Getting Started with Raspberry Pi

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Contents

1 Introduction

1.1 What is a Raspberry Pi?

The Raspberry Pi is an tiny computer, that includes a microprocessor, a bit of memory, a slot for an SD card, input/output (I/O) ports, e.g. HDMI, USB, headphone, camera, and some general purpose input/output (GPIO) pins for various types of electrical connectors.

1.2 Why use the Raspberry Pi?

Generally, Raspberry Pis draw considerably less power than regular computers, are a lot smaller, and are relatively cost-effective. In addition, the GPIO pins allow for connecting and controlling various types of electrical components, such as LEDs and sensors. Raspberry Pis are very flexible devices. They can be used for personal computers, home survaillance systems, weather stations, adblockers for your home network, retro gaming machines, as an AI assistant, and so much more! In this class, we'll be using it as an environmental monitoring device.

1.3 Packaging List

Here are the things you will have to work with:

1. Raspberry Pi Zero W board
2. Case
3. 2.5A power supply
4. HDMI to mini-HDMI adapter
5. USB to micro-USB adapter
6. Header pin diagram
7. PMS5003 Particulate Sampler
8. BME280 Temperature, Humidity, and Pressure sensor
9. Cables
10. micro-SD card

1.3.1 Other items

1. SD card
2. SD card to USB adapter
3. USB multiport adapter
4. Breadboard
5. Wires
6. Line level converter (LLC)
7. MCP3008
8. various MQ-sensors

Figure 1: Raspberry Pi Image Software. Use the program to select Raspberry Pi OS (Operating System) 32-bit. Then select the SD card location. Finally, click on "Write".

1.4 Preloaded Micro-SD Card

Here's what we have done to prepare for class:

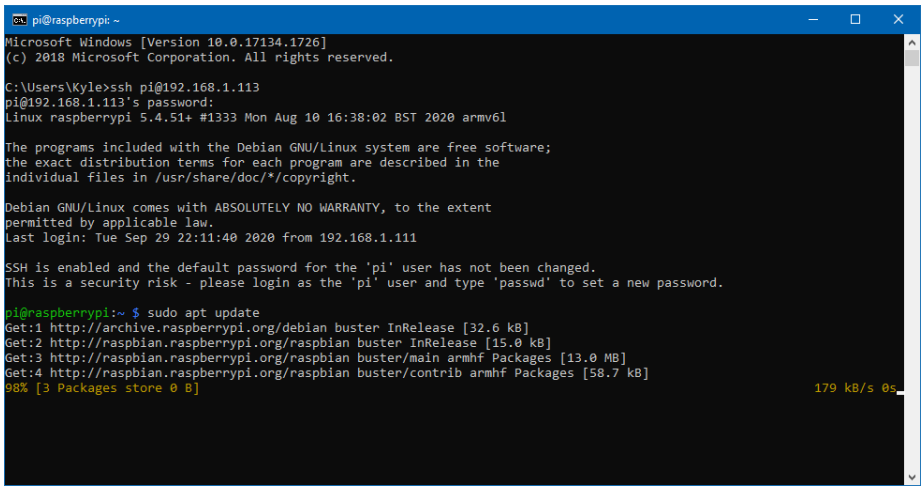
1. Used "Raspberry Pi Imager" to image micro-SD card (https://www.raspberrypi.org/downloads/) (Figure).
2. Registered Raspberry Pi with Pomona's network.

1.5 Update and Upgrading Raspberry Pi OS

Every few months, the operating system should be updated. These have been updated on January 2025 with the following commands:

