

# Robot - Raspberry Pi Camera

## Items required

Item	Example supplier
Raspberry Pi Zero W	<a href="https://raspberrypi.australia.com.au/raspberry-pi-zero-w?src=raspberrypi">https://raspberrypi.australia.com.au/raspberry-pi-zero-w?src=raspberrypi</a>
Raspberry Pi Zero Camera 5MP  (note camera cable for Zero is different to standard Raspberry Pi)	<a href="https://www.aliexpress.com/item/New-Arrival-Raspberry-Pi-Zero-Camera-5MP-RPI-Zero-Camera-Module-Webcam-for-Raspberry-Pi-Zero/32785811007.html?spm=a2g0s.9042311.0.0.27424c4d9wXoaJ">https://www.aliexpress.com/item/New-Arrival-Raspberry-Pi-Zero-Camera-5MP-RPI-Zero-Camera-Module-Webcam-for-Raspberry-Pi-Zero/32785811007.html?spm=a2g0s.9042311.0.0.27424c4d9wXoaJ</a>  or  <a href="https://raspberrypi.australia.com.au/5mp-camera-for-raspberry-pi">https://raspberrypi.australia.com.au/5mp-camera-for-raspberry-pi</a>  <a href="https://core-electronics.com.au/raspberry-pi-zero-camera-adapter.html">https://core-electronics.com.au/raspberry-pi-zero-camera-adapter.html</a>
16GB (or larger) Micro SD	
Power Bank	<a href="https://www.kmart.co.nz/product/black-universal-portable-charger/1638343">https://www.kmart.co.nz/product/black-universal-portable-charger/1638343</a>  or  <a href="https://www.emax.co.nz/index.php?main_page=product_info&amp;cPath=9858_10161_10165&amp;products_id=3075">https://www.emax.co.nz/index.php?main_page=product_info&amp;cPath=9858_10161_10165&amp;products_id=3075</a>
3D print camera enclosure + bracket for robot	Available in tinkerCAD. Search in "3D designs" for "balrobot" in the tinkerCAD gallery.

Possible alternative to Raspberry Pi Zero W is the Nano PC / Nano Pi:

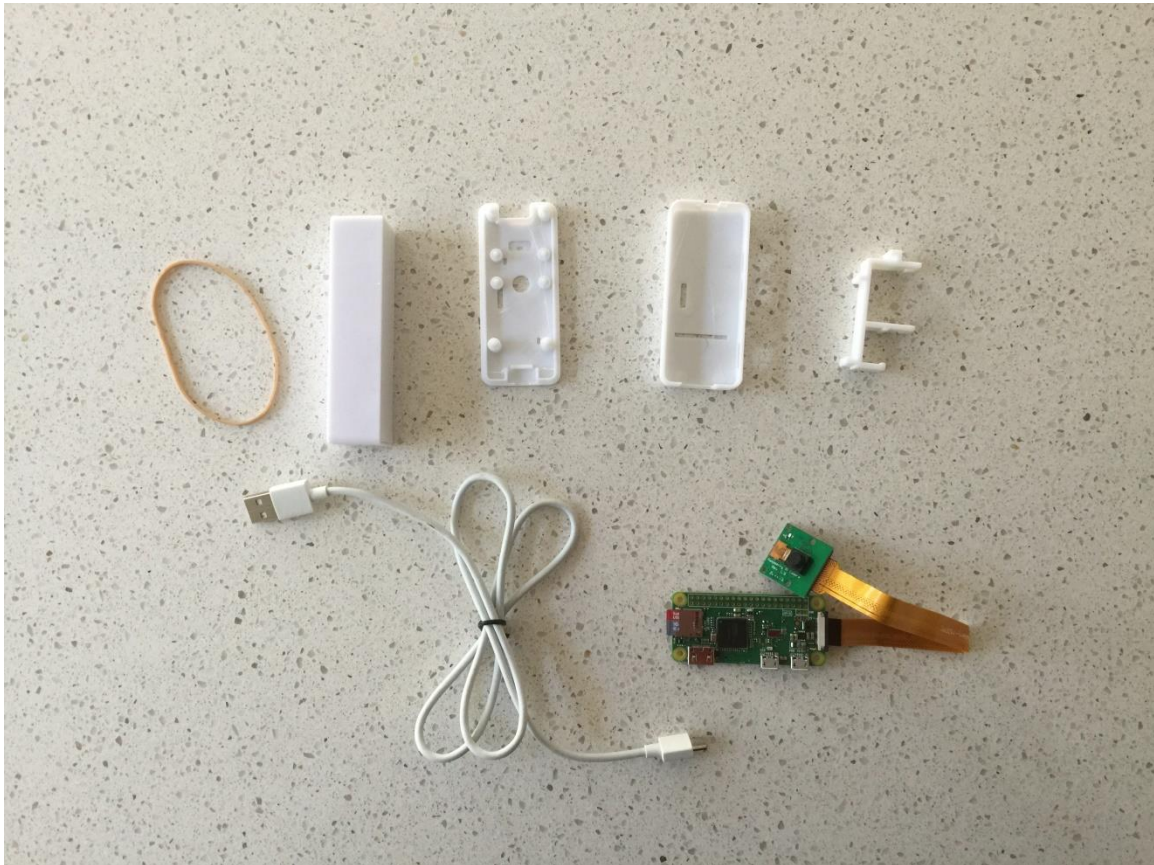
<https://www.friendlyarm.com/index.php?route=product/category&path=69&page=1>

