naturebytes

Wildife cam kit guide Version 4

For kits and cases bought from Spring 2020

(for older versions go to naturebytes.org)

Suitable for Ages 8 +

About this guide and your kit

The guide

This guide will take you through the assembly process and give you all the information you need to know to get started with your naturebytes wildlife cam Kit.

Use the images and read the description carefully to help you through each step.

Attention! When you see these symbols pay particular attention to make sure everything is assembled correctly.

What is the naturebytes wildlife cam kit ?

The naturebytes wildlife cam kit is a wildlife camera that anyone can build to take stealthy high definition images of wildlife. Beginner, expert, wildlife enthusiast or hacker, the Raspberry Pi powered kit is a fun way to develop your digital making skills and gain a new insight into the natural world around you

This kit contains small parts. DO NOT allow children under 5 years old to play with or near this product.

Contents

1.Check List

2.The PIR Sensor

3.Controlling the power

4.The Camera

5.The Raspberry Pi and Real Time Clock

6.The Power supply

7. The Case

8.Testing Your Kit

9.Tips and Tricks

10.Additional Features

Check list

Open your kit and check you have the required components:

Cam Case Parts

- [ ] Case
- [ ] Main Insert - May vary
- [ ] Strap
- [ ] Battery holder
- [ ] 6 x Stubby Screws 6 mm
- [ ] 5 x Screws 25mm
- [ ] 2 x Screws 18mm
- [ ] 9 x Brass nuts
- [ ] 5 x Spacer 18 mm (black)
- [ ] 2 x Spacer 8mm (white)

Electronics and additonal parts

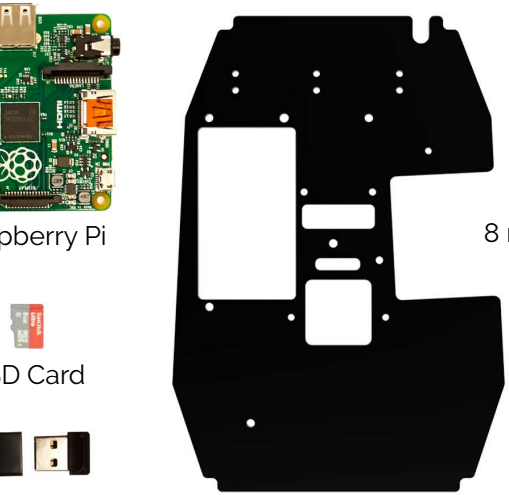
- [ ] Camera module
- [ ] Raspberry Pi - A+/B/B+/Zero
- [ ] Rechargeable Battery/powerbank
- [ ] USB Wire
- [ ] 3 x Wires - Black, Yellow, Red
- [ ] RTC (Real time clock) - optional
- [ ] Lipo rider - optional
- [ ] Velcro dots - optional
- [ ] 3 x Wire ties - optional
- [ ] SD Card
- [ ] USB
- [ ] PIR Sensor

Case

Camera module

Strap

Raspberry Pi


Main Insert - may vary

Battery Holder

6mm Stubby screw

Brass nut

8 mm Spacer

18mm Spacer

25mm Screw

18mm Screw

SD Card

USB Wire

Wires

USB

PIR Sensor

Power Bank

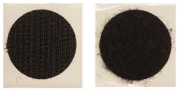
Optional components

Rechargeable Battery

Lipo rider

RTC

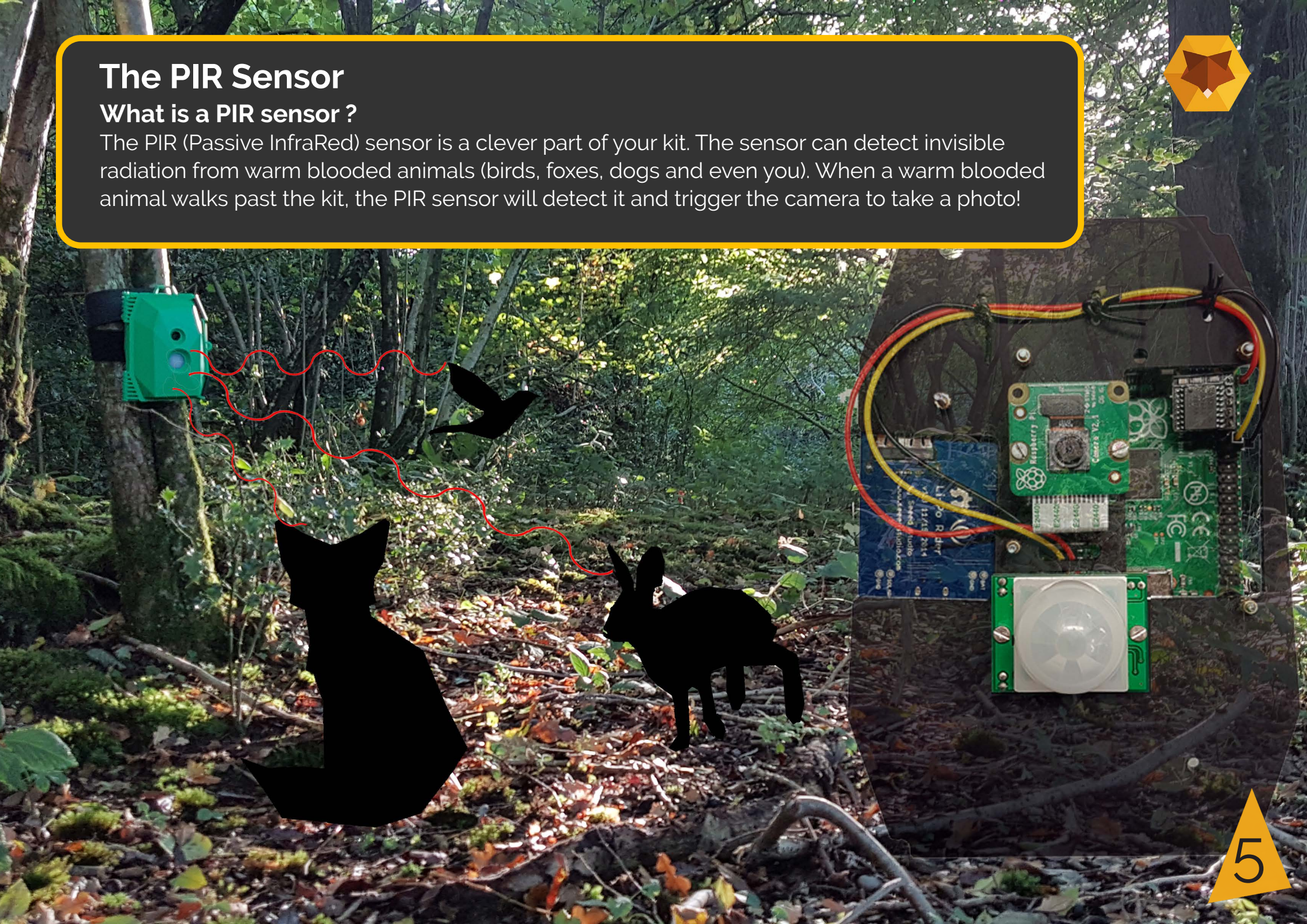
Wire ties


Velcro dots

The PIR Sensor

What is a PIR sensor ?

The PIR (Passive InfraRed) sensor is a clever part of your kit. The sensor can detect invisible radiation from warm blooded animals (birds, foxes, dogs and even you). When a warm blooded animal walks past the kit, the PIR sensor will detect it and trigger the camera to take a photo!



The PIR Sensor

Task 1 - Connecting the PIR sensor wires

Attach the three colour wires to the sensor pins. The three PINs are labelled (from left-right in image) VCC, OUT and GND. Make sure the correct colour cable is connected to the correct pin as follows:

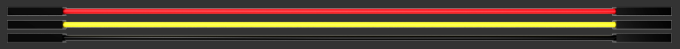
Red Wire - VCC
Yellow Wire - OUT
Black Wire - GND

Note: your PIR sensors may vary from that in the image.

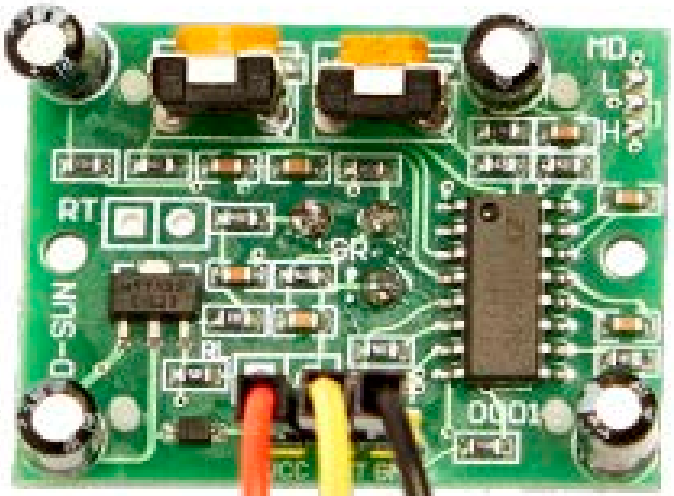
What you will need :

PIR

Wires



Red
Yellow
Black



VCC -Red wire

GND - Black wire

OUT - Yellow wire

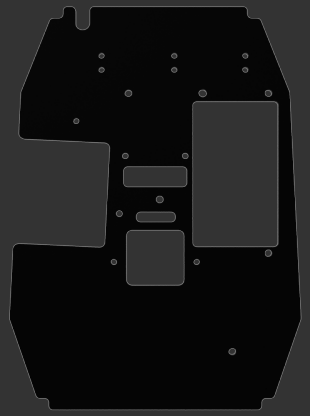
The PIR Sensor

Task 2 - Feeding the wire through the insert

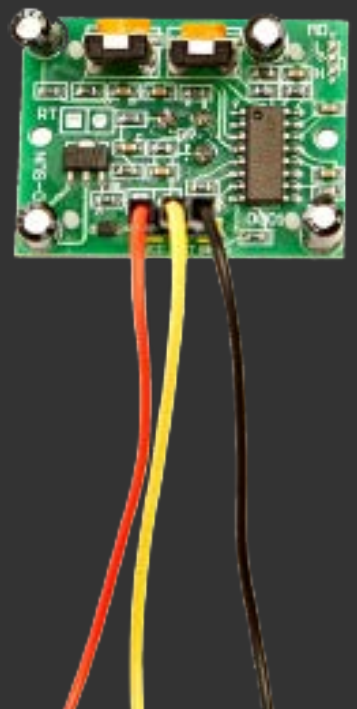
Feed the wire through the insert.
Pass the jumper wires through the lower-middle hole as highlighted in the image below. Make sure that the wires are fed through the correct side of the insert.

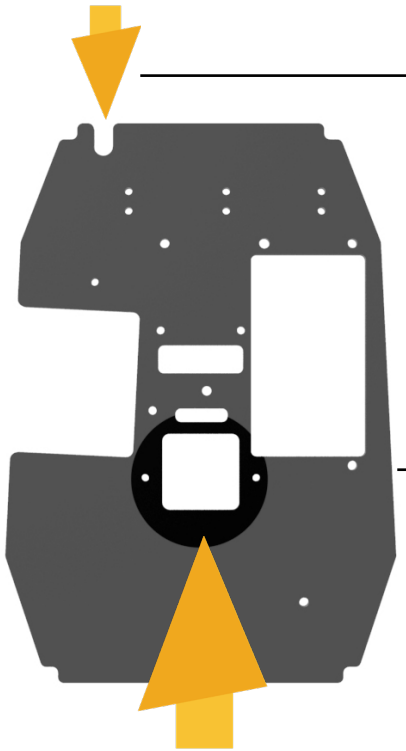
What you will need :

