BREKEL

RASPBERRY PI

FACE CAM

BOM (BILL OF MATERIALS)

- Raspberry Pi Zero 2 W (~$15)
  - Pi Zero 1 works but is not powerful enough for full frame rate
  - Pi 3/4/5 are too large and overkill
- Micro SD card of 4GB (or larger) (~$10)
  - speed doesn't matter so much since we only use it to boot and don't save anything
  - note that you'll need a card reader for your computer to preprare the card
- Raspberry Pi Camera Module 3 Wide (120 degrees) (~$35)
  - the NoIR variant is best since it's a bit more light sensitive
  - the v2 or v1 or the v3 non-Wide (75 degrees) models don't fit well for our purpose
- Raspberry Pi Zero camera cable (~$5)
  - you'll specifically want a cable for the Pi Zero (or Pi5) model as this has a wide connector on one side (for the camera) and a narrow connector on the other side (for the Pi Zero board)
  - 80mm works well, 150mm might fit when folded
- USB PowerBank (~$25)
  - make sure it can deliver at least 2 amps at 5v
- Micro USB cable (~$5)
  - to power the Raspberry Pi from the USB PowerBank
- Adafruit Neopixel 12 LED Ring ($5)
  - make sure you'll get the RGBW variant, not the RGB one
  - Warm White, Natural White or Cool White should all work (Warm White may be a bit more pleasant on the eye)
- 3 Jumper Wires (male-female)
  - roughly 10 cm is a good length
  - to connect the LED Ring to the Raspberry Pi board

Note that your Raspberry Pi will need access to WiFi to stream video data to your computer.

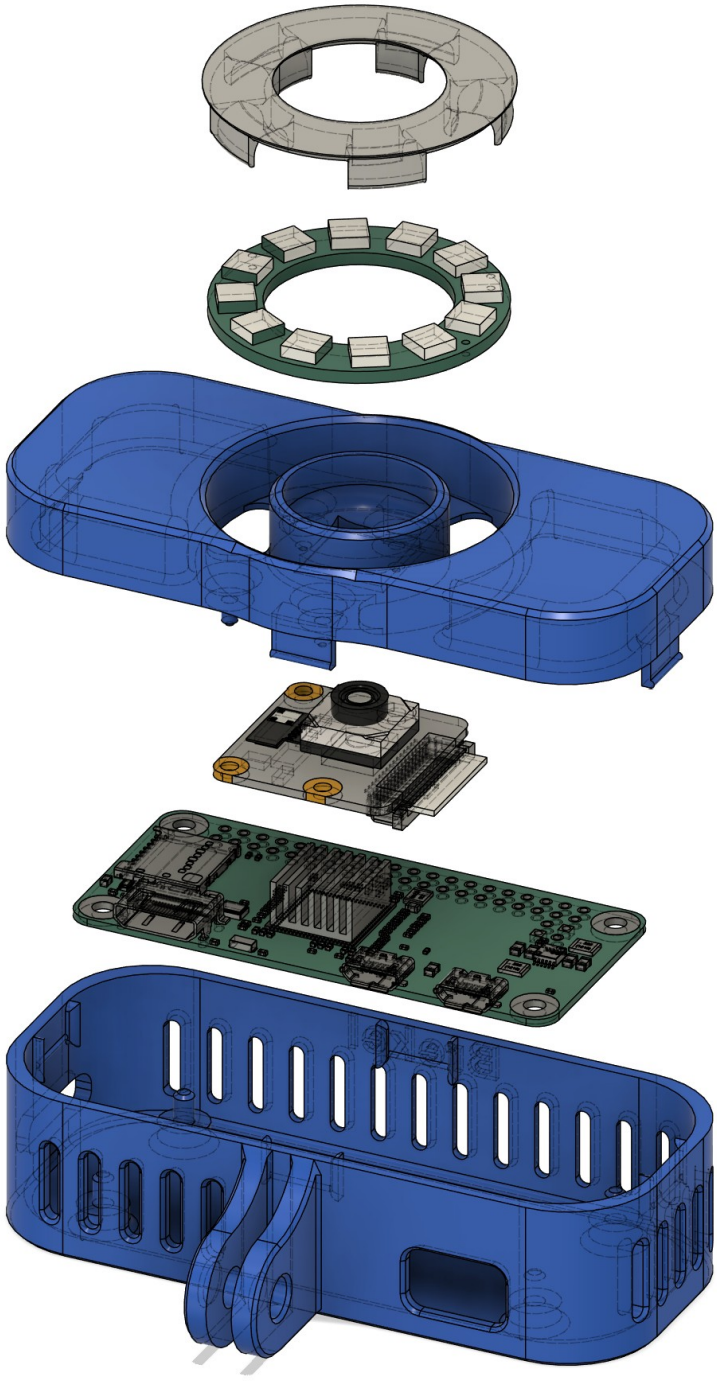
During installation it will also need internet acces to download the software.