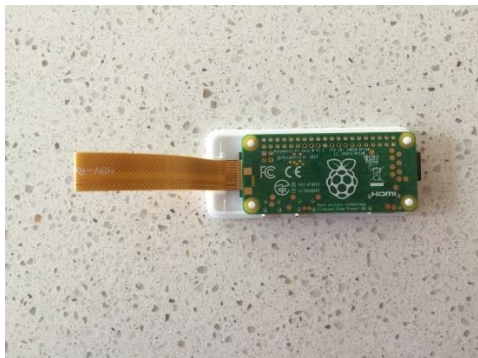
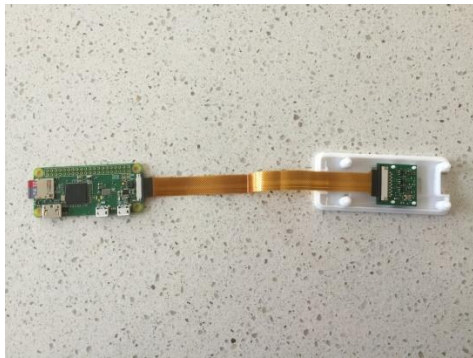
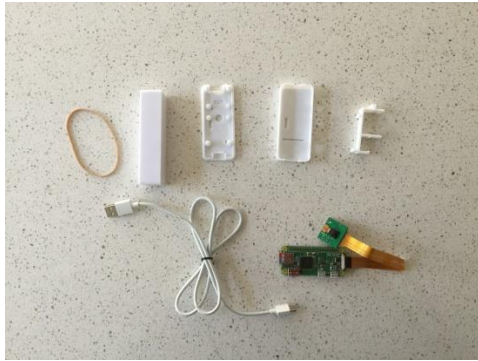
# Camera Make Steps

I have used a separate power supply (use a 5V power bank) for the camera because the raspberry pi is quite power hungry and the robot is not sufficient to power the raspberry pi camera. The benefit of a separate power supply is that the camera can be used standalone from the robot.

All items to construct the robot camera are shown below (note a rubber band is used to hold the powerbank and power cable since these come in different sizes – the easiest way to hold these is with a rubber band).

The camera enclosure is available in tinkerCAD. Search in “3D designs” for “balrobot” in the tinkerCAD gallery.



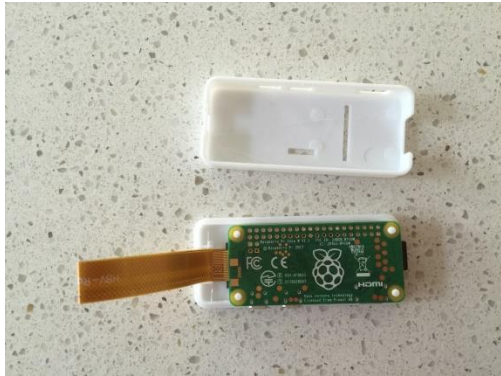


Parts:

- Raspberry Pi Zero W
- Raspberry Pi Zero camera
- 5V Power Bank + cable
- 3D printed camera attachment
- Rubber band

Insert camera into front housing – there are pins for the camera board to slide into.

Fold the Raspberry Pi Zero W board over the top of the camera board – there are pins for the Raspberry Pi board to slide into.



Insert the rear housing to the camera enclosure.

Note that there are openings in the enclosure to allow plugs to be inserted into the Raspberry Pi sockets.

The bracket holds the camera enclosure together and attaches to the caster wheel extension of the robot.



The bracket holds the camera enclosure.



Slide the powerbank behind the camera enclosure.





Insert the rubber band underneath the bracket and between the camera and powerbank.

Sit the power cable on top of the powerbank and wrap the rubber band over the power cable and powerbank and attach to the small hook behind the powerband on the bracket.



Plug in the power cable plugs into the camera and the powerbank.



An extra slot has been added to the caster wheel extension for the camera bracket to clip into.

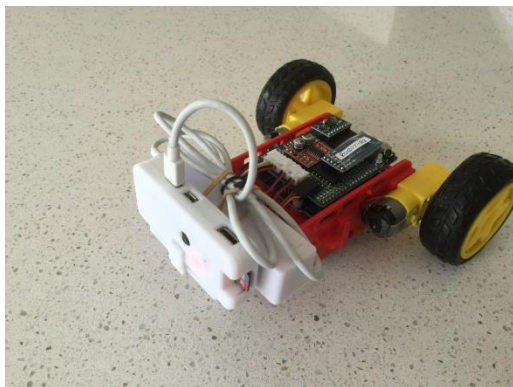
Attach the bracket to the robot caster wheel extension.





Attached the bracket to the robot caster wheel extension.

