1. Install Raspbian
   1. Download the Raspbian with desktop image from raspberry pi website
   2. Extract the zip
   3. Flash the image to an SD card using balena etcher
   4. Remove the SD card and plug it into the raspberry pi
   5. First boot will have a pop up that states “Root filesystem resized” then will reboot
   6. Follow the guided setup
      1. Set locality to USA, English, US Keyboard
      2. Time zone: New York
      3. Password: thinfilm1
      4. Skip network setup
      5. Skip software update
      6. Reboot
   7. Open a terminal window and type “sudo raspi-config”
      1. Navigate to System Options>Wireless LAN
      2. Network SSID: wahoo
      3. Passphrase/Password: None (leave blank)
      4. If connection fails, contact ITS about resetting wahoo registration
      5. NOTE: This may take 30sec-2min to connect, watch the network icon in the task bar
   8. Preserve network connection
      1. “sudo nano /etc/wpa\_supplicant/wpa\_supplicant.conf”
      2. Add the line in red so the network block reads

network={

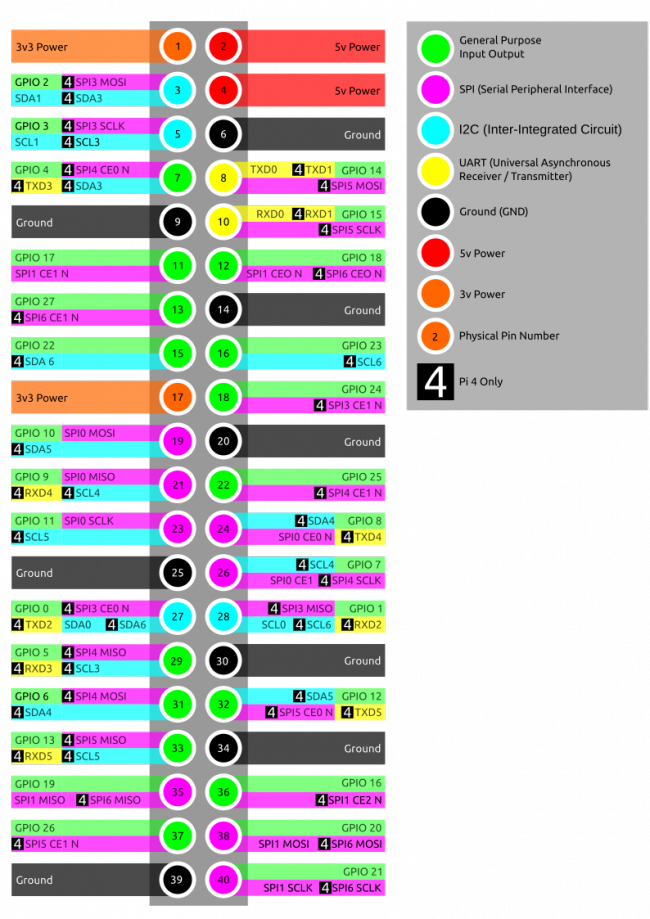
ssid=”wahoo”

key\_mgmt=NONE

scan\_ssid=1

}

* 1. Run update and upgrade
     1. sudo apt update && sudo apt upgrade
  2. Install necessary software
     1. sudo apt install minicom ipython ipython3 qt5-default pyqt5-dev pyqt5-dev-tools
     2. Note: You may need to run the above line twice if you get an error for no PyQt5 found when you try to start the GUI
     3. sudo pip3 install pyvisa pyvisa-py pyvisa-sim
  3. Run the configuration script
     1. Sudo raspi-config
     2. 8→Update the config tool
     3. 1→System Options
        1. S4: Set hostname: laser-brain
        2. S7: Disable boot splash screen
     4. 5→Interfacing Options
        1. P2: Enable SSH
        2. P3: Enable VNC (You will need RealVNC vnc viewer to connect from another computer)
        3. P6: Disable serial login shell, enable serial hardware
     5. Finish
  4. Configure SSH (Change to non-default port for a little better security)
     1. Sudo nano /etc/ssh/sshd\_config
     2. Add a line below “#Port 22”:
        1. Port 242
        2. Exit and save (Ctrl+X, Y, <enter>)
        3. Reboot
  5. Enable extra serial connections
     1. Ls -l /dev/ttyA\*
        1. List currently available serial interfaces
           1. ttyACM0 = usb-serial interface to Arduino
           2. ttyAMA0 = default serial, currently consumed by the bt radio
     2. Enable the dtoverlays for uart0, uart4, uart5
        1. Sudo nano /boot/config.txt
        2. Add the following lines to the end of the file after “enable\_uart=1” to move the bt radio to the miniuart, then enable uarts 4 and 5, 0 is automatically moved to /dev/ttyAMA0 when you move bt to miniuart
           1. dtoverlay=pi3-miniuart-bt
           2. dtoverlay=uart4
           3. dtoverlay=uart5
        3. Exit and save (Ctrl+X, Y, <enter>)
        4. Reboot
     3. Download the PLD Laser Brain software files for testing
        1. cd ~
        2. git clone <https://github.com/ibrummel/PLD-Laser-Brain.git>
        3. cd PLD-Laser-Brain
  6. Set up the power button on GPIO3
     1. Run ./install\_power\_button.sh from the PLD-Laser-Brain/pi-power-button
        1. Work based on this tutorial <https://howchoo.com/g/mwnlytk3zmm/how-to-add-a-power-button-to-your-raspberry-pi>
  7. Install Arduino IDE
     1. Download linux 32 bit ARM version from Arduino.cc>software>downloads
     2. Extract to ~/Arduino/
     3. “cd ~/arduino-versions/arduino-<version>/”
     4. “./arduino-linux-setup.sh”
     5. “sudo ./install”
     6. “sudo reboot now”



Troubleshooting:

|  |  |
| --- | --- |
| Symptoms | Solution |
| -Python GUI fails to read data from microcontroller  -Not solved with full power cycle  -Cannot reflash microcontroller via Arduino IDE (ERROR: Selected serial port does not exist or your board is not connected), but can read serial and “lsusb” shows Arduino device as connected. | -Physically open case and unplug/replug the microcontroller USB cable |
|  |  |