Input
Type C
In / Out
Transcend

3D PRINTABLE CASE

Files for a 3D printable case can be downloaded from the following link:

https://www.printables.com/model/805075-rasberry-pi-zero-face-camera

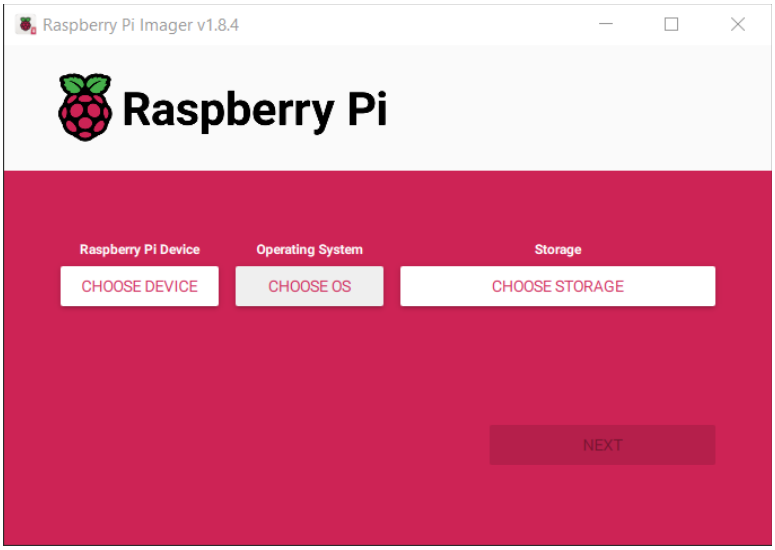


This can be printed on a consumer 3D printer or for example by a service like PCBWay for example.

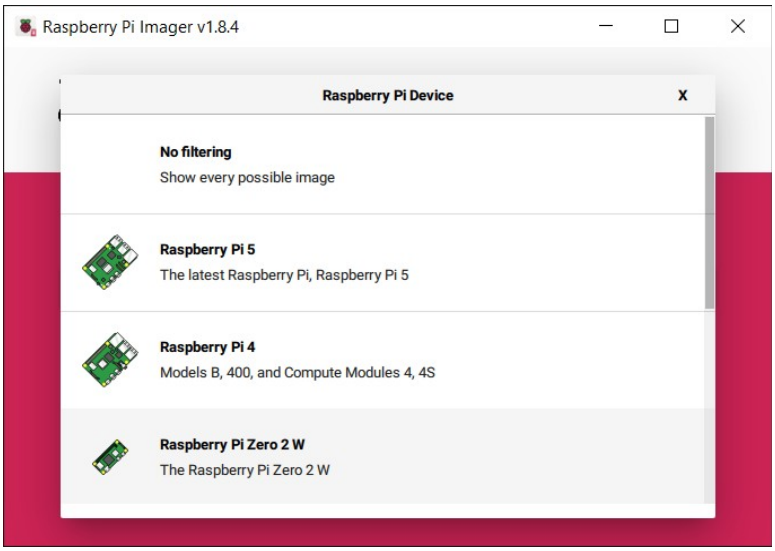
PREPARING THE MICRO-SD CARD

Download & install the Raspberry Pi Imager from:

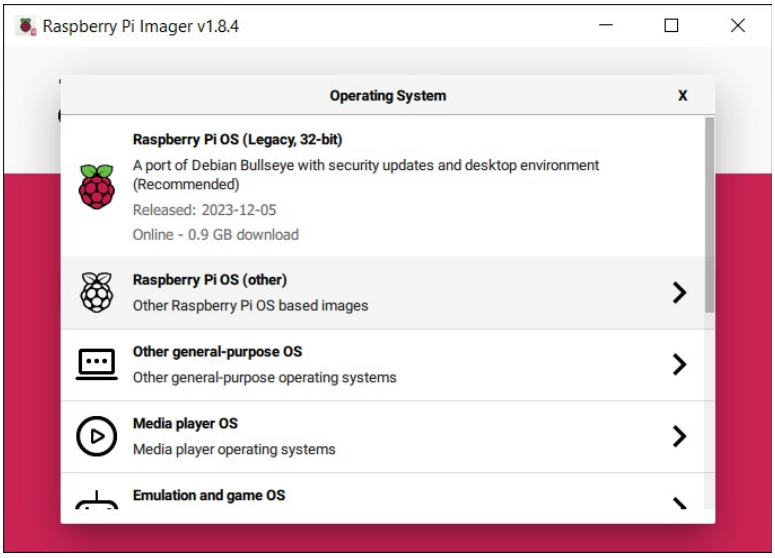
https://www.raspberrypi.com/software



Click “Choose Device” and select your Pi model

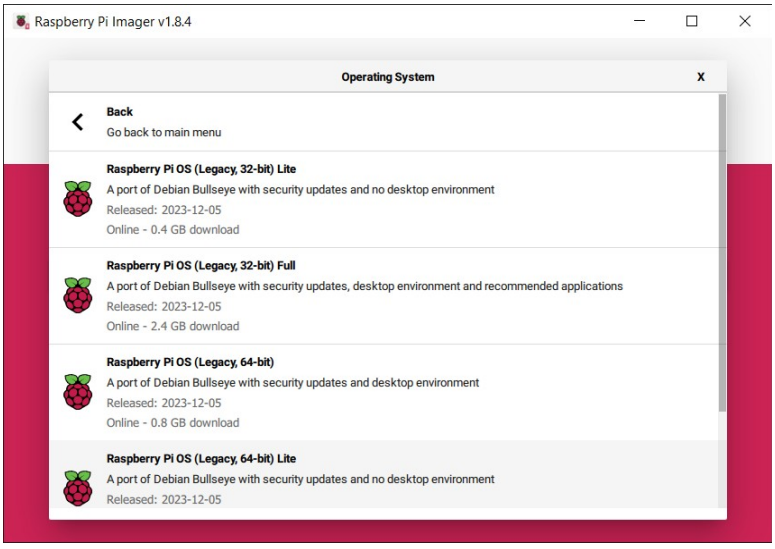


Click “Choose OS” and select “Raspberry Pi OS (other)



