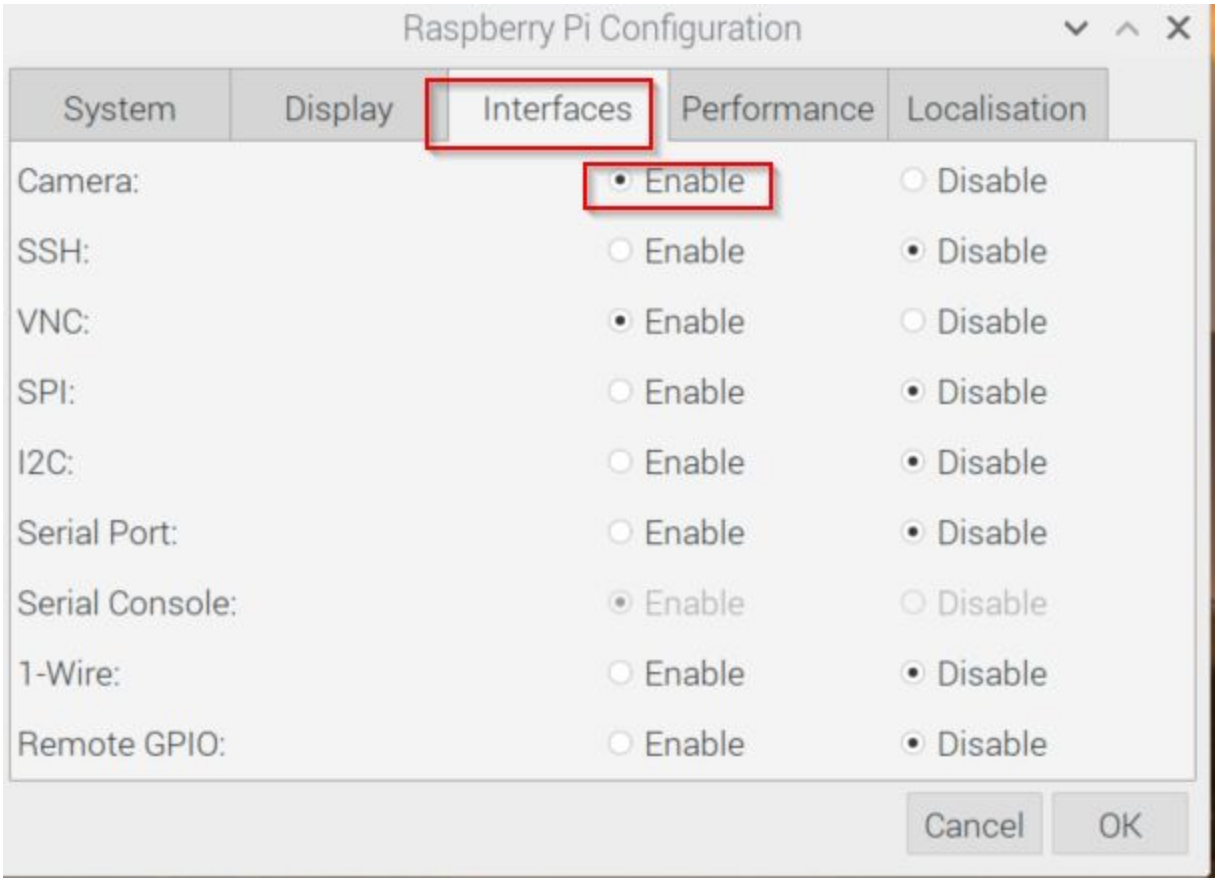
b. Click on “Interfaces”, then click the radio button for “Enabled” next to “Camera”. Click Ok. Reboot again, then your camera should work.



This concludes this lab

Please take a picture of your setup and upload it as your submission for this lab

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