1. First...!

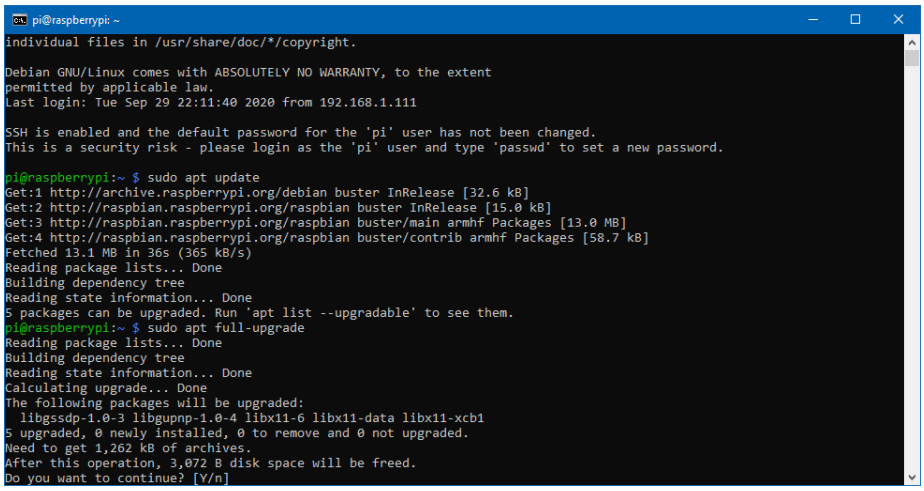
```
sudo apt update
```



2. Secondly, we want the Pi to compare the version list with its current packages and programs and update where needed. In your SSH session, type:

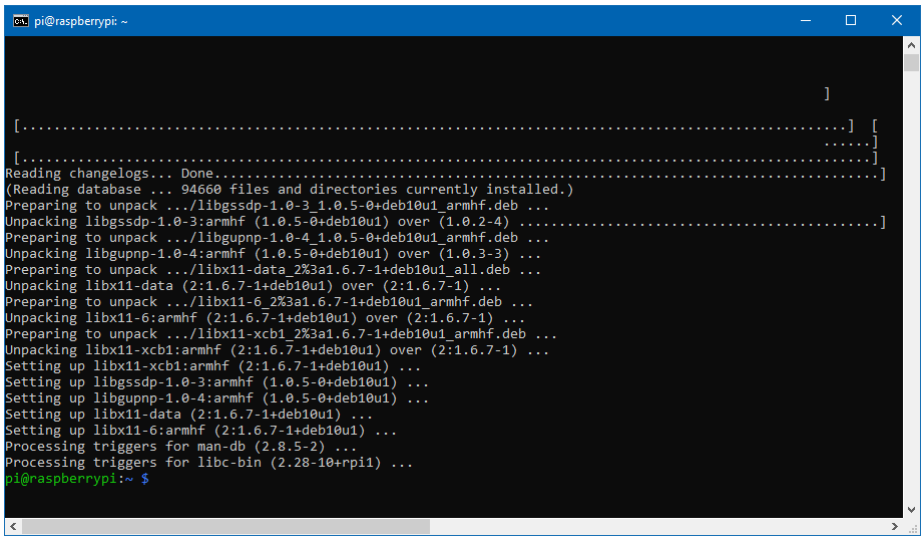
```
sudo apt full-upgrade
```

3. You will be asked if you are sure you want to upgrade. Type **"y"** and **Enter**.



4. Once it is finished, it will show this once again:

```
pi@raspberrypi/:~ $_
```



5. Congratulations! Your Pi has been upgraded!

2 Configuring the Pi

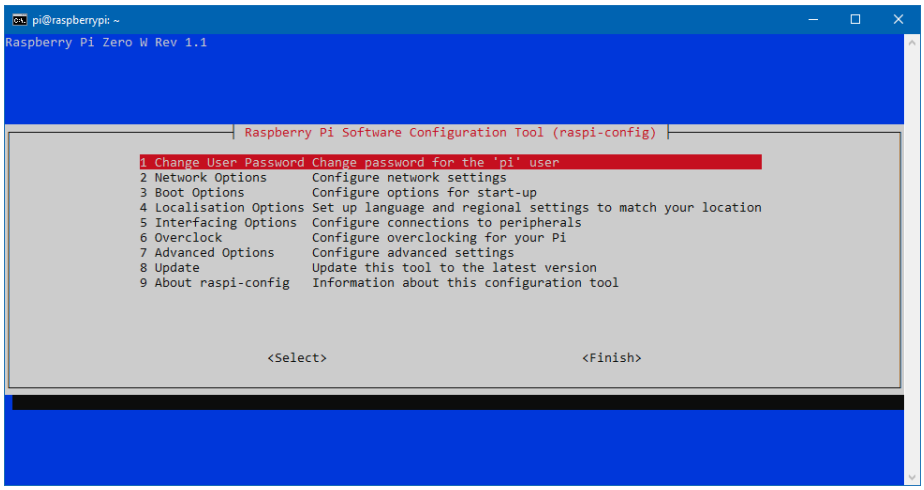
2.1 Changing the Pi User Password??