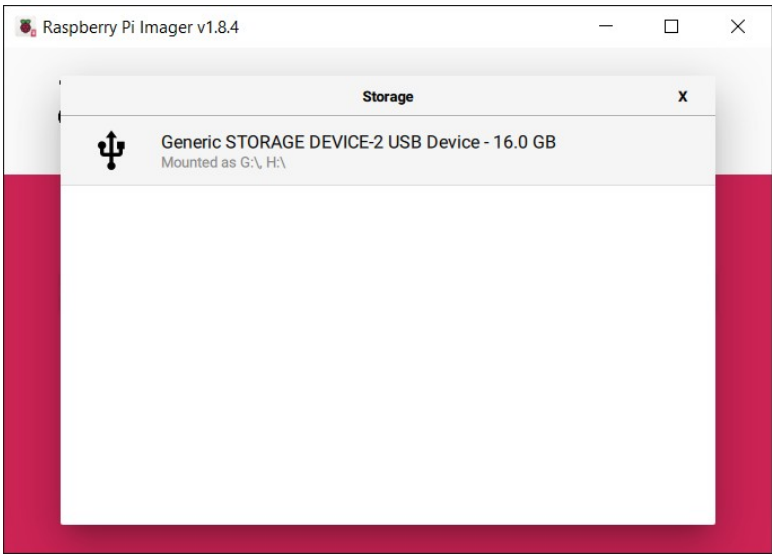
Select the 64-bit Lite version

(You can install the Full OS option (32 or 64 bit also doesn’t matter) but in our case we don’t need it so best to save resources and stick with the Lite OS version)

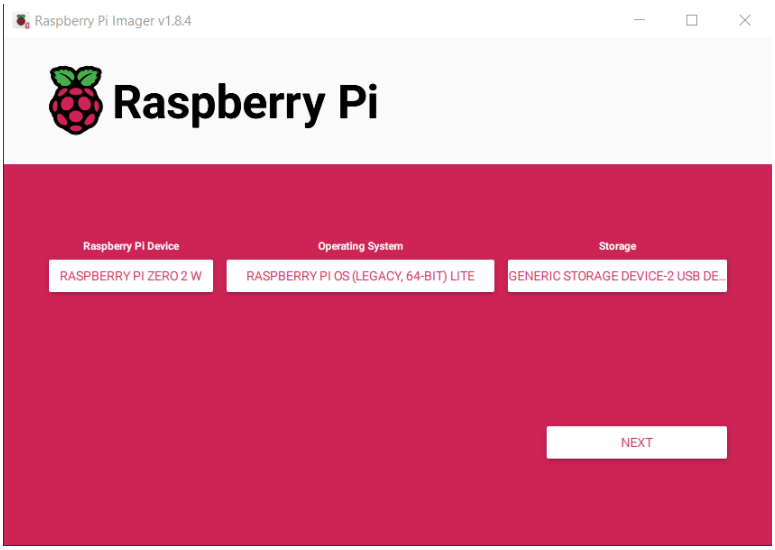


Make sure your MicroSD card is inserted and click “Choose Storage”

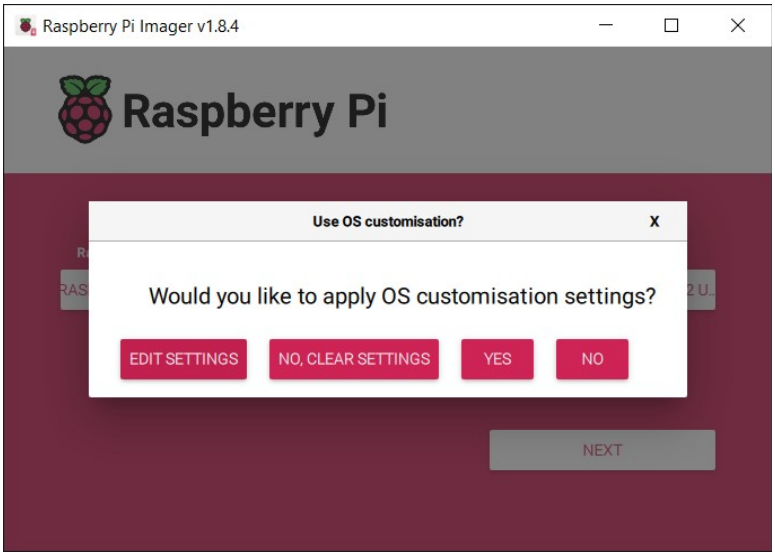
Pick your SD card, double check and make sure you pick the correct one as everything will be overwritten on it!



