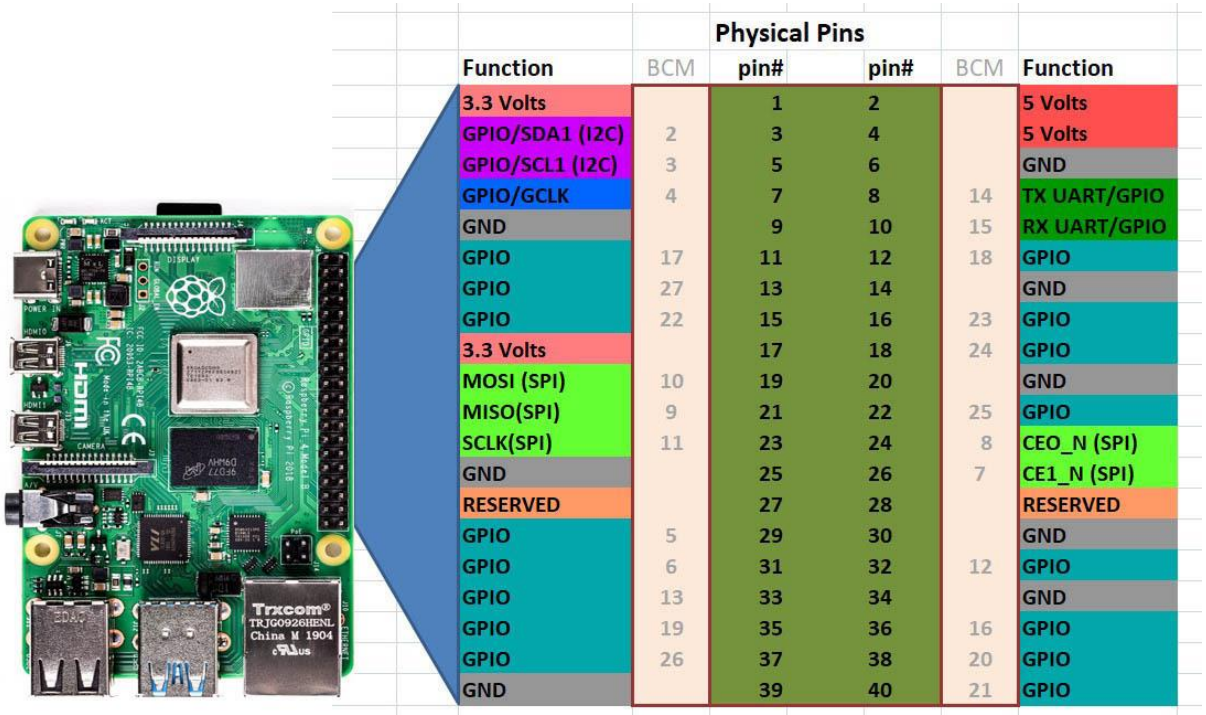
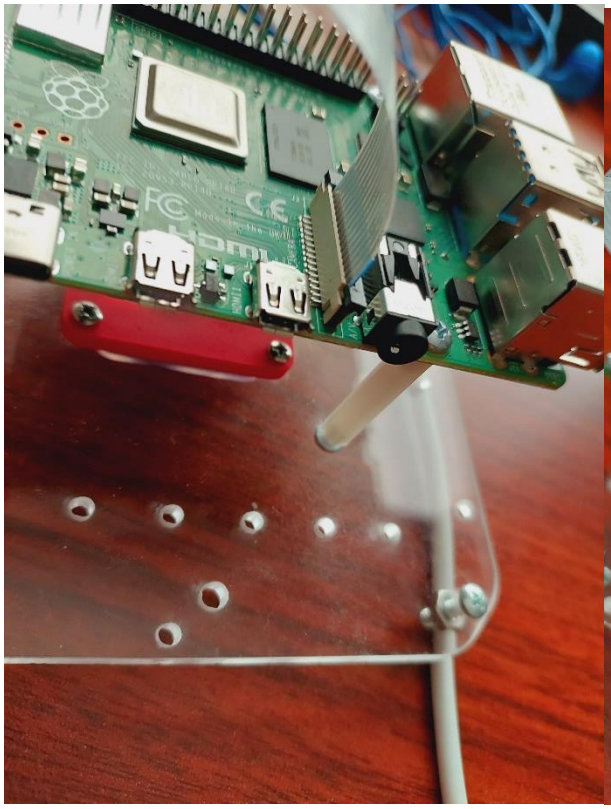
# Raspberry Pi GPIO Pins