Main Insert



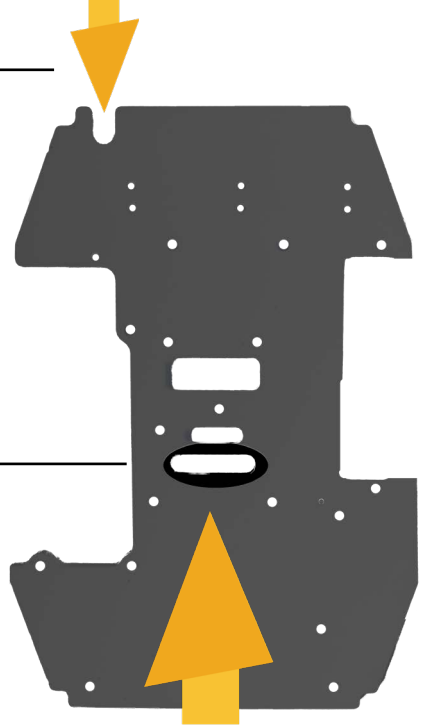
PIR Assembly



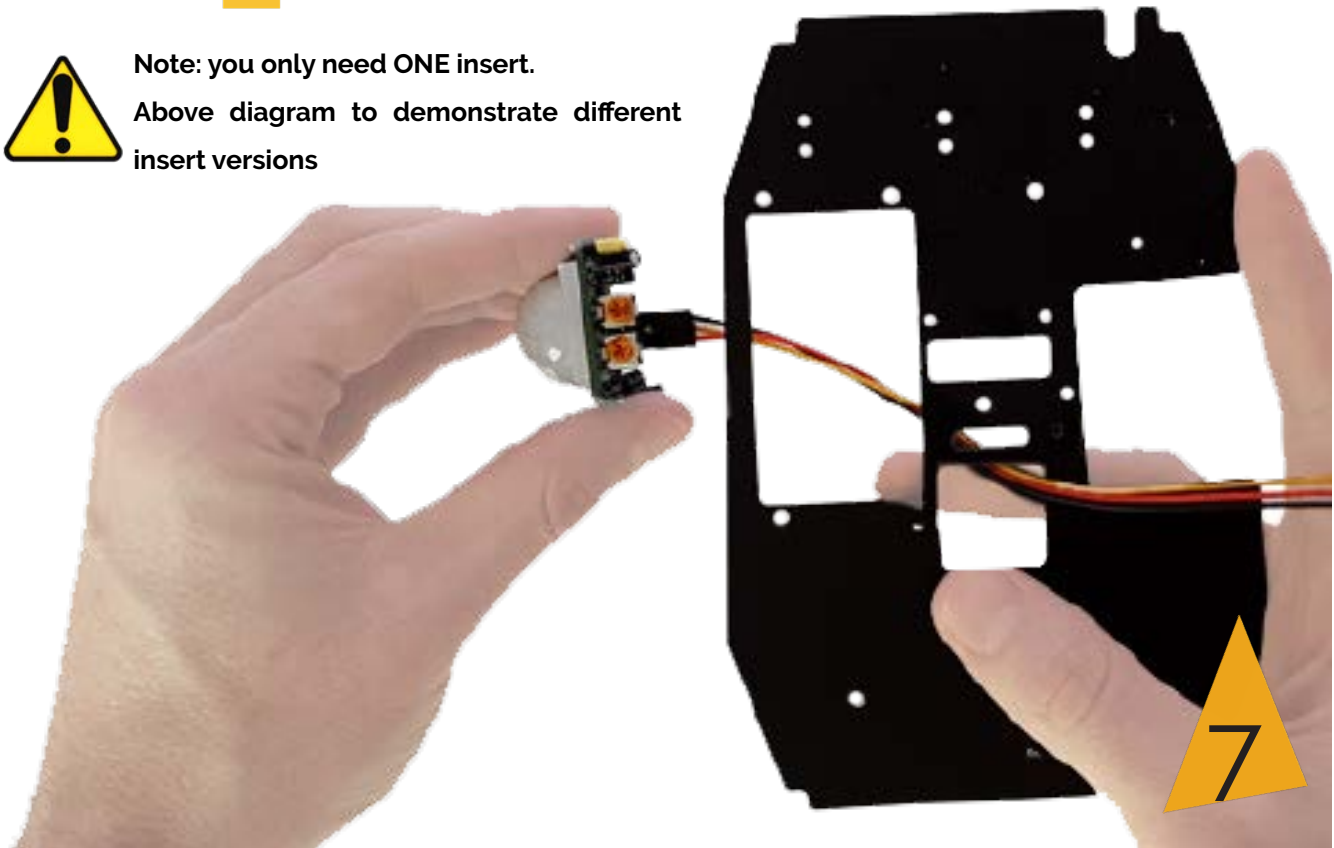


Front of Main Insert models with the notch on the left

Front of Insert to hold the PIR and Camera



Note: you only need ONE insert.
Above diagram to demonstrate different insert versions



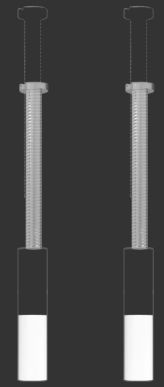
The PIR Sensor

Task 3 - Secure the PIR sensor

Screw the PIR onto the insert making sure the spacers go between the two. See the diagram for how the setup works.

What you will need :

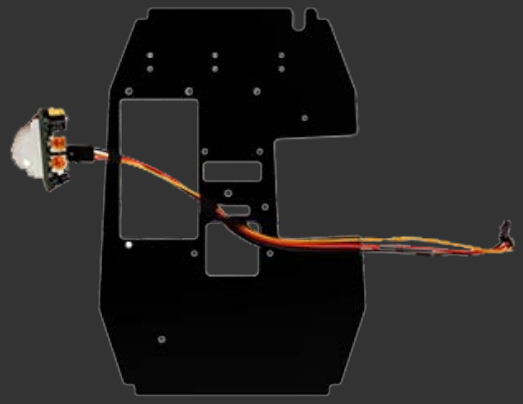
2 x 18 mm Screws



2 x 8 mm Spacers

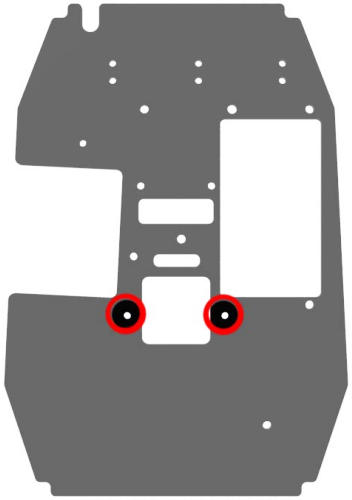
2 x Brass nuts

Insert from Task 2



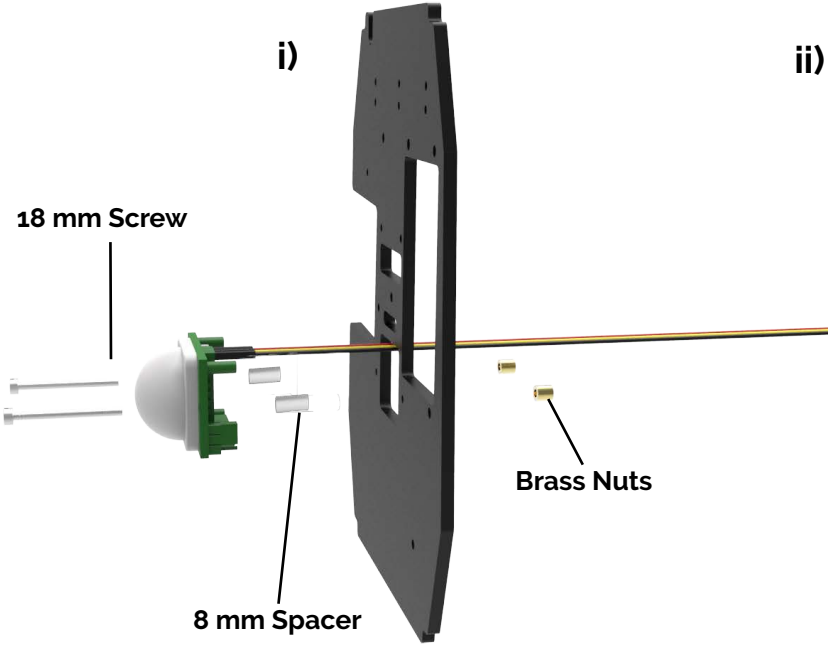
Make sure you are using the correct size spacers and screws. Use a ruler to double check them.

8 mm Spacer 18 mm Screw

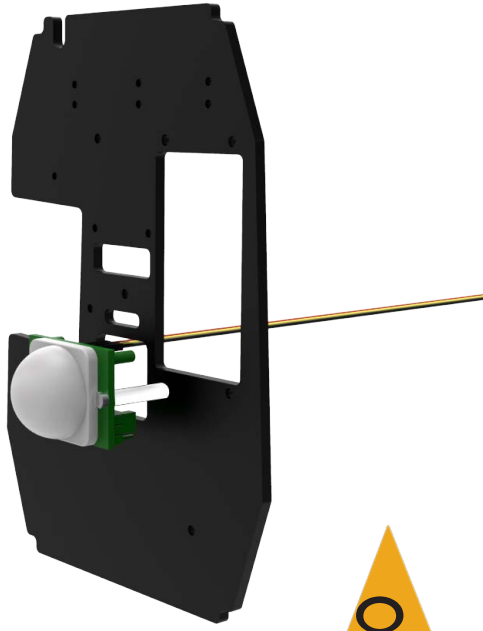


PIR Hole location

i)



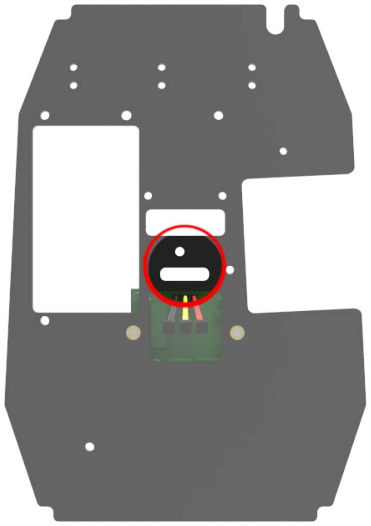
ii)



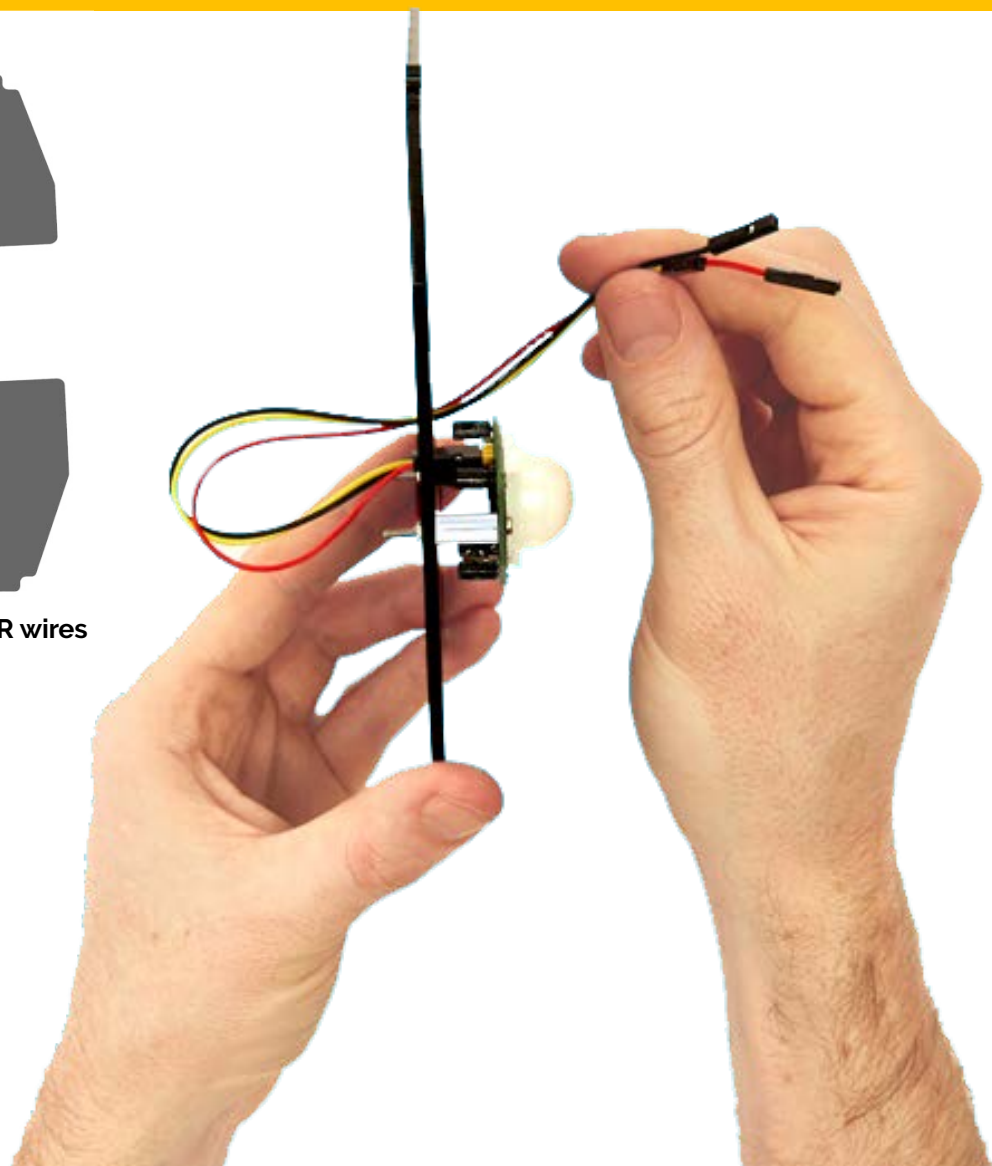
The PIR Sensor

Task 4 - Feeding the wires back through the insert

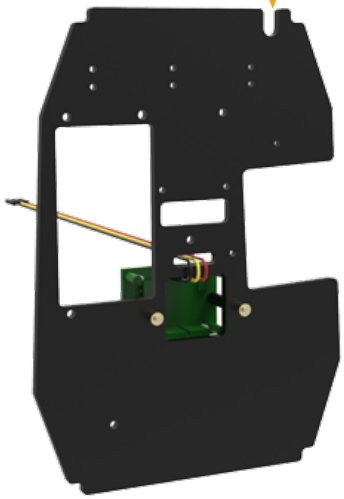
Feed the wires through the insert from the back to the front, as shown in the diagram

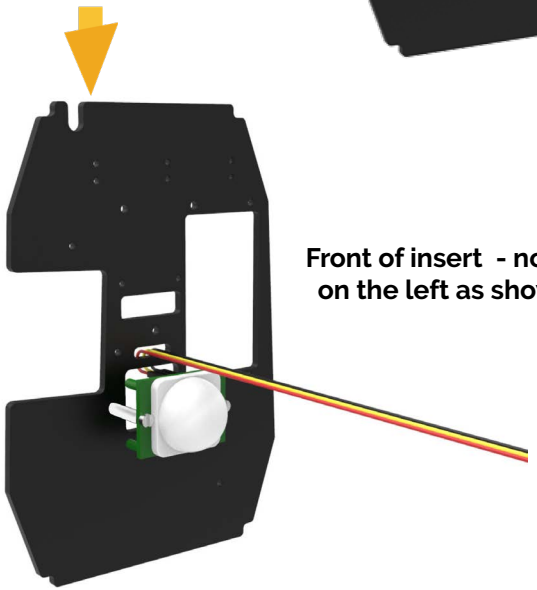


2nd hole location for PIR wires



Back of insert - notch on the right





Front of insert - notch on the left as shown

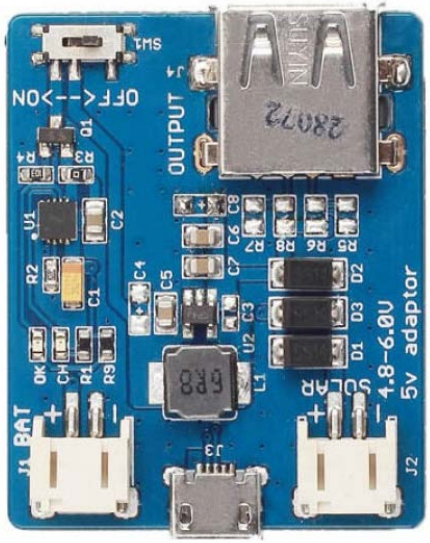
Controlling the power

Choose one of the two options below:

A: Direct connection to powerbank
most common - go to page 12

or

B: Using a Lipo Rider (for makers)
for makers - go to page 11



Option A: Direct connection to a powerbank

A powerbank such as Anker power 10,000 can be used to power your wildlife cam kit by directly connecting to the Raspberry Pi by a micro USB cable.