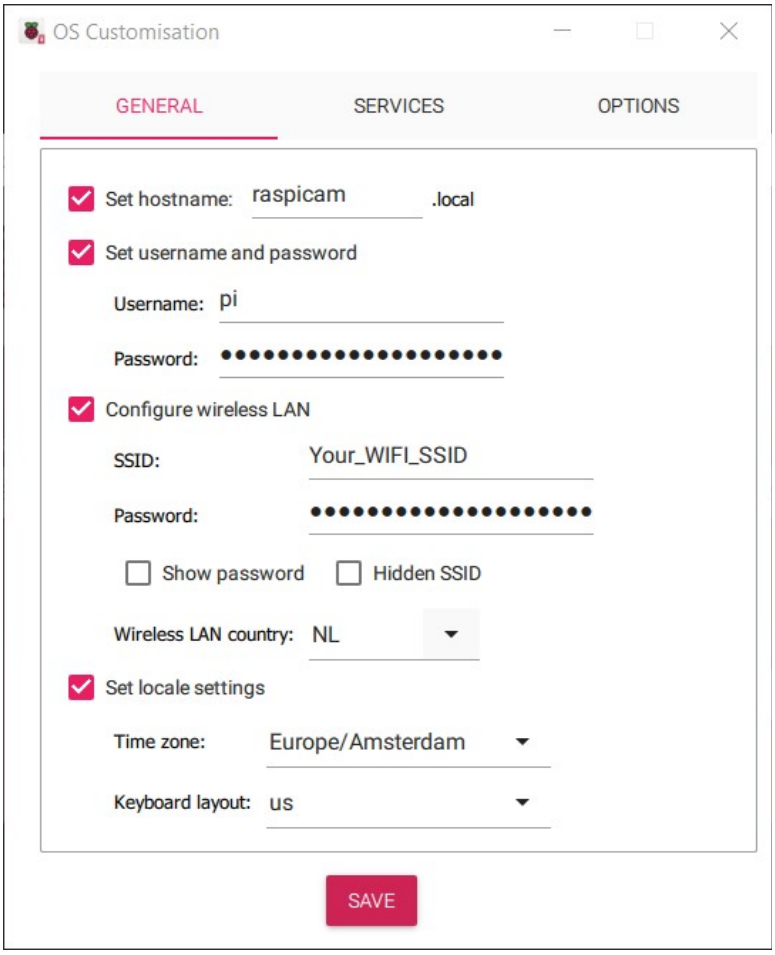
When done click “Next”



In the “Use OS customization” popup click “Edit Settings”



On the “General” tab enable and fill out the following items:



Enable “Set hostname” and set it to “raspicam”, this is how your device will present it on the network and the Brekel app relies on this specific name (so don’t customize it)

If you want to run multiple facecams you can use “raspicam1”, “raspicam2”….. up to “raspicam9”

Enable “Set username and password” when disabled the default will be “pi” and “raspberry” to login, but it’s generally a good idea to set a custom password for security reasons.

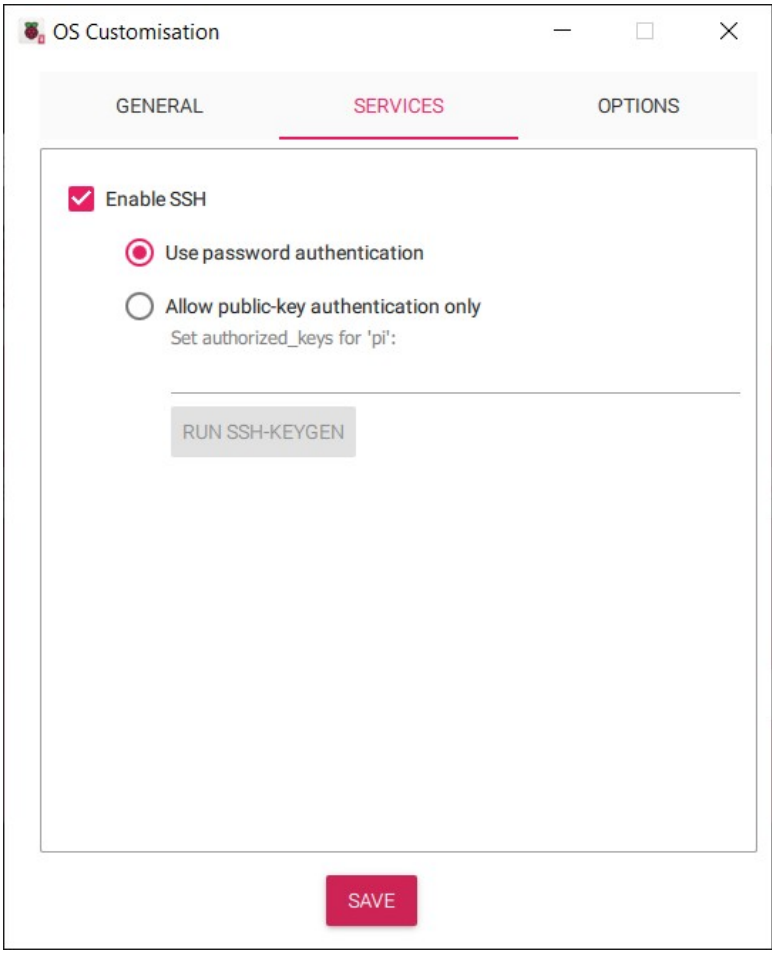
Leave the Username set to “pi” as some things in the rest of the installation may rely on that.

Enable “Configure wireless LAN” and set the “SSID” and “Password” so your device can get onto your WiFi.