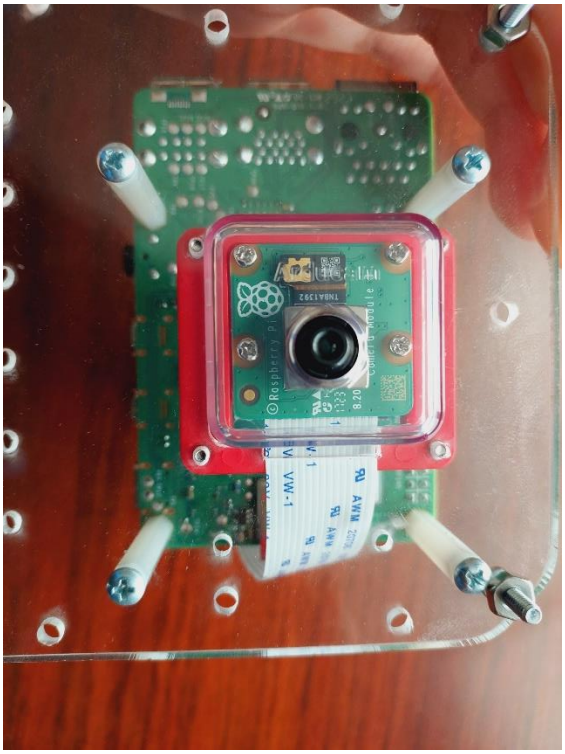
https://pinout.xyz/

| | | Physical Pins | | | |
|---|---|---|---|---|---|
| Function | BCM | pin# | pin# | BCM | Function |
| 3.3 Volts | | 1 | 2 | | 5 Volts |
| GPIO/SDA1 (I2C) | 2 | 3 | 4 | | 5 Volts |
| GPIO/SCL1 (I2C) | 3 | 5 | 6 | | GND |
| GPIO/GCLK | 4 | 7 | 8 | 14 | TX UART/GPIO |
| GND | | 9 | 10 | 15 | RX UART/GPIO |
| GPIO | 17 | 11 | 12 | 18 | GPIO |
| GPIO | 27 | 13 | 14 | | GND |
| GPIO | 22 | 15 | 16 | 23 | GPIO |
| 3.3 Volts | | 17 | 18 | 24 | GPIO |
| MOSI (SPI) | 10 | 19 | 20 | | GND |
| MISO(SPI) | 9 | 21 | 22 | 25 | GPIO |
| SCLK(SPI) | 11 | 23 | 24 | 8 | CEO_N (SPI) |
| GND | | 25 | 26 | 7 | CE1_N (SPI) |
| RESERVED | | 27 | 28 | | RESERVED |
| GPIO | 5 | 29 | 30 | | GND |
| GPIO | 6 | 31 | 32 | 12 | GPIO |
| GPIO | 13 | 33 | 34 | | GND |
| GPIO | 19 | 35 | 36 | 16 | GPIO |
| GPIO | 26 | 37 | 38 | 20 | GPIO |
| GND | | 39 | 40 | 21 | GPIO |