Skip to **page 12 'The Camera'** if using this option

Option B: Using a Lipo Rider (got to next page)

The LiPo Rider board allows you to connect power to your wildlife cam kit. It boosts and regulates the power from the rechargeable battery with a RJT connection to the Raspberry Pi. It allows the battery to be charged using a micro USB charger and use solar power.

Continue to the **next page** if using this option

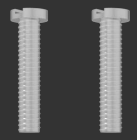
Option B: The LiPo Rider

Task 5 - Secure the LiPo Rider

Attach the LiPo Rider to the insert using the LiPo holder. Place spacers between the insert and the LiPo holder. See the diagram for how the setup works.

What you will need:

(Parts available separately)



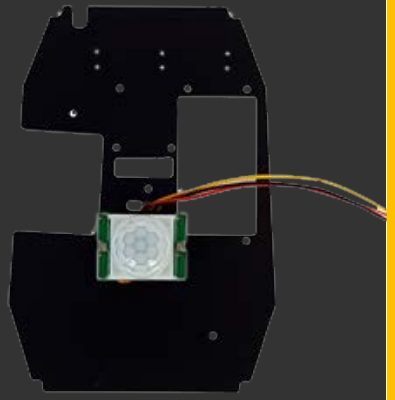
2 x 12 mm Screws

2 x 3 mm Spacers

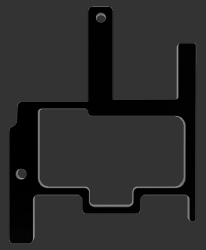
2 x Brass nuts

LiPo Rider

Insert from Task 4



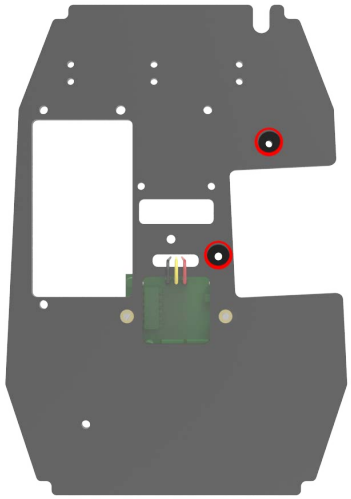
LiPo holder



Make sure you are using the correct size spacers and screws. Use a ruler to double check them.

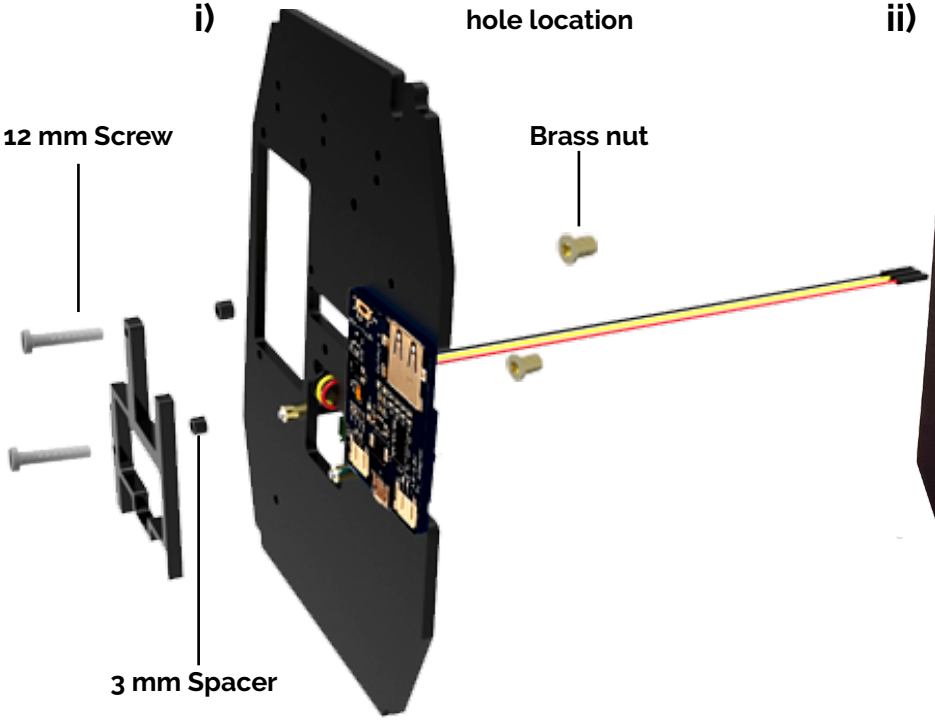
3 mm Spacer

12 mm Screw



LiPo Rider hole location

i)



ii)

The Camera

About the Camera

The camera module can be used to take high-definition video and stills photographs.

It is a fixed focus camera that connects to the Raspberry pi through the ribbon.
If you are using a Pi Zero your camera ribbon might look a little different

Product Description:
Size: 25 mm x 23 mm x 9 mm
Resolution: 5 or 8-megapixels
Static images: up to 3280 x 2464 pixels
Video Mode: up to 1080p

The Camera

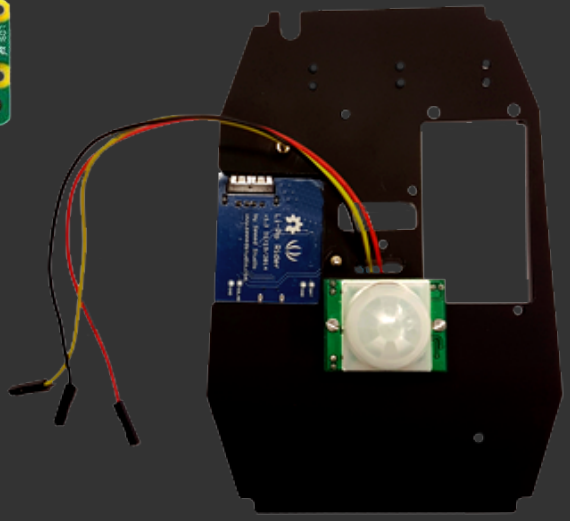
Task 6 - Feed the camera ribbon through the insert

Next feed the ribbon through the insert from the front (same side as the PIR), to the rear side with the LiPo rider.

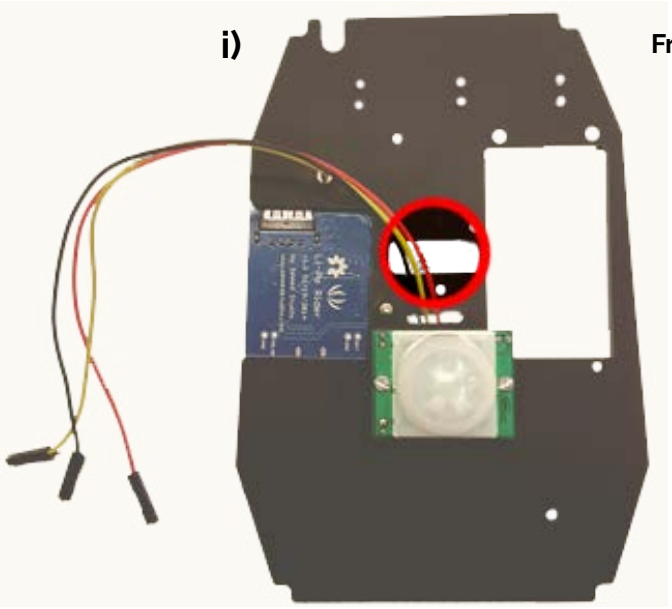
What you will need :

Camera

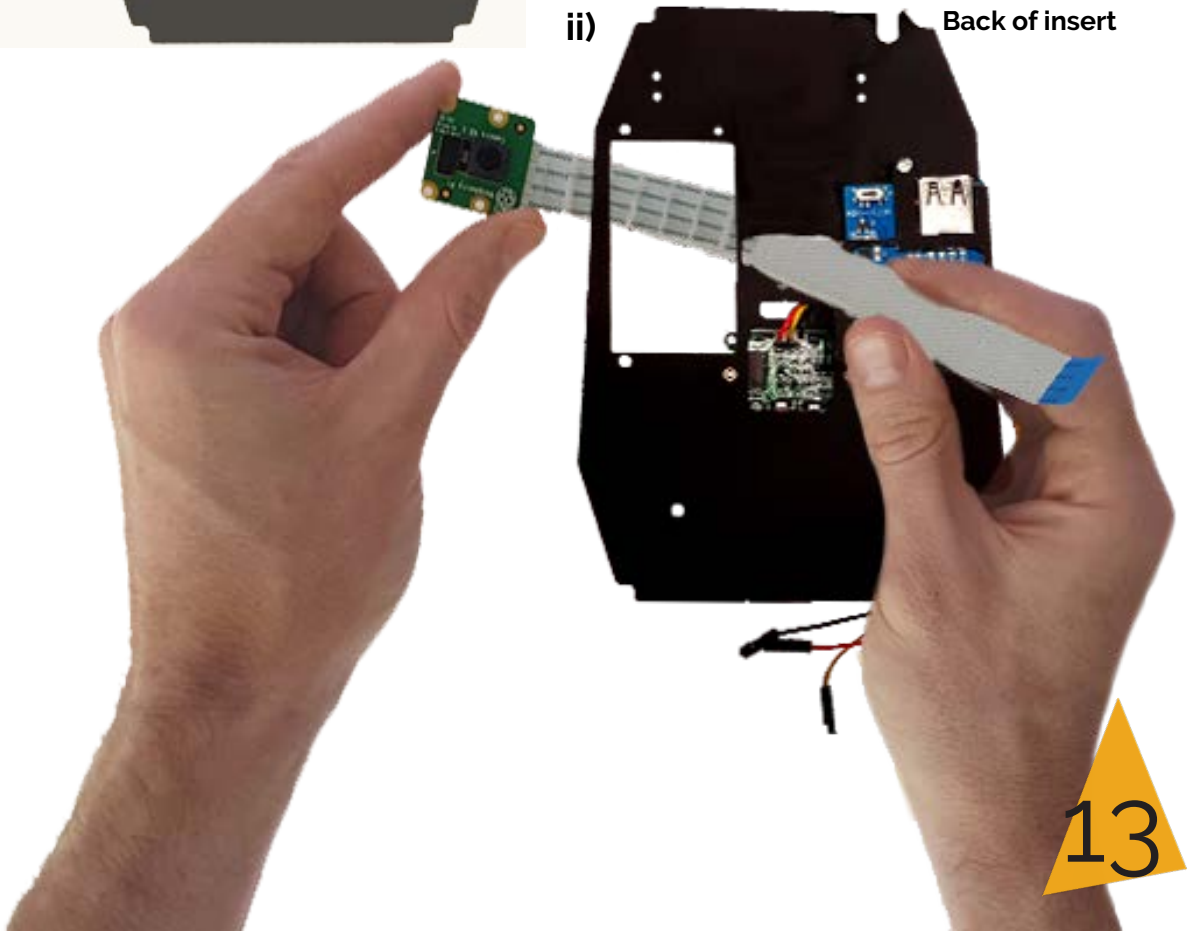
Insert assembly from Task 5



i) Front of insert



ii) Back of insert



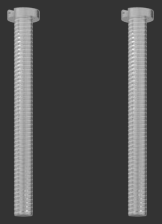
The Camera

Task 7 - Secure the Camera

Now attach the camera to the insert assembly using the screws, spacers and brass nuts.

What you will need :

2 x 25 mm Screws



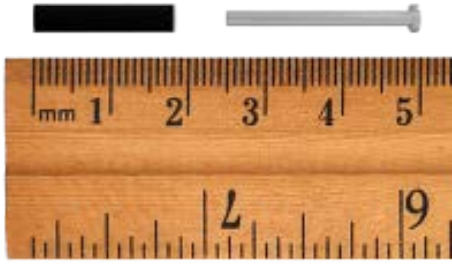
2 x 18 mm Spacers

2 x Brass nuts

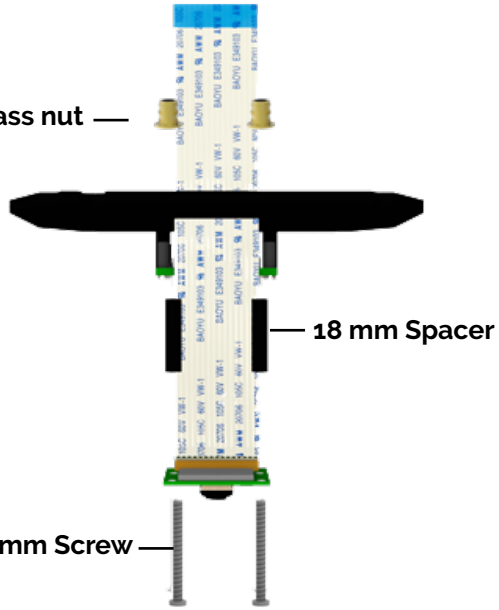
Insert from Task 6

Make sure you are using the correct size spacers and screws. Use a ruler to double check them.