Note sure we will do this...

As a security measure, since your Pi is in your WiFi network, you'll want to change the password for the Pi.

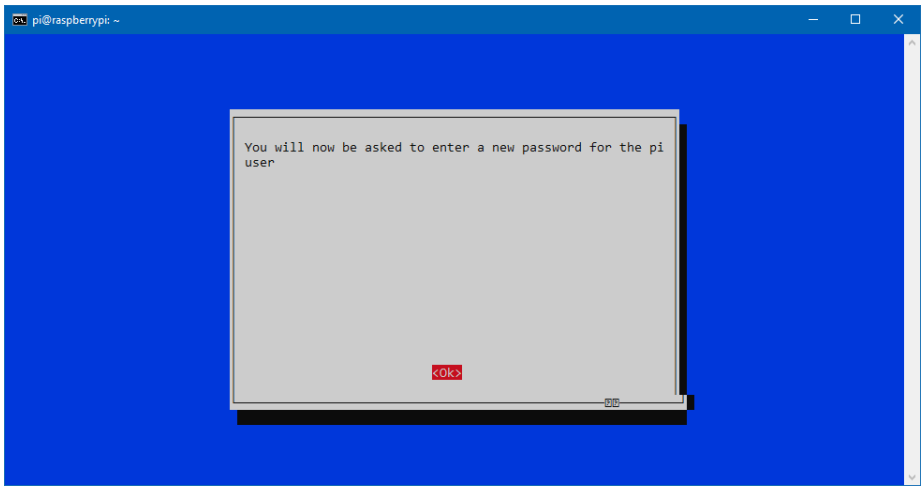
1. Run the Raspberry Pi configuration utility by using this command in the CLI:

```
sudo raspi-config
```

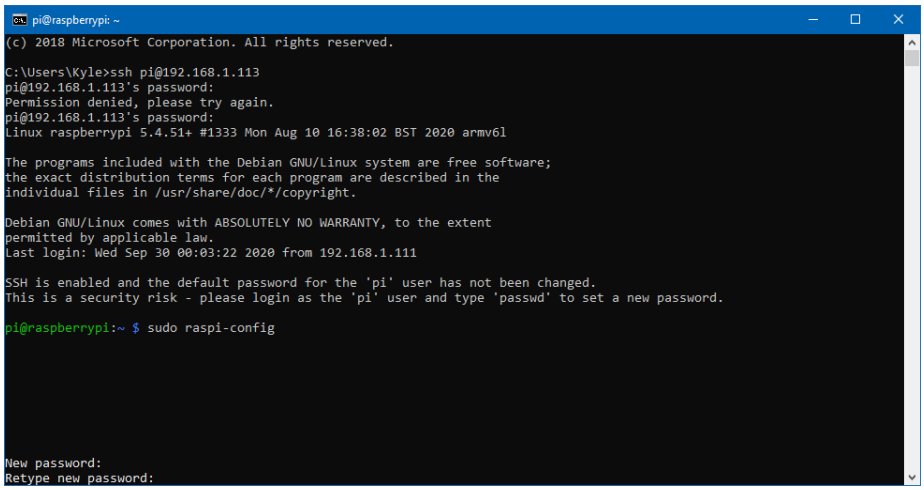


2. Navigate to **"Change User password for the 'pi' user"** and hit **Enter**.

3. It will prompt you that it is going to ask for the new password. Press **Enter**, and type your new password followed by **Enter** again.