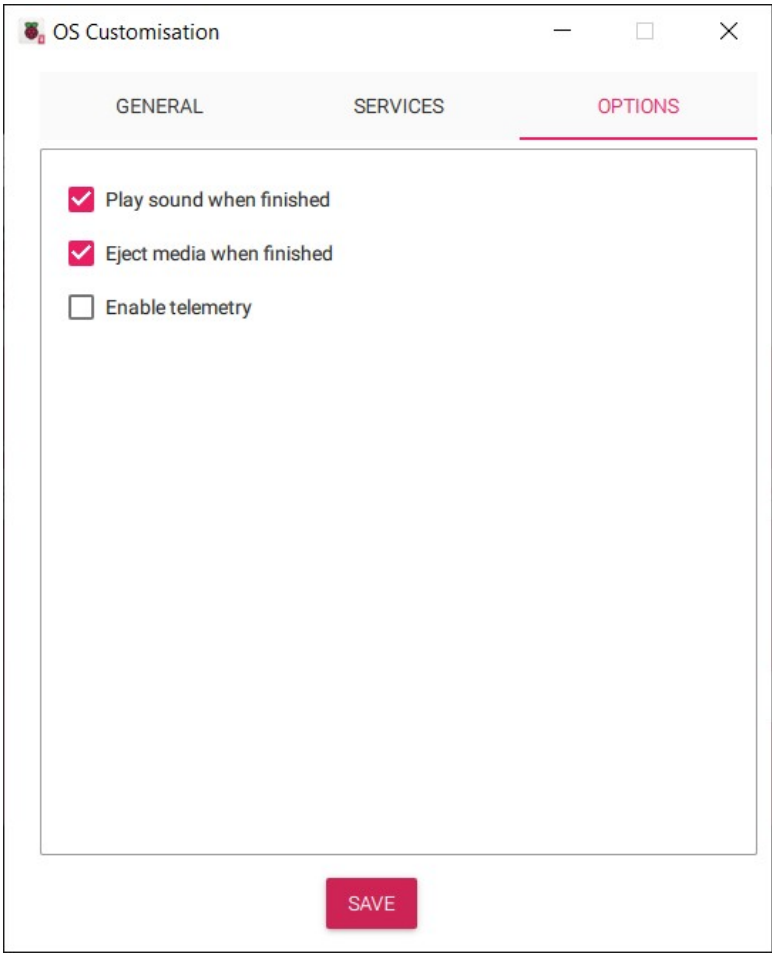
For good measure set the “Wireless LAN country” to your country’s code
https://en.wikipedia.org/wiki/List_of_ISO_3166_country_codes

Enable “Set locale settings” and set your “Time zone” so the clock can sync to the correct time.

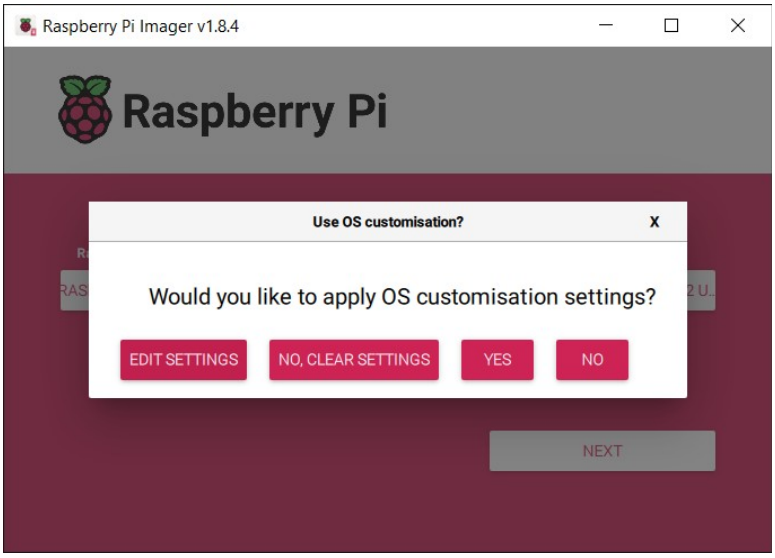
On the “Services” tab make sure “Enable SSH” is turned on so we can log into your device later on.



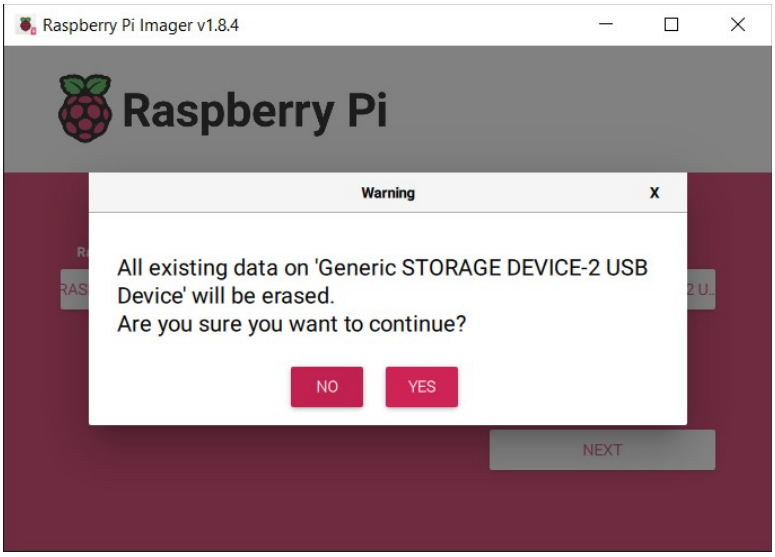
On the “Options” tab enable “Play sound when finished” and “Eject media when finished”, both are optional but convenient.