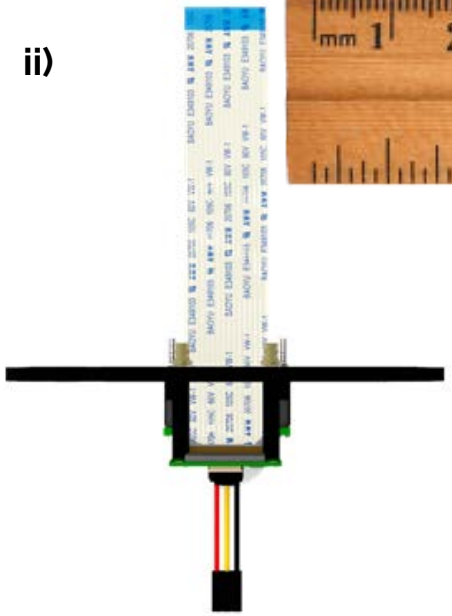
18 mm Spacer **25 mm Screw**

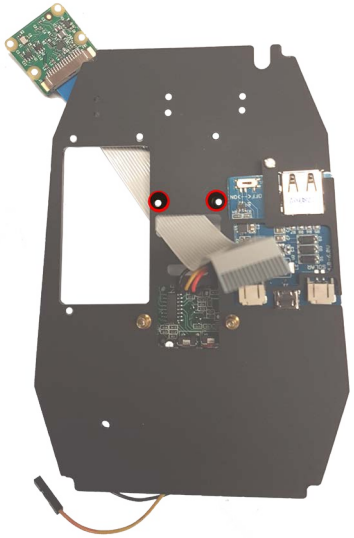


i)

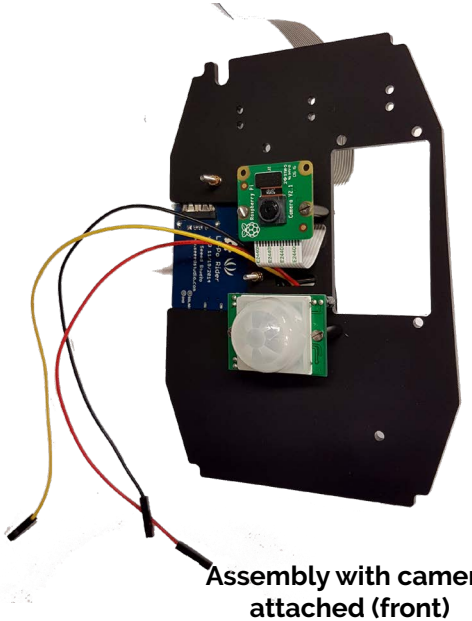


ii)





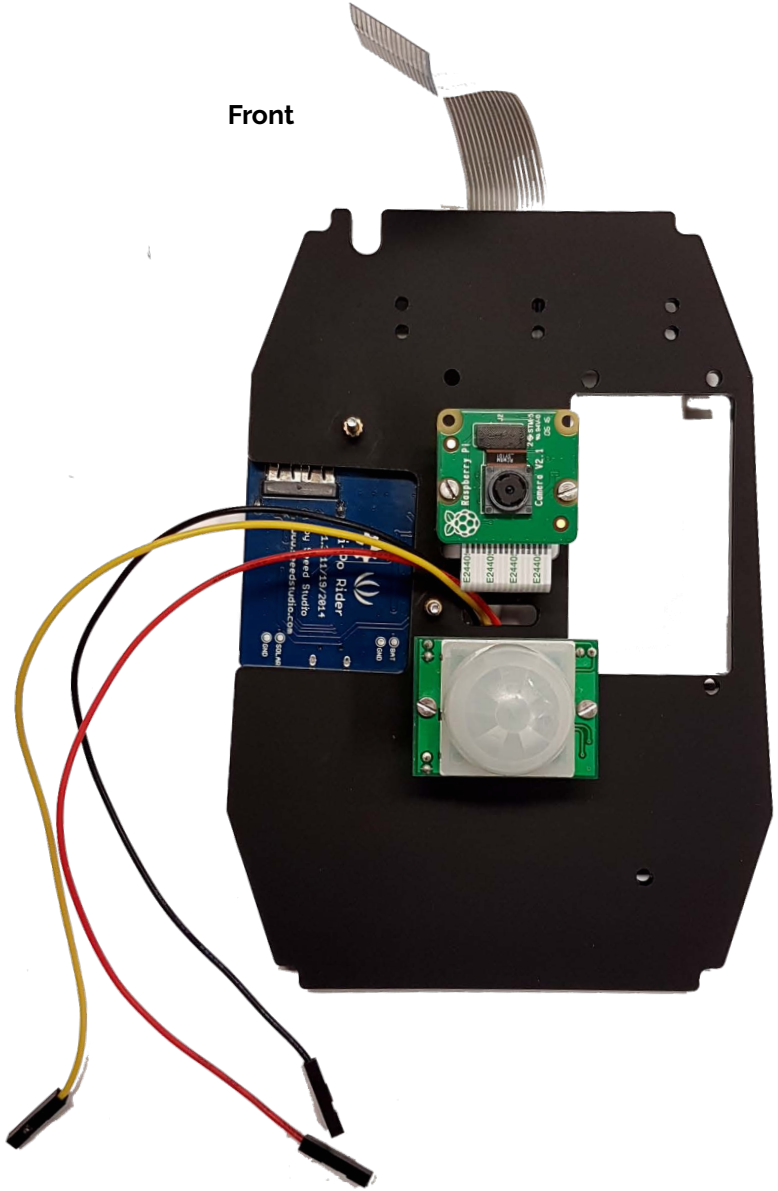
Camera hole location (back)



Assembly with camera attached (front)

Your assembly should look like this (LiPo rider optional)

Front



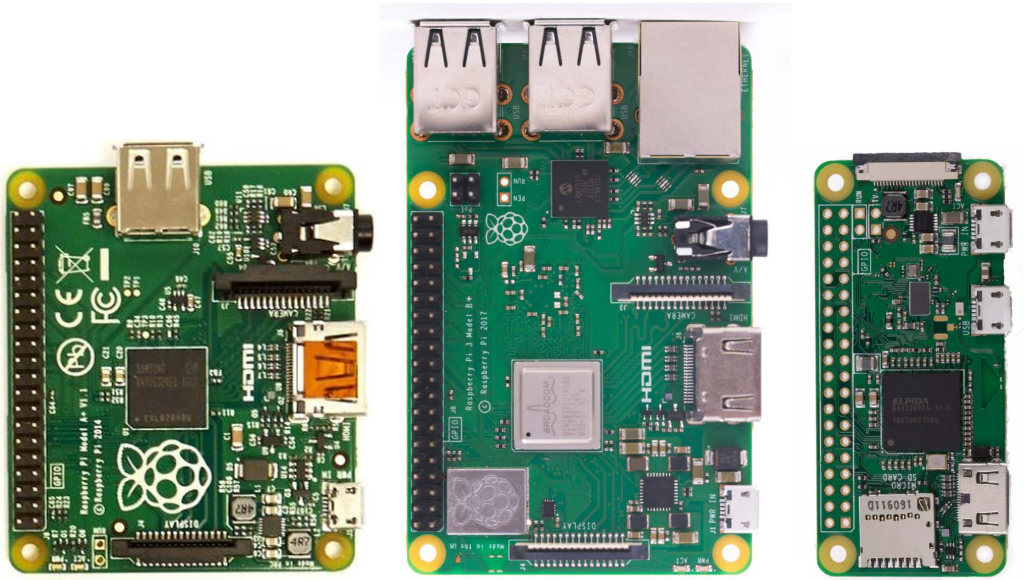
Back

The Raspberry Pi and RTC

The Raspberry Pi

The Raspberry Pi inside your cam kit is a small yet powerful computer. It is the brains of the kit, connecting and controlling all the other electronic parts.

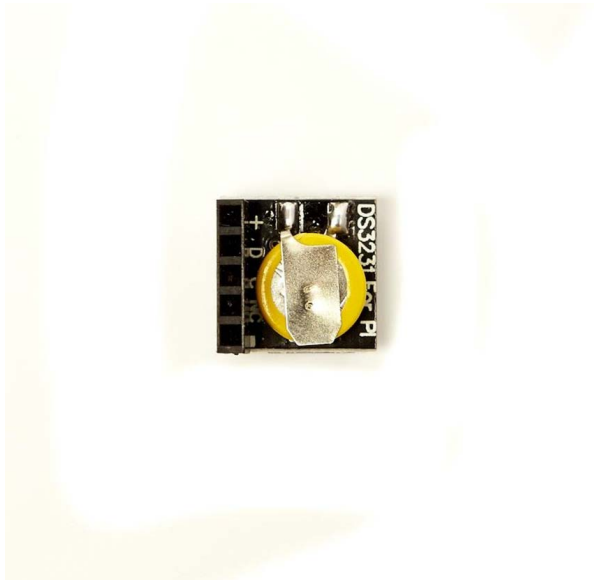
You can use any Raspberry Pi model with the wildlife cam kit.
If you have purchased the case only you can download the image file from naturebytes.org



Raspberry Pi Model A+

Raspberry Pi Model 3B+

Raspberry Pi Zero W



The Real Time Clock (optional)

The Real TIme Clock (RTC) is the time-keeper of your kit. It provides useful information on when each of the photos or videos are taken. You can even code your kit to timestamp each image.

Attaching the Real Time Clock to the Raspberry Pi

Task 8 - Attach the RTC

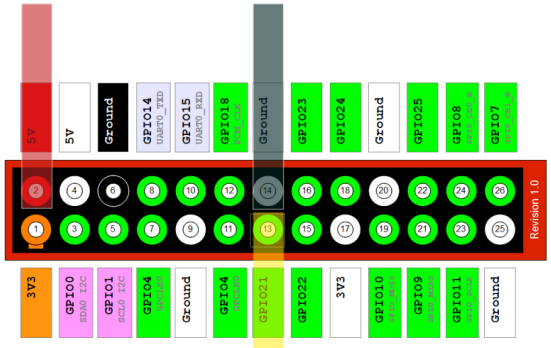
Attach the RTC to the Raspberry Pi, positioning it on the pins shown to the right.

What you will need :

Real Time Clock

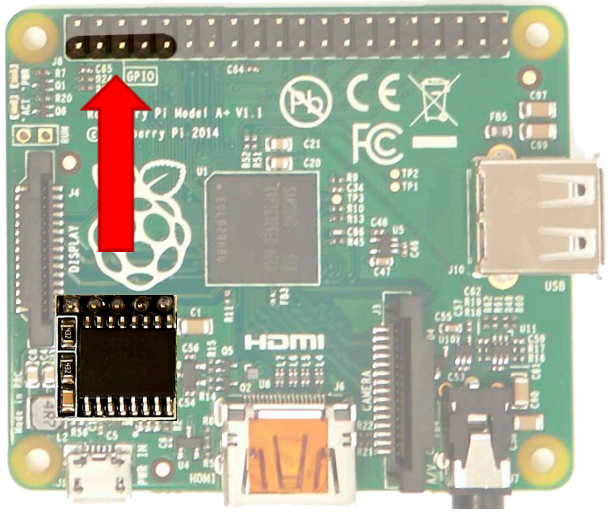
Raspberry Pi A +

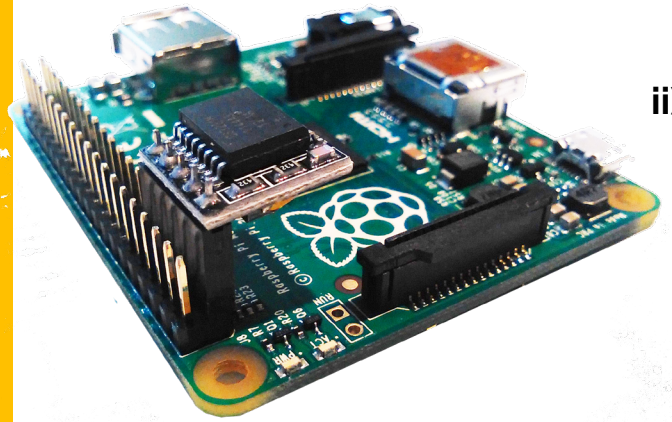
Make sure the real time clock is positioned the right way round. Compare your Raspberry Pi with the images on the bright to check its correct



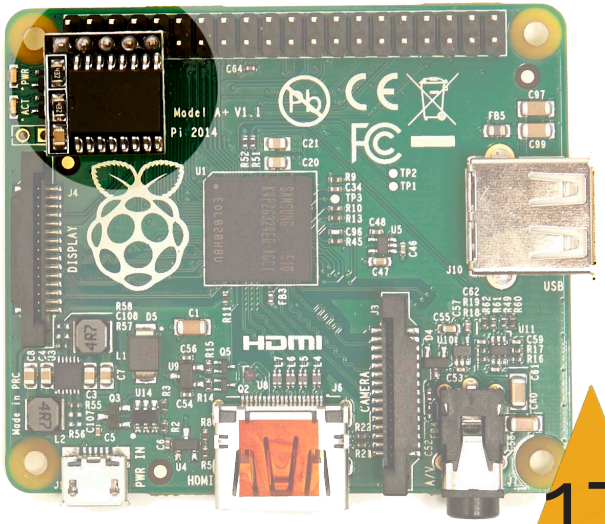
Whatever model of Raspberry Pi you have the pins the RTC attaches to are 1,3,5 & 7.

)





ii)



Attaching the Raspberry Pi

Task 9 - Connect the Camera to the Raspberry Pi

The camera ribbon locates into the port highlighted in the image (right).

Follow these steps below with the help of the images on the following page.

I) Gently lift the clasp on the camera port, highlighted in image i) on the following page.

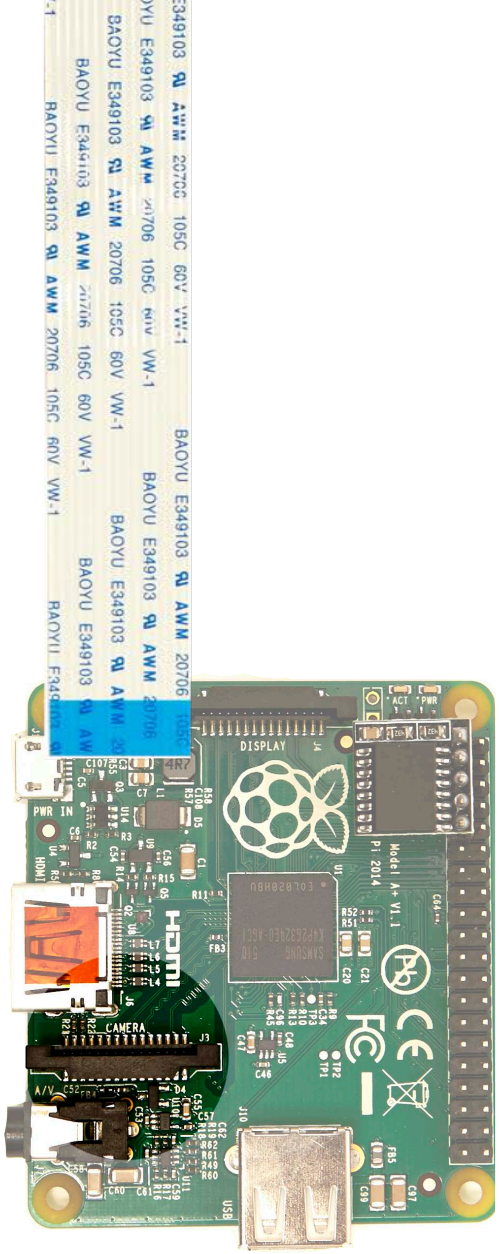
II) Insert the camera ribbon into the port ensuring the blue tab on the ribbon is facing away from the HDMI port (labelled on the Pi) as seen in image ii) on the following page.