There is a small hook on the front of the bracket which hooks over the front of the robot caster wheel extension piece.



Slot in the caster wheel extension into the robot.

The robot now has a camera !

Note, if a shorter power cable is available, it would look tidier.

The power bank will provide power for approx. an hour before it needs recharging.



Recharging uses a standard (e.g. phone) micro USB charger, or can be purchased inexpensively from the likes of the Warehouse.



# Camera Software Install

## Step 1:

Unzip and copy NOOBS onto micro SD card

<https://www.raspberrypi.org/help/noobs-setup/2/>

## Step 2:

Insert micro SD card into Raspberry Pi Zero W, plug in a monitor to the micro HDMI socket and keyboard / mouse into the micro USD socket.

Power up the Raspberry Pi and follow the install instructions (the install includes entering the WiFi login details).

## Step 3:

Enable the Camera and VNC on the Raspberry Pi using the command:

```
sudo raspi-config
```

[https://elinux.org/RPi\\_raspi-config](https://elinux.org/RPi_raspi-config)

## Step 4:

Install VNC viewer on your PC:

<https://www.realvnc.com/en/connect/download/viewer/windows/>

At this stage you can now connect to your Raspberry Pi directly from you PC (headless) without the screen/keyboard/mouse.

Step 5:

Install the camera software:

<https://elinux.org/RPi-Cam-Web-Interface>

Step 6:

You can now view the camera from your phone/PC browser.

In your browser URL go to: enter the Raspberry pi ip address in your browser

To find the Raspberry Pi ip address use the command:

```
ifconfig
```

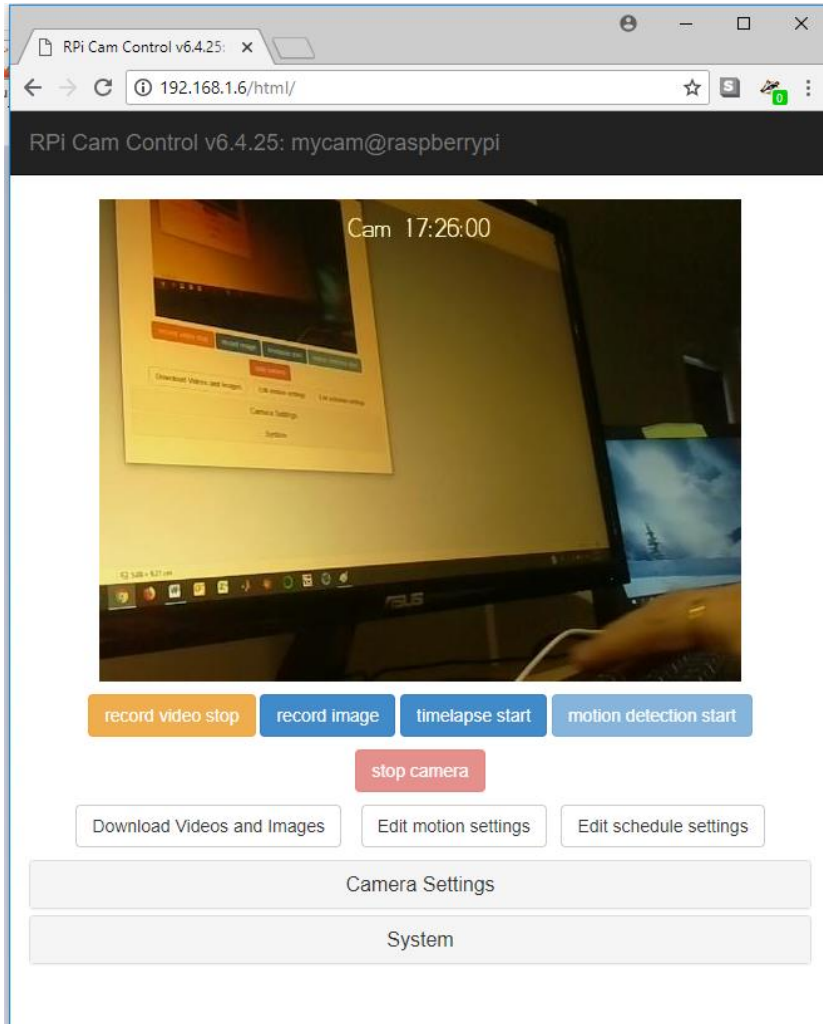
(look at wlan0 section)

Note: an alternative to finding and typing the Raspberry Pi ip address into the browser is to set up the Raspberry Pi as a WiFi Access Point (AP), and then logon to the Raspberry Pi AP from your phone/PC.

<https://www.raspberrypi.org/documentation/configuration/wireless/access-point.md>

# Camera Software Configuration

The camera software <https://elinux.org/RPi-Cam-Web-Interface> creates the following web page:



By clicking on the “Camera Settings” button, a large number of parameters can be changed.

Two parameters which are useful to change are:

Resolution: change to “SD TV 576p 4:3” – this increases the field of view (can see more)  
Rotation: change to “Rotate\_270” – the camera is mounted on its side so need to rotate