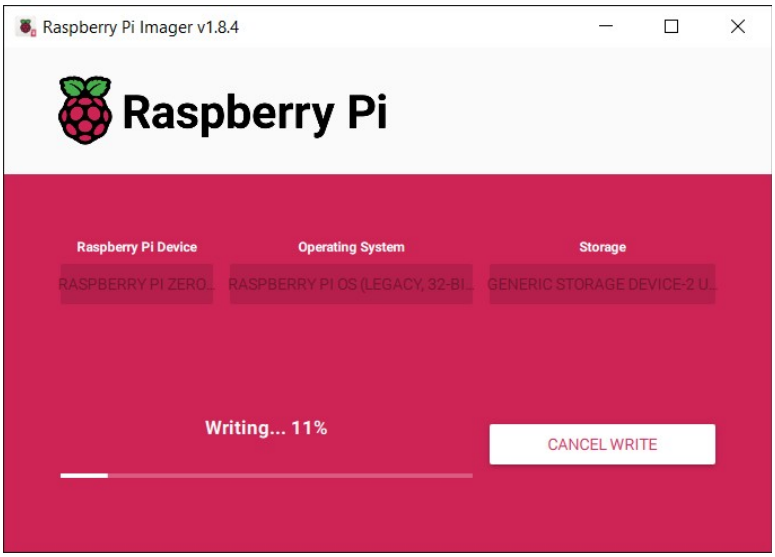
Hit Save and back on the “Use OS customization?” window hit “Yes”



Double check the correct storage device was selected and click “Yes” to start writing to your MicroSD card.

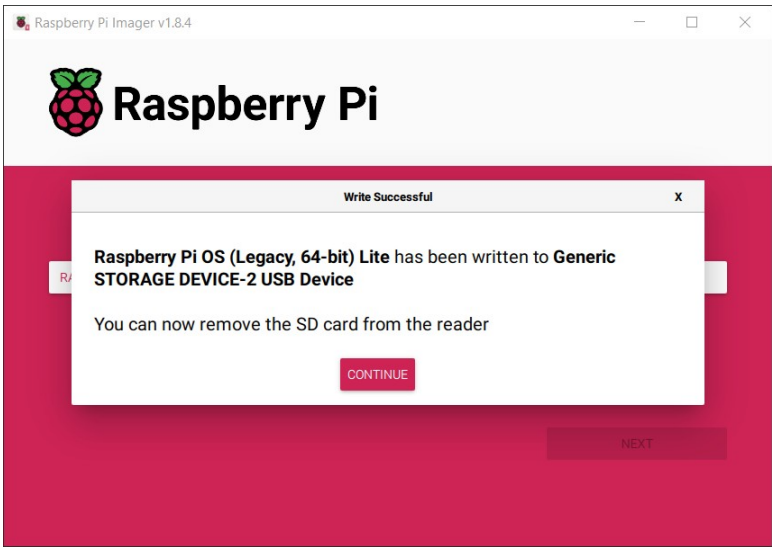


Wait until “Writing” and “Verifying” is completed, this may take a minute or two.



Once it’s done remove the card from the reader.

If your OS asks to format the disk (since it can’t recognize the file system on the card now) make sure to hit Cancel, otherwise you’ll have to repeat all steps above!



CONNECTING TO THE PI

Insert the Micro-SD card into your Raspberry Pi.

This is also a good time to insert the camera cable to your Pi and camera, pay attention that the cable is inserted so the metal connectors on the cable match those on the board.

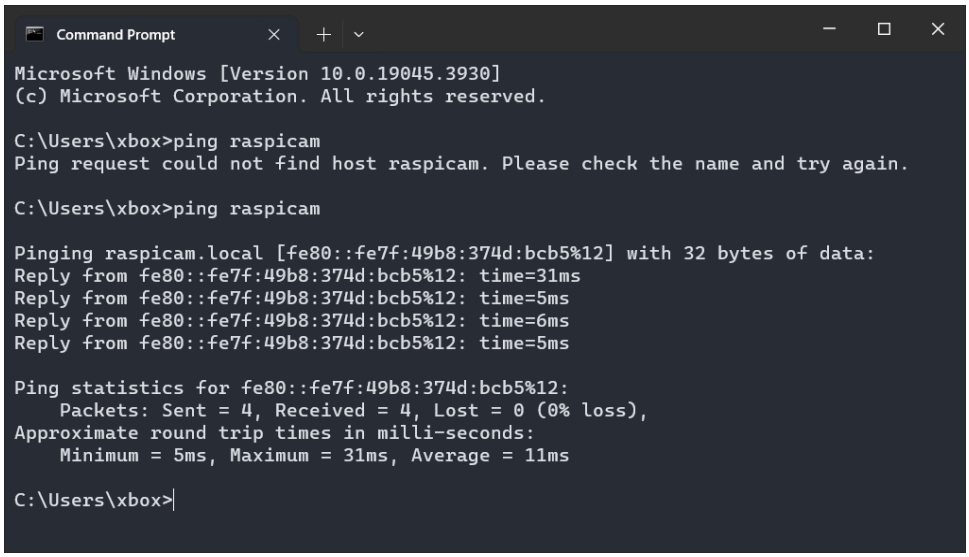
Connect your power supply (an LED should light up on the main board to indicate the device is getting power)

Wait a minute or two for the device to boot up, it should automatically connect to your WiFi based on the settings used previously.