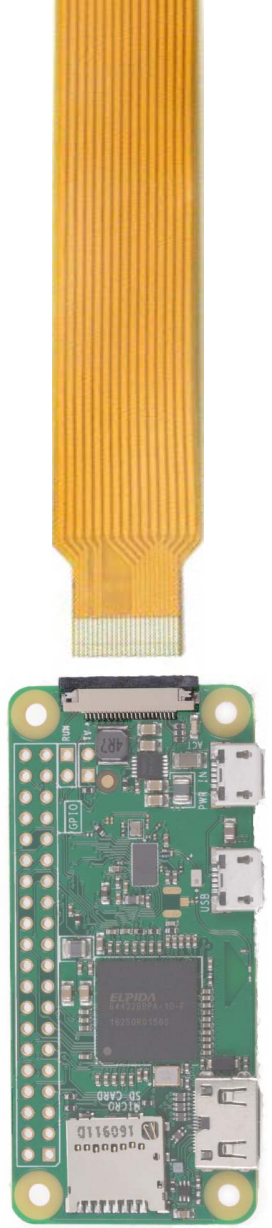
III) Secure the ribbon by holding it in the port and gently pushing down on the clasp. Make sure the ribbon is pushed down evenly and not at an angle.

What you will need :

Raspberry Pi

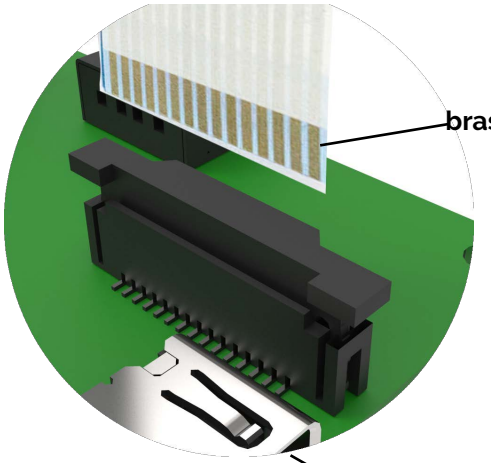
Task 7 Insert Assembly





Connecting the Camera Ribbon

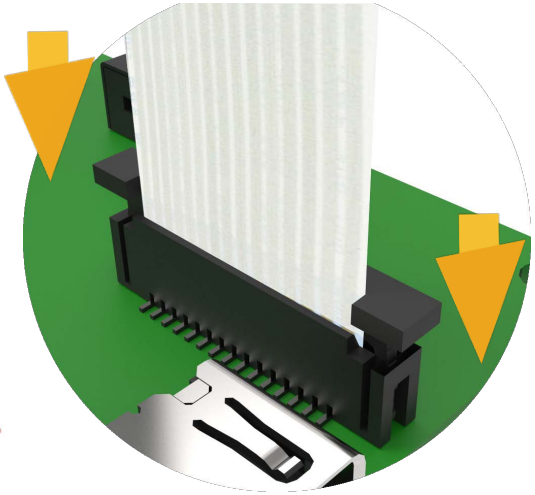
i)



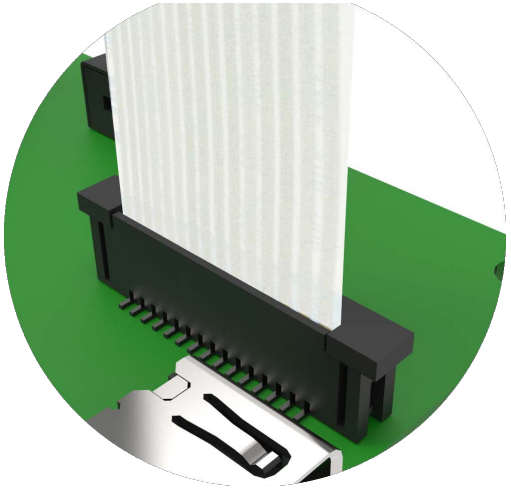
brass contact points

HDMI connector

ii)



iii)



Make sure the brass contact points on the ribbon are facing the HDMI plug on the Raspberry Pi.

If using a Raspberry Pi Zero - make sure the brass contact point on the ribbon face the back of the board

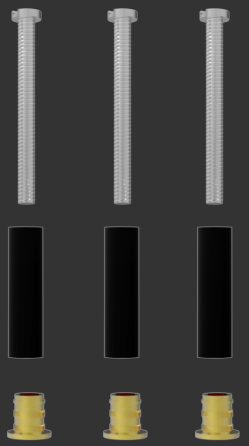
Finished Assembly

Attaching the Raspberry Pi

Task 10 - Connect the Raspberry Pi to the insert assembly

Attach the A+ Raspberry Pi to the insert using the screws, nuts and bolts provided.

What you will need :



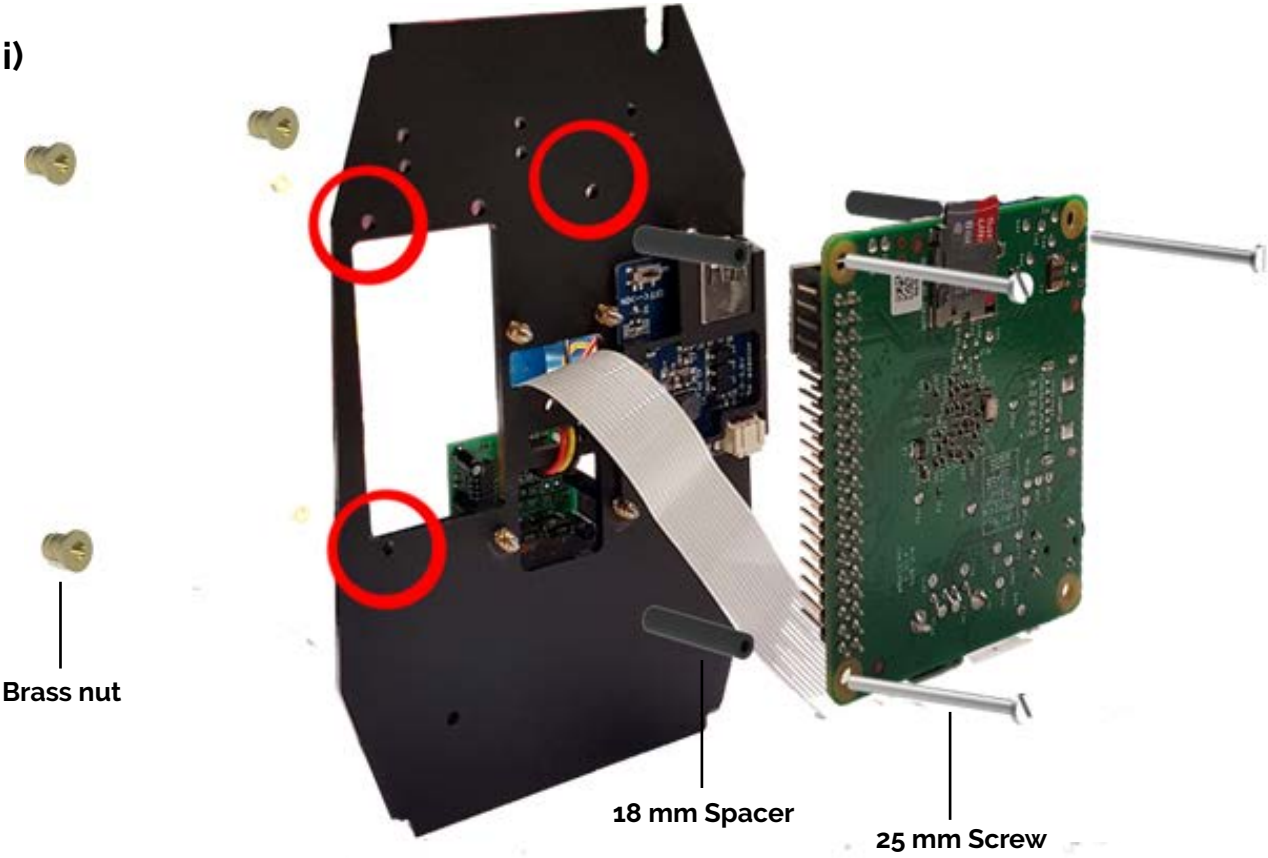
3 x 25 mm Screws

3 x 18 mm Spacers

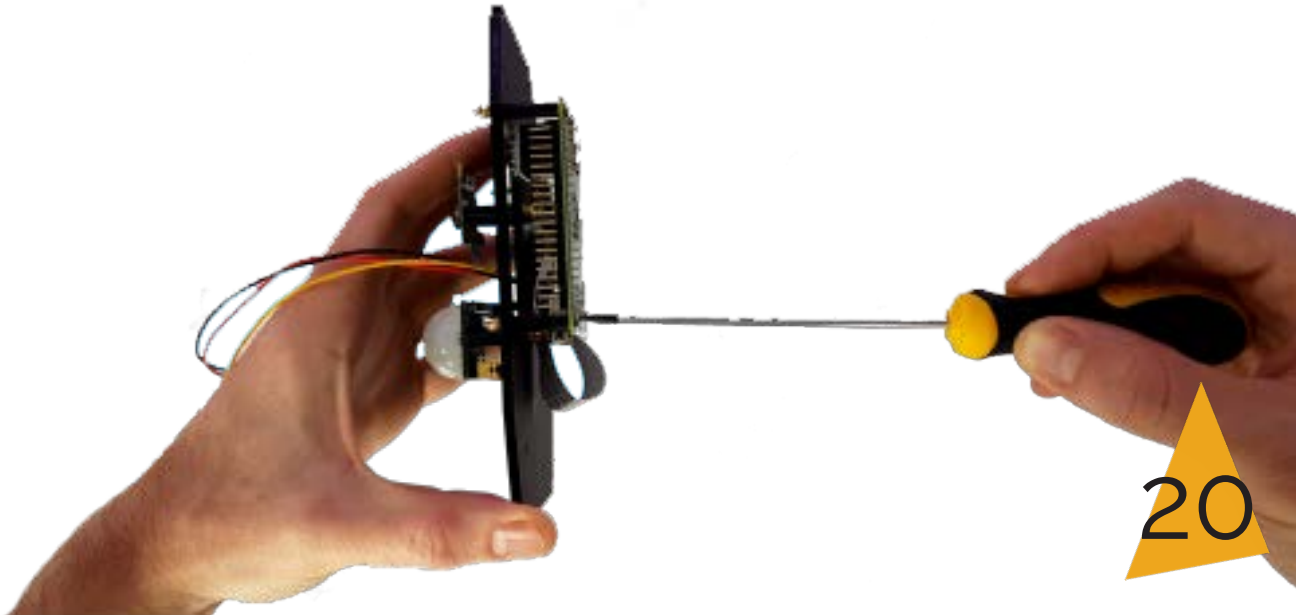
3 x Brass nuts

Task 9 Insert Assembly

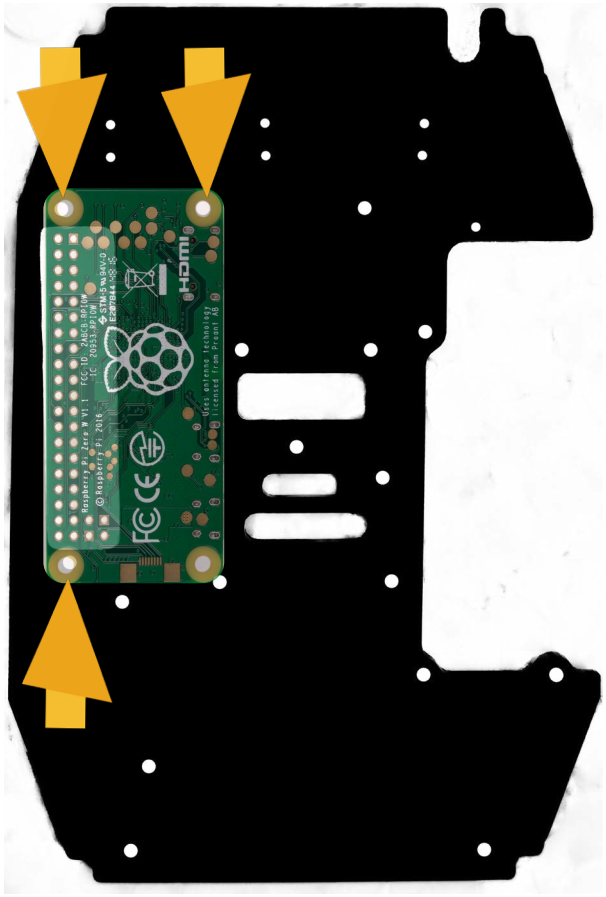
i)



ii)



Footprint Raspberry Pi



For the **Pi Zero** use these holes for securing to the insert

For the Raspberry **Pi B+ models** use the same holes as demostrted on the page before for securing to the insert