4. Verify the password by typing it again.



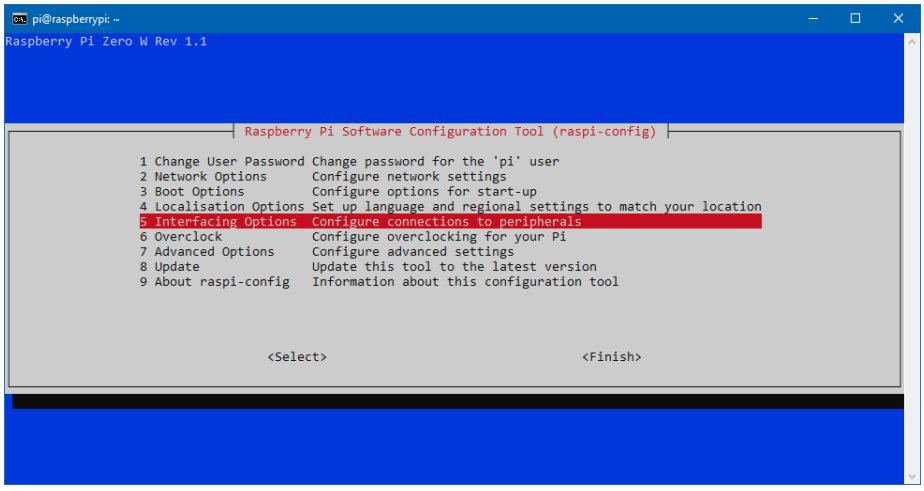
5. Your Pi now has your new password. Don't forget it!

2.2 Network Options

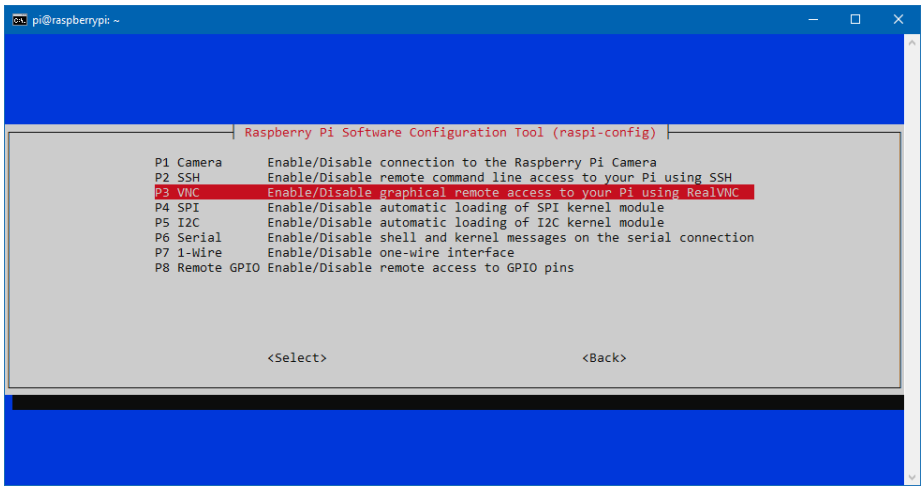
2.3 Virtual Network Computing (VNC) Option

NOTE RealVNC lets you control the Pi via a graphical user interface (GUI)https://www.youtube.com/watch?v=NWBmYnNvN3A.