For the following steps we'll configure some things on the command line, you can hook up a monitor and keyboard but it's easier to do from your computer using SSH.

Open a Command Prompt on your computer and use the following command to check if your Pi has booted:

```
ping raspicam
```



When the device is still booting (first boot can take a few minutes to initialize things) you get a response like:

> Ping request could not find host raspicam. Please check the name and try again.

When it finished you'll get a response like the following (the IPv6 IP and time will vary):

> Pinging raspicam.local [fe80::fe7f:49b8:374d:bcb5%12] with 32 bytes of data:
>
> Reply from fe80::fe7f:49b8:374d:bcb5%12: time=31ms
>
> Reply from fe80::fe7f:49b8:374d:bcb5%12: time=5ms
>
> Reply from fe80::fe7f:49b8:374d:bcb5%12: time=6ms
>
> Reply from fe80::fe7f:49b8:374d:bcb5%12: time=5ms

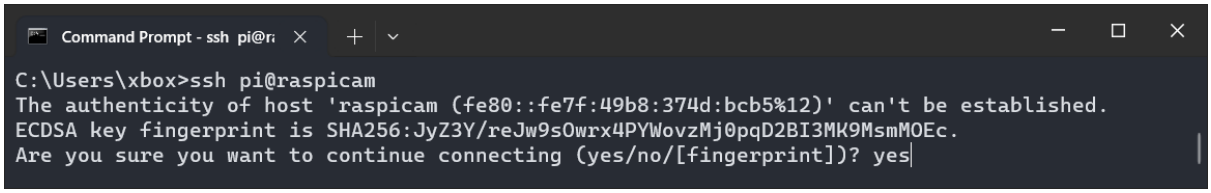
If you can't ping your Pi, not even after waiting a few minutes, try preparing your Micro-SD card again using the steps above and pay attention that the "Wireless LAN SSID & Password" settings are correct for logging onto your WiFi.

Log into your Pi using the following command:

```
ssh pi@raspicam
```

(if you used a different username than “pi” during the Micro-SD card setup use that instead)

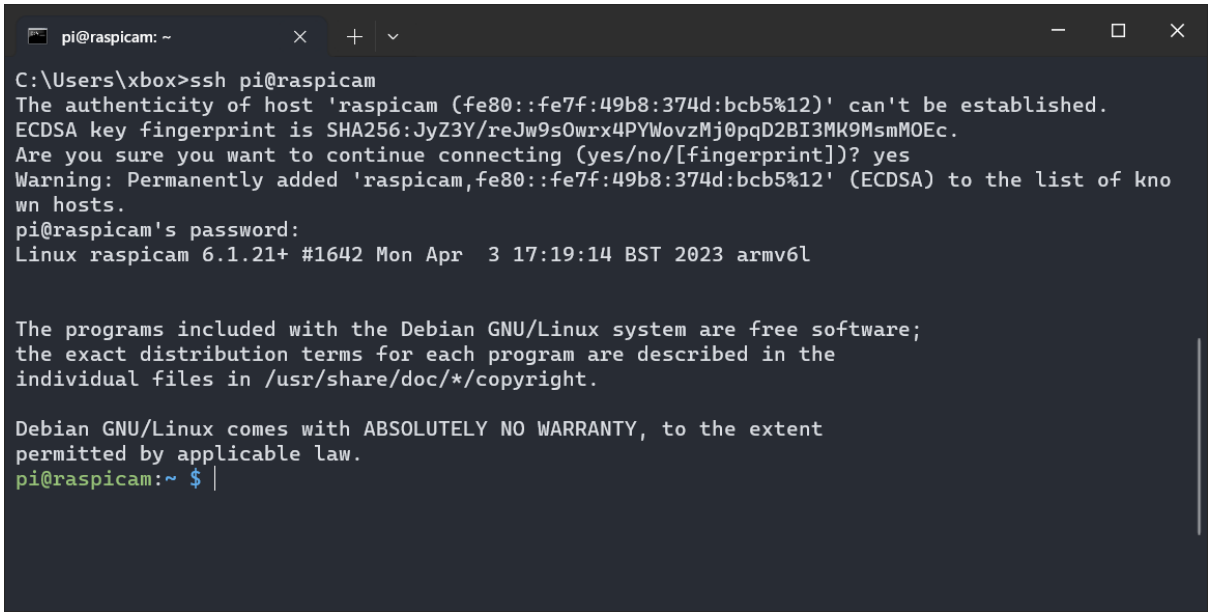
When you connect for the first time you’ll get a warning like the following:



Accept the prompt by entering yes so this warning will not appear again the next time.

You’ll now be asked for your login password (which we set that when setting up the Micro-SD card).

After a successful login you should now be logged in and at the command line of the RaspiCam device.



INSTALL THE SOFTWARE

To install the “camera-streamer” software we can make use of a convenient install script.

(you do need internet access for this installation procedure).