Connecting the Raspberry Pi

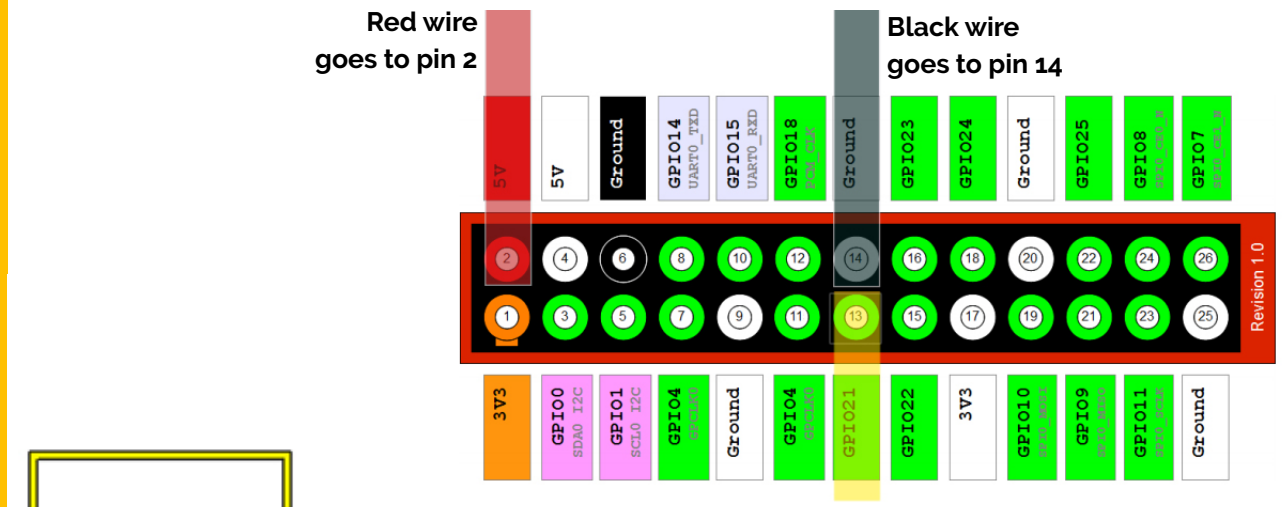
Task 11 - Connect the PIR wires to the Raspberry Pi

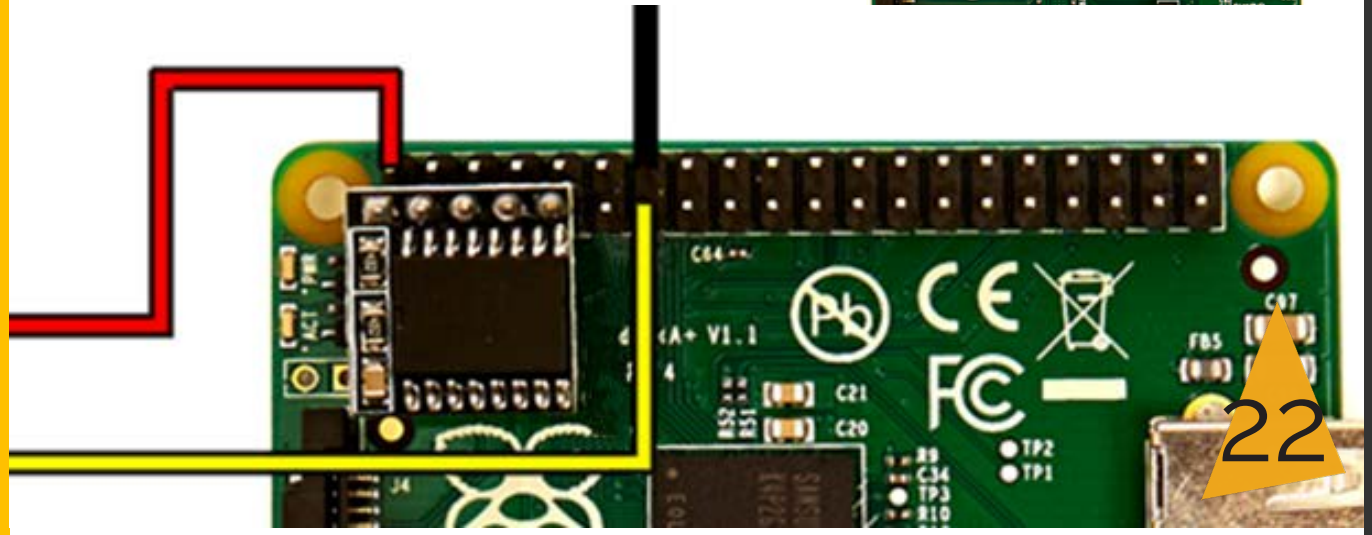
Attach the three wires from the PIR to the correct pins on the Raspberry Pi as shown in the diagram. Ensure the wires go around the camera and onto the correct pins.

What you will need :

Task 9 Insert Assembly

Note: the pins will be same with all Raspbery Pi models





Optional: Securing the wires

Secure the wires onto the insert

Feed the 3 black cable-ties through the holes and twist them to secure the wires to the insert.

What you will need :

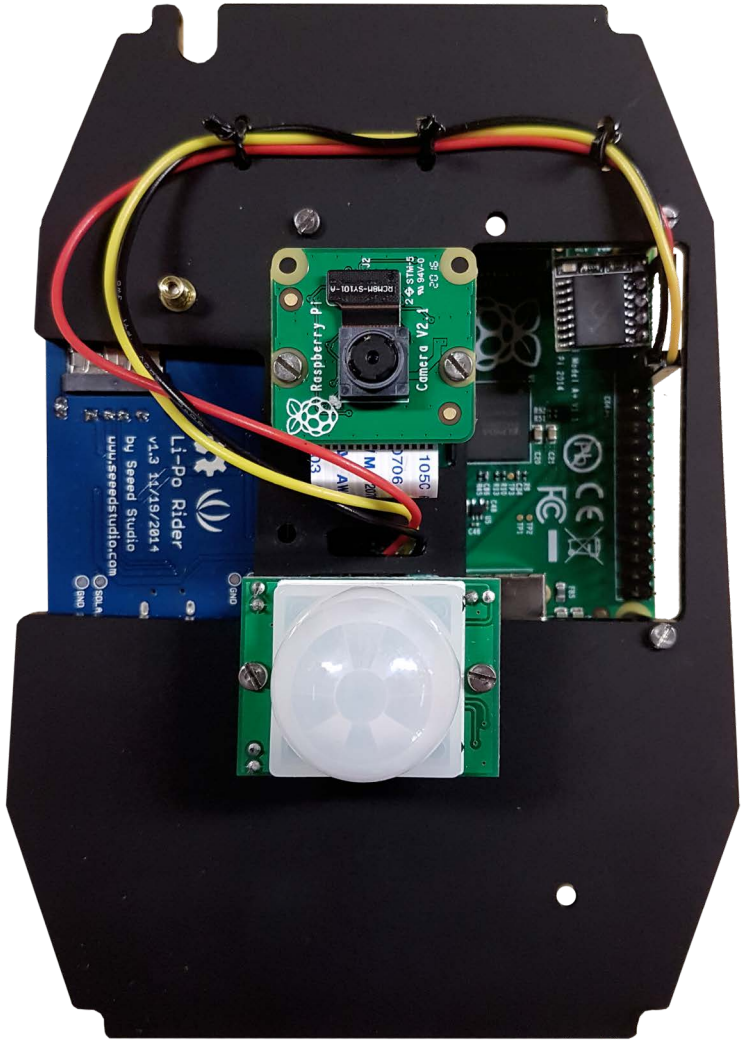
3 x Black cable ties

Task 11 Insert Assembly

i)

use wire or cable ties to attach wires

Final Insert Assembly - showing the LiPo Rider power option



The Case

About the Wildlife Cam Kit Case

It looks snappy but the best thing about the case is that it's weather-proof, protecting all the parts inside from the elements.

The weatherproof case has passed ingress testing to gain a certified IP rating of 55. The case has been designed so that it is hackable and will fit all the Raspberry Pi's and additional add-on modules and power units.

Controlling the power

Option A - direct connection to powerbank, skip to page 29

Option B - The lipo rider and battery, go to the next page

Controlling the power using a LiPo Rider (Option B)

Task 12 - Assemble the Case

I) Place the insert assembly into the front of the case with camera facing down, and secure with the large screws at the four corners.

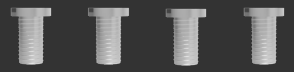
II) Connect the LiPo Rider to the Raspberry Pi using the USB cable.

What you will need :

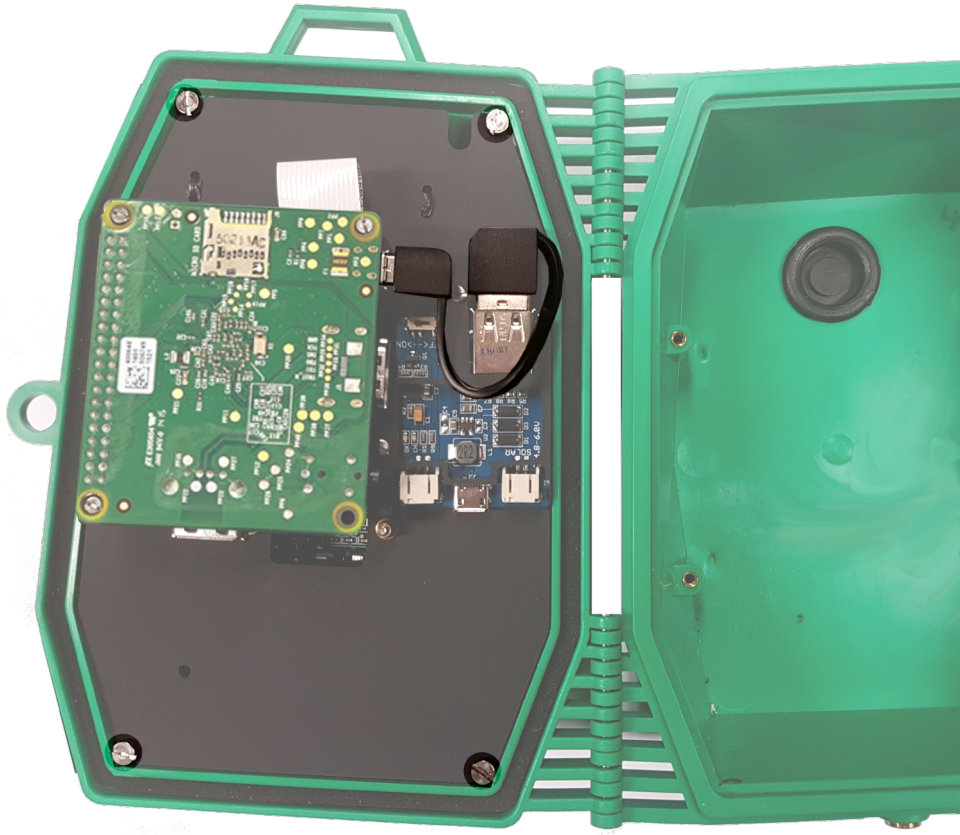
Task 11 Insert Assembly

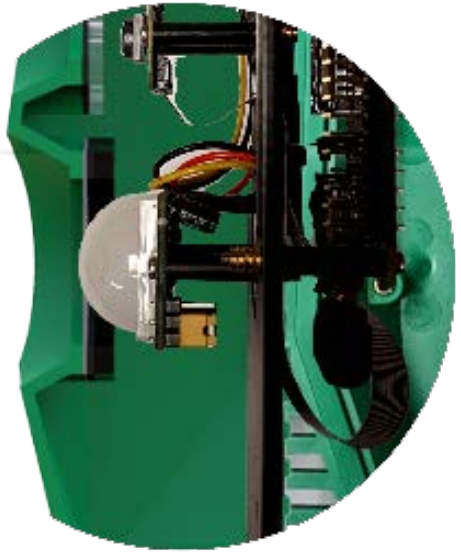
USB cable

4 x Large Screws 6 mm



Case





There may be resistance when placing and securing the insert assembly but don't worry. - the kit is designed so the PIR sensor dome presses against the flexible Fresnel PIR window. This optimises animal detection and triggering of the camera.

Connecting the battery

Task 13 - Attach and connect the battery pack

The battery pack sits in the back of the case and is connected to the LiPo Rider. Use the screws to secure the battery holder. Now plug the battery into the LiPo Rider socket labelled “BAT”.

Caution - ensure the LiPo Rider is switched to off before connecting.

What you will need :

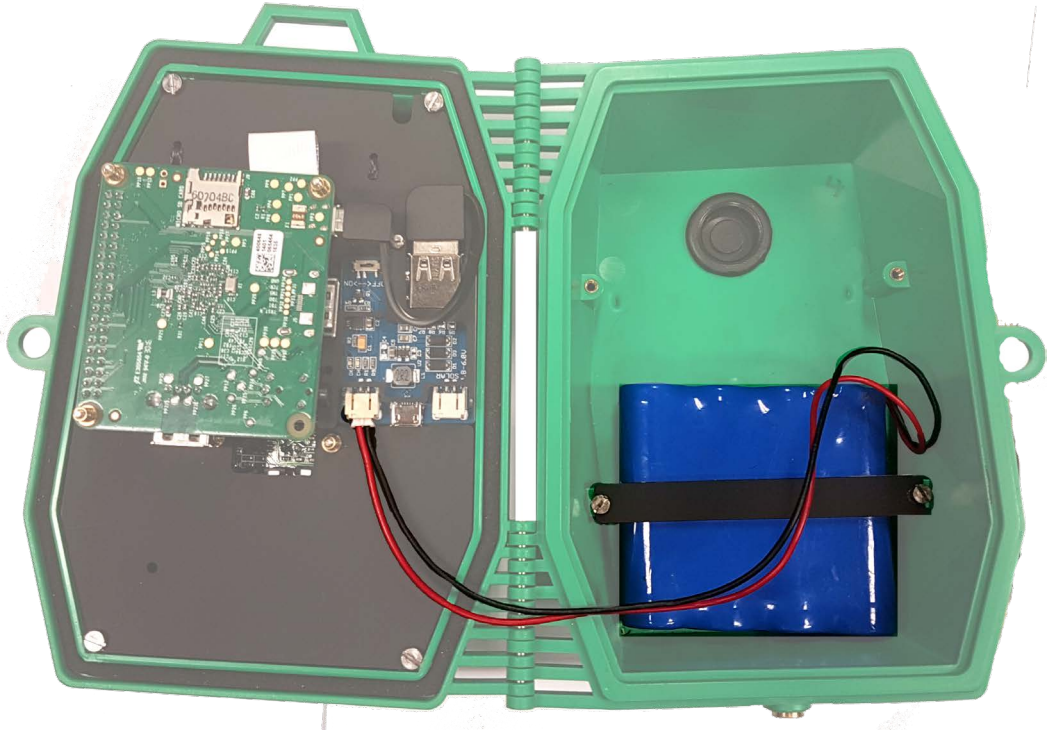
Task 12 Insert Assembly

2 x Large Screws 6 mm

Battery Holder

Continue to page 30

Place the battery into the bottom of the back of the case and connect to the LiPo Rider



Controlling the power using a Powerbank (Option A)

Task 12 - Attach and connect the powerbank

I) Place the insert assembly into the front of the case with camera facing down, and secure with the large screws at the four corners.