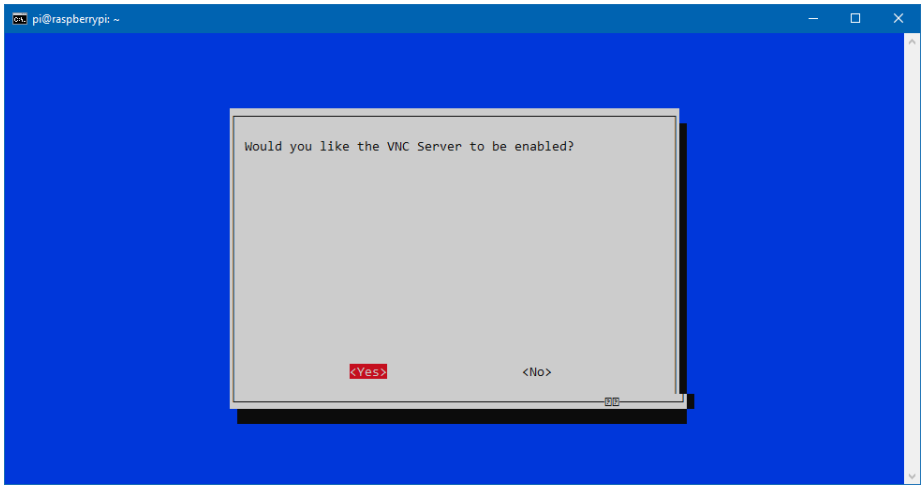
1. While still in the raspi-config utility, navigate to **"Interfacing Options"**.



2. Navigate to **"VNC"** and select it.



3. The Pi will prompt you if you want the **VNC Server** enabled. Select **"Yes"**.



4. Wait a second and the Pi should let you know that the **VNC Server** is now enabled. This server will start automatically when the Pi boots up.

5. You still need to download **RealVNC *Viewer*** on the computer you want to remotely access the Pi with.

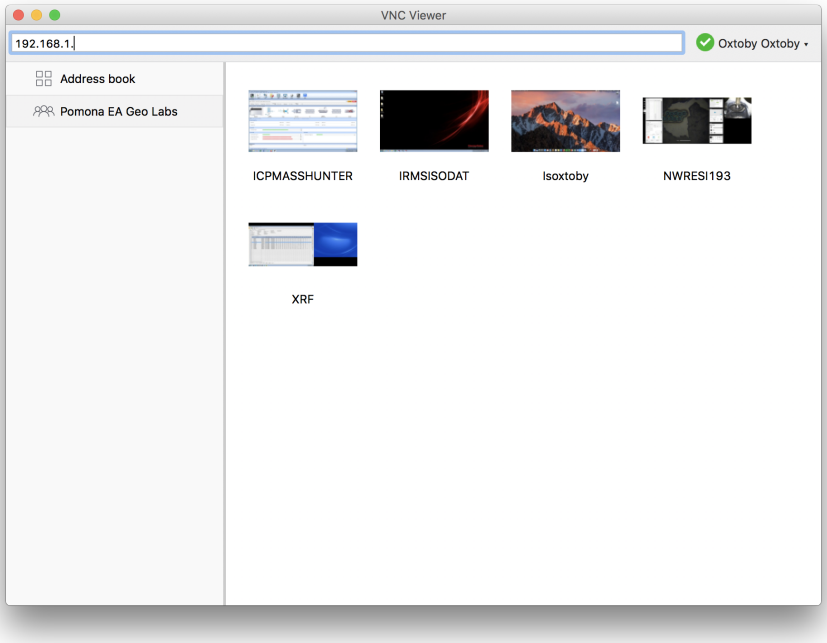
6. **RealVNC Viewer** can be downloaded at: https://www.realvnc.com/en/connect/download/viewer/[1] [2]

7. Download the client that is for your OS and then install it.

8. When you open VNC Viewer, you should see something like the image below. In the top toolbar, input the IP address of the Pi and hit **"Enter"**.

[1] I don't think this will work – I prefer using remote desktop connection... why did you pick this one?

[2] Raspberry Pi OS comes with RealVNC Server already installed, you just have to enable the option (covered in the SOP). The other requirement is that you download RealVNC Viewer on the computer you want to VNC in with. I chose this route because it already is sort of equipped with RasPi OS, and the Viewer is cross-platform so I wouldn't need to write two sections of the SOP, on OSX and Windows.



9. You will be prompts for the username (pi) and the password – These are your pi's username and password. Remember changing your password will be a good idea a some point.

10. Wait a minute and you should eventually see the desktop of the Pi. You can can browse and manipulate with your mouse etc.

3 Finishing Up