The installation script is hosted on github: https://github.com/Brekel/raspi-facecam

Camera-streamer is an open source project by Kamil Trzciński: https://github.com/ayufan/camera-streamer

First run following command to make sure the git client is available

```
sudo apt install git
```

Now run the following command to download the latest version of the software from github:

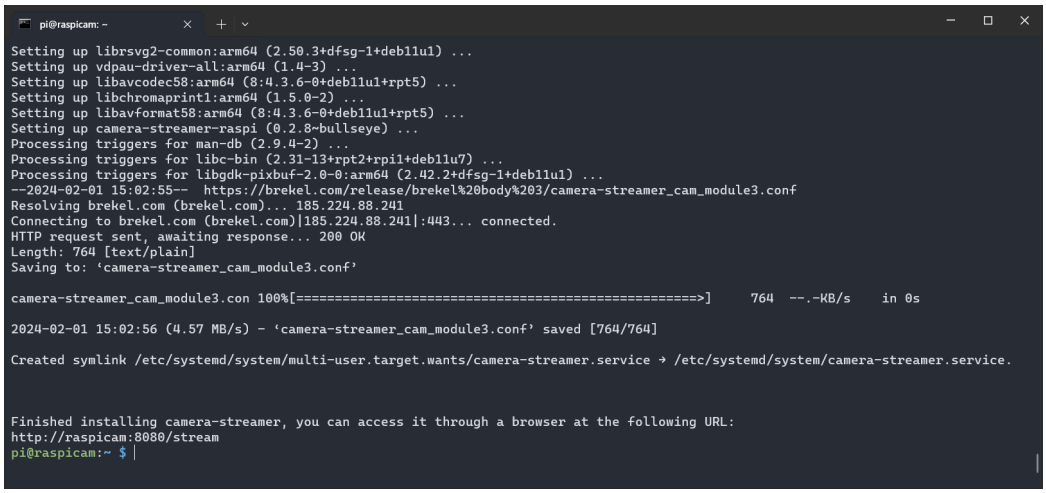
```
git clone https://github.com/Brekel/raspi-facecam.git
```

```
cd raspi-facecam
```

Execute the script using the following command

```
./install_camera-streamer.sh
```

Installation can take 5-10 minutes (depending on your SD-card and internet speed), you may be asked for your Raspberry Pi login and may need to hit enter at times during the installation when it asks if you want to continue.

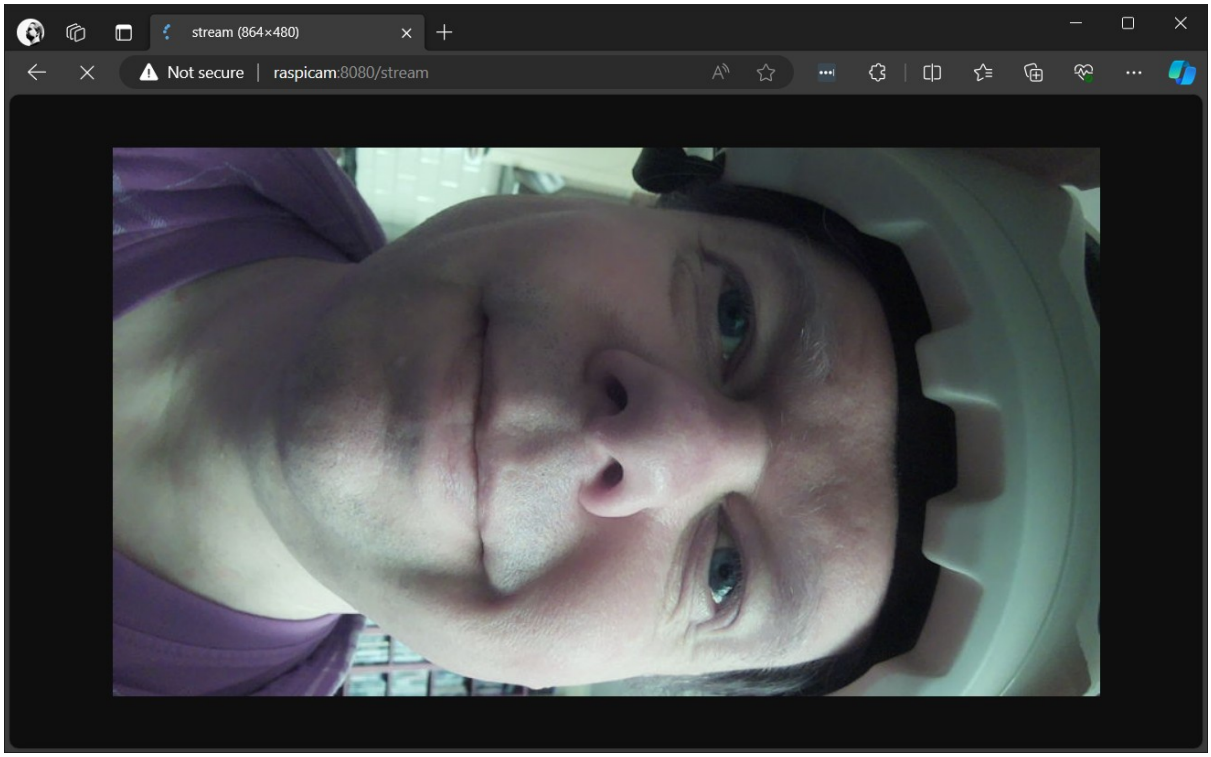


(you can now close this commandline window)

DONE, CHECKING CAMERA LIVE STREAM

We are now done, to double check you can access the camera feed by point your favorite web browser to the following address:

http://raspicam:8080/stream



Indeed the image appears to be on it's side, this is correct and the Brekel app will epect & correct this.

(in this case the camera was mounted to a bicycle helmet using a GoPro extension arm)