II) The powerbank sits in the back of the case and is connected directly to the Raspberry Pi. Use the screws to secure the battery holder. Now plug the battery into the Raspberrty Pi using the Micro USB connector cable.

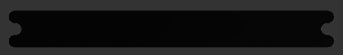
What you will need :

Task 11 Insert Assembly

Powerbank

Case

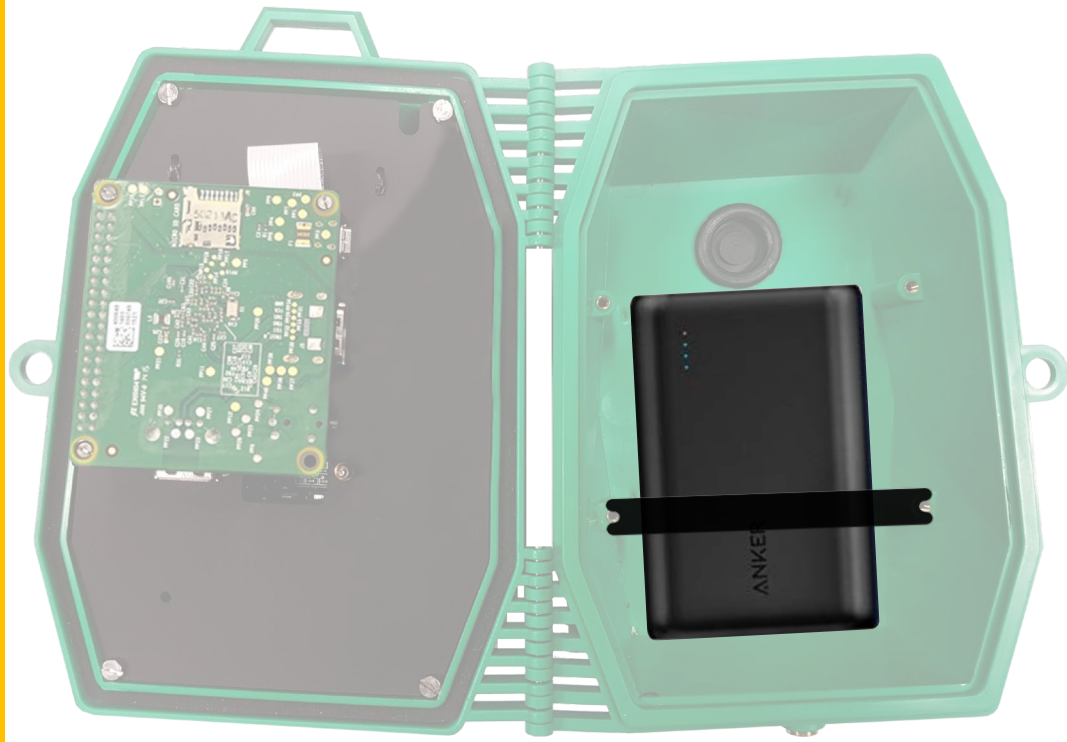
Battery Holder



2 x Large Screws 6 mm

USB cable

Place the powerbank into the back of the case and connect to the Raspberry Pi with your USB cable



SD card and USB Flashdrive

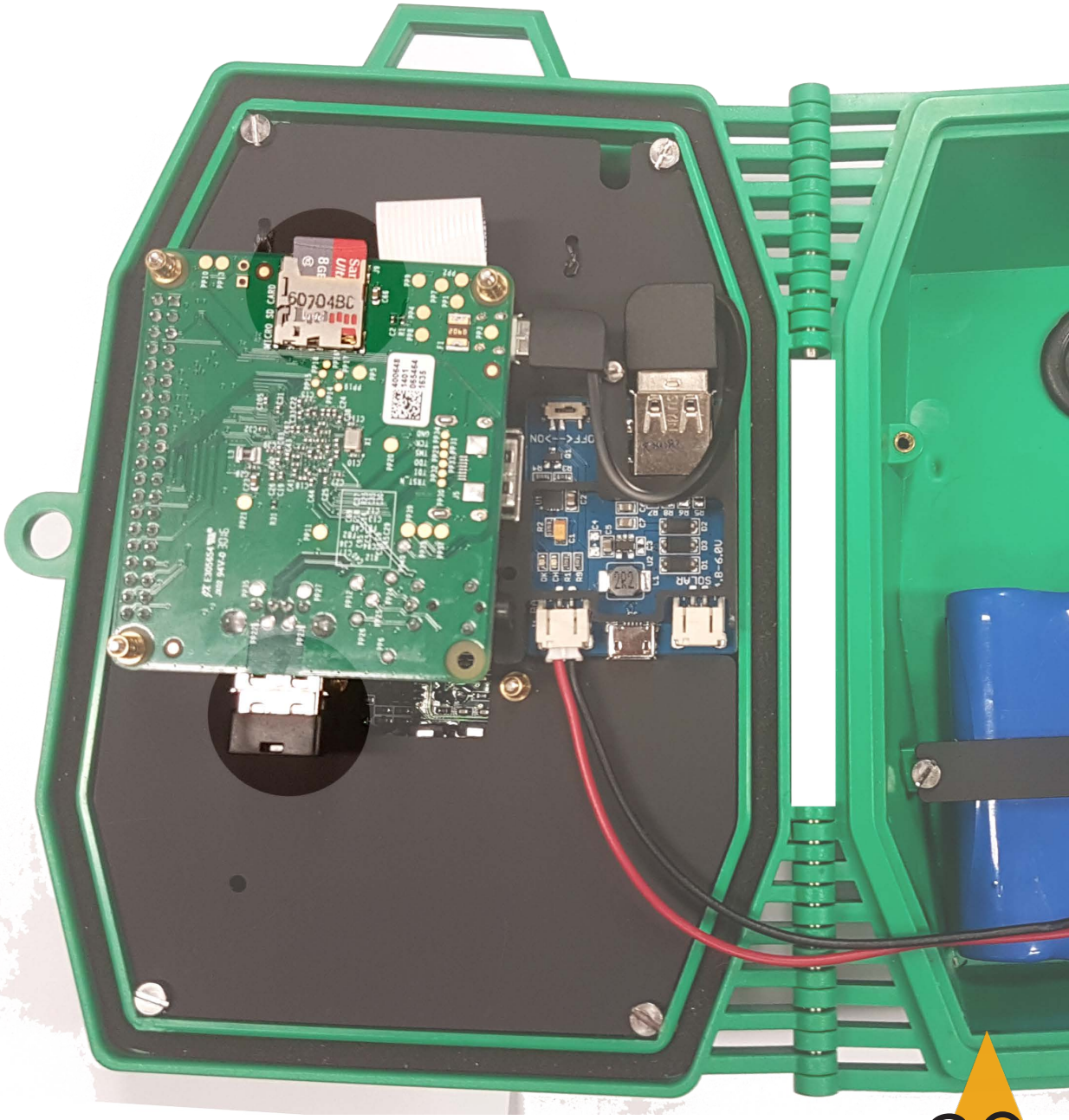
Task 15 - Insert the SD and USB Flashdrive

Insert the USB Flashdrive into the lower USB slot on the Raspberry PI and to finish, insert the SD card into the top slot.

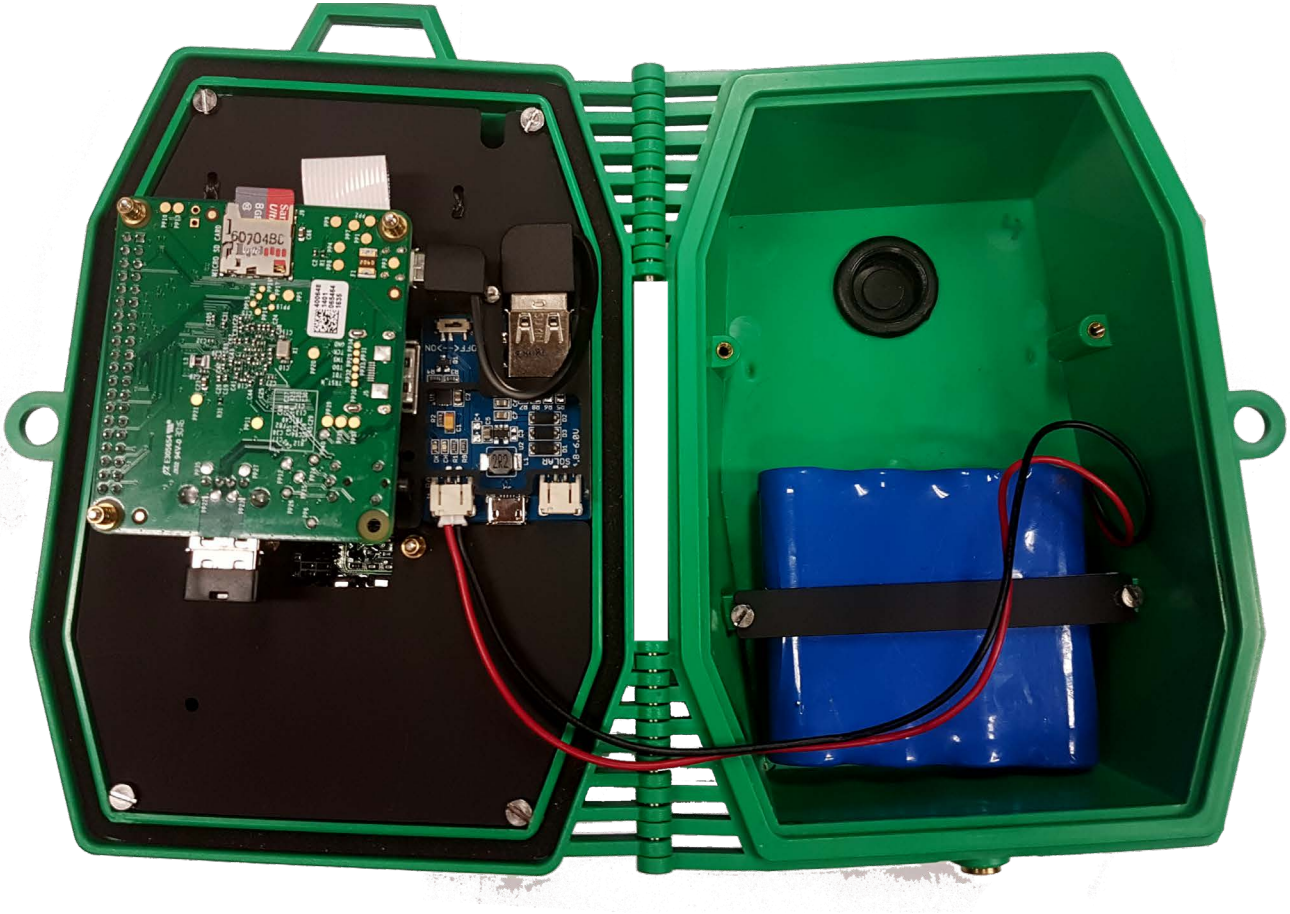
What you will need :

USB

SD CardR

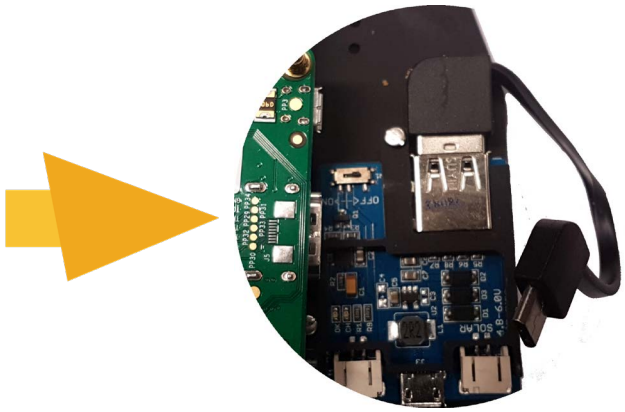


The Complete Wildlife cam kit



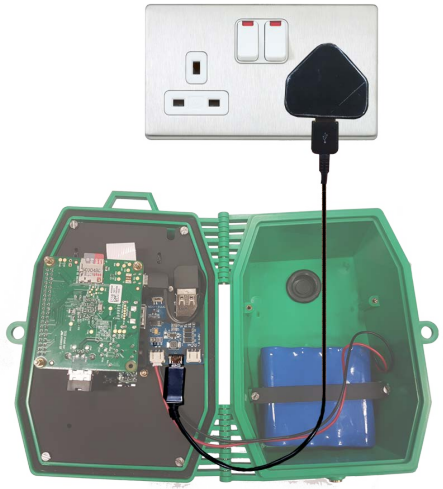
Charge your kit - fully charge your powerbank or use the LiPo rider as below

You must charge your kit before putting it outside. This will ensure you get the best performance out of your kit and the most out of your battery life. To charge the battery:

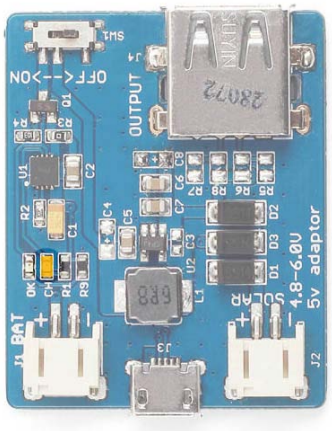


i) You must first disconnect the micro usb wire connecting the Lipo Rider to the Rasberry Pi.