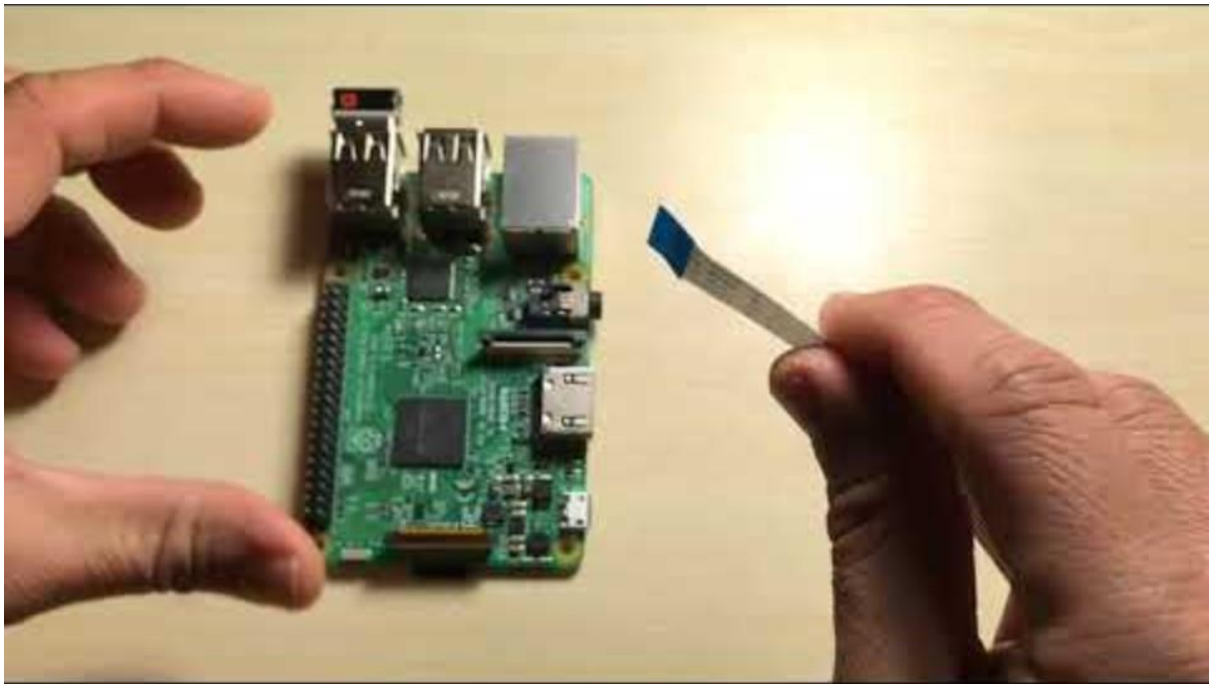
## Camera





The blue part of the ribbon (with the blue text), should face the USB and ethernet ports. It should be plugged in exactly the way it is in the image

**Connecting to the Raspberry Pi**



## Electrical

- Uses 3.3 Volts and 250 mA of power
- Power consumption- V * A = 250 mA * 3.3 W = 0.825 W
- Raspberry Pi itself consumes 3- 5 W under typical load, so the power consumes by camera is quite small in comparison

## Software

- For future reference- https://datasheets.raspberrypi.com/camera/picamera2-manual.pdf

## Configuration

- Configuring the camera
    - Still- capturing high-resolution still image
    - Preview- displaying camera preview images on display, prior to capturing still image
    - Video- recording video files
- Configuration does not include camera settings that can be changed during runtime- like brightness or contrast
- Three types of images- main, lores (low resolution), raw
- We'll be using main image
- Image resolution
- Format of the pixels

## Focus

- Manual Focus
    - Minimum value for the lens is most commonly 0.0 (meaning infinity)

    - Maximum value is 10.0, meaning closest focal distance is 1/10 meters or 10cm
- The reciprocal of the “LensPosition” is taken as the focal length

**Adding EXIF data to the image**

- Exchangeable Image File Format
- Stores metadata within image file. Metadata includes:
    - Camera Settings
        - Camera model
        - Lens type
        - Shutter speed
        - Aperture
        - ISO
        - Focal length
    - Date and time when photo was taken
    - GPS Coordinates
    - Orientation (portrait or landscape)
    - Image dimensions (width and height)
    - Software used to edit or process image

**Software General Steps**

- Imports
- Create an object
- Choose the appropriate configuration
- Add features to configuration
- Use the configuration
- Start preview window if choosing preview configuration
- Change camera controls if needed
- Camera options choose if required
- Start camera
- Focusing options
- Capture footage
- Stop camera