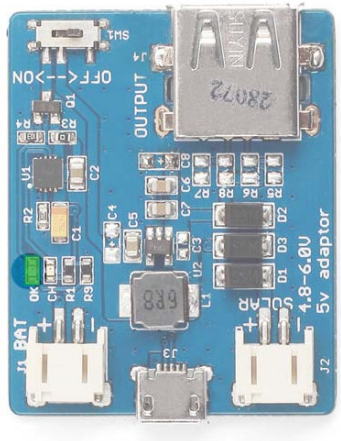
ii) Plug a micro USB cable into the LiPo rider as illustrated in the image below
iii) Connect the micro USB charging device. A plug adapter or computer will do.
iv) When charging, the Orange LED will light up
v) When fully charged, the Green LED will light up. The initial full charge will take approximately 8 hours.
vi) When fully charged disconnect the LiPo Rider from the charging device and reconnect the LiPo Rider and Raspberry Pi.



Charging - orange light

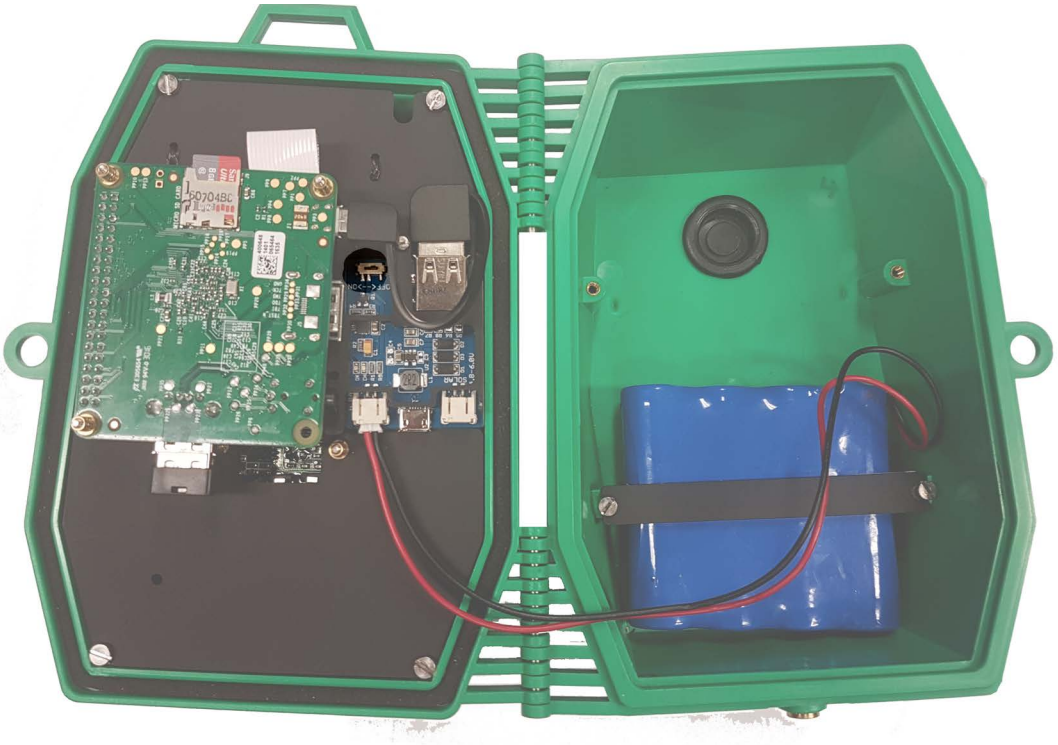


Charged - green light



Switching on your kit

Now you are ready to test your kit.



i) Turn the power on, flip the switch on the LiPo Rider highlighted in the image.

ii) Leave the camera face down as the Raspberry Pi boots - you will see the LEDs flashing indicating itis loading. This should take apprximately 1 minute.

iii) Now take a selfie, Close the case and turn the camera to face you. You should trigger the camera.

iv) Grab your images, after a few selfies and giving enough time for the images to save (approx. 1 min),

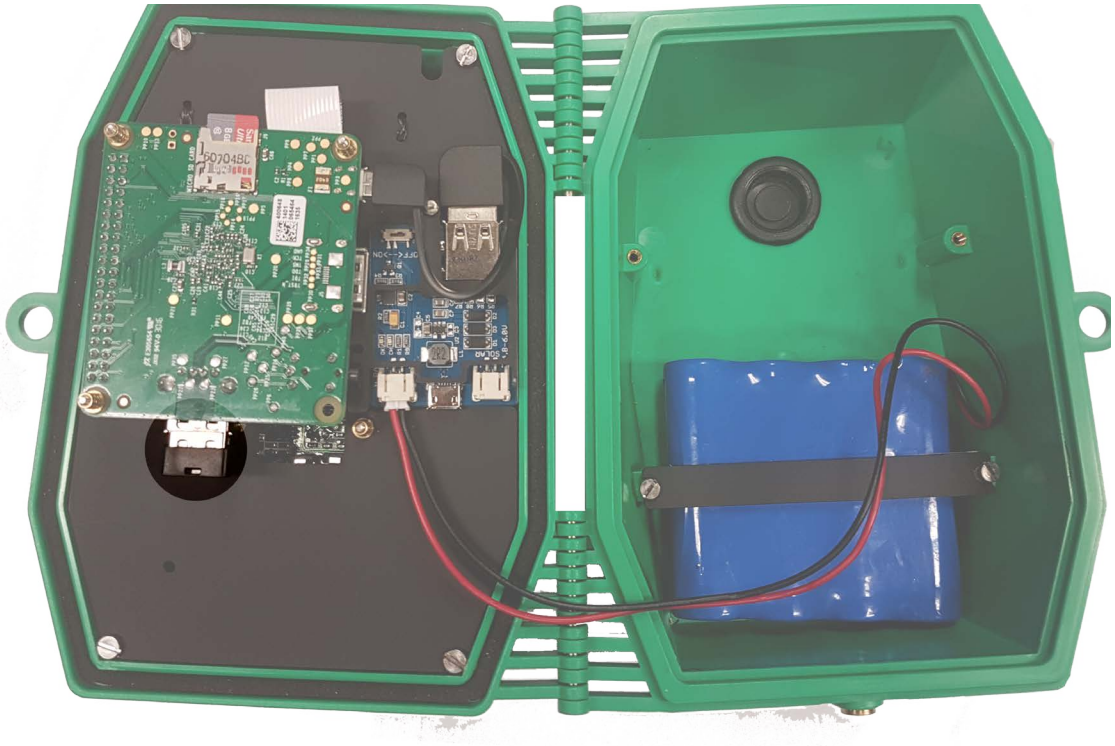
Go to the next steps to see how to view your test images.

Getting your Images

To view your test images:
i) Remove the USB Flashdrive from the camera and plug it into another laptop or computer.

ii) If you are able to view your images, your camera is working correctly. Your Cam Kit is ready to go out into the wild.

If you do not see any images check back through the manual steps paying special attention to the PIR wire arrangement and Camera ribbon connection, then repeat the test.



Think about a suitable location

There are many different ways to place your camera. Where, when and how you place it will determine which animals you are likely to photograph. Make sure you get off to a good start following these tips:

1) Look for wildlife corridors and signs of activity such as paths, fences and where you've seen animals before.

2) Height and direction - would you prefer a wider view looking down at a bird table to capture multiple birds, or are you focusing on individuals close up?

Locating your Kit - Tips

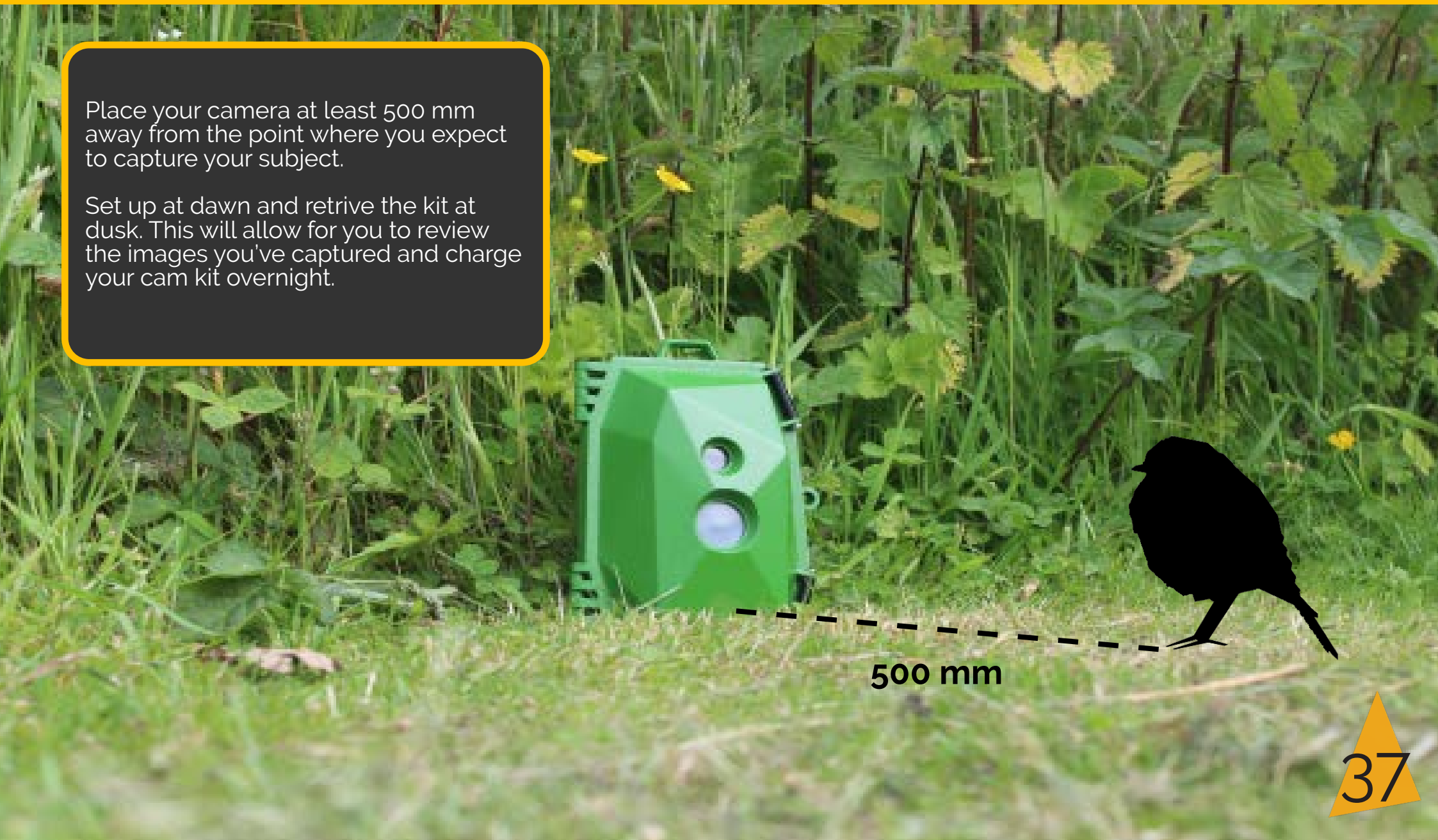
Place you camera where it is protected from direct sunlight. Changes in heat will trigger your camera, so avoid false triggers by placing the kit away from the glare of morning and afternoon sun. You can adjust the sensitivity of your PIR sensor (see online for details) if you find that the camera is taking too few or too many photos, regardless of placement.

Make sure the kit is positioned in a convenient and accessible location. You'll want to open the case and re-moved the USB drive to check how your camera is doing, so leave enough space to

Locating your Kit - Tips

Place your camera at least 500 mm away from the point where you expect to capture your subject.

Set up at dawn and retrive the kit at dusk. This will allow for you to review the images you've captured and charge your cam kit overnight.



Additional Features

Using my kit as a computer

To benefit from the addtional features on your wild-life cam kit you simnply can access the code that powers your kit by using it as a computer.

You can plug your kit into a screen with a HDMI cable. You can use any TV for this as long as it has a HDMI input.
You will then need a mouse in order to navigate the interface and a keyboard to write the code.
We suggest using a wireless keyboard and mouse for this as the dongle will plug straight into the single USB socket on the Rapsberry Pi A+.
If you don't have a wireless keyboard and mouse then we suggest using a usb splitter to connect multiple devices.
The image (right) illustrates how to set up the kit.
Instead of using the battery, you can also power your kit by plugging it into a standard home mains supply using a micro USB, similar to charging a mobile phone.

What you will need ;-

HDMI Wire
3 Port USB Hub
Mouse & Keyboard
Wireless WIFI dongle
Micro USB charger

Setting the time module

When first starting your cam kit it wont know what time it is so it will stamp the images with the wrong time and date. You may want to change this so follow these steps to change it.

Connect the cam kit to a screen , keyboard and mouse and turn on your kit and let the Naturebytes screen load up. Once loaded click on the Terminal x function and type the following code >

sudo date -s “04 MAR 2015 13:24:00“

PRESS ENTER

sudo hwclock –w

PRESS ENTER

sudo hwclock –r

PRESS ENTER

This will then change the time for you and stamp your images with the correct time and date.

```
63      if(!isBuilding)
64      {
65          if(GUI.Button(new Rect(Screen.width - btnWidth, Screen.height - btnHeight, btnWidth, btnHeight), "Tower One"))
66          {
67              buildGrid.transform.position = buildGridOriPos;
68
69              for(int i = 0; i < availableTowersList.Count; i++)
70              {
71                  if(availableTowersList[i])
72                  {
73                      curTowerBeingBuilded = 1;
74
75                      //The code below causes an error in x-code
76                      towersList[i].transform.position = AvailablePlate();
77                      availableTowersList[i] = false;
78
79                      curTowerIndex = i;
80                      curTowerToBeBuild = towersList[i];
81
82                      PlaceRangeIndicator();
83
84                      isBuilding = true;
85                      //ableToBuild = false;
86
87                      break;
88                  }
89              }
90          }
91      }
```

Warning Lithium-ion Batteries!

This kit contains small parts. DO NOT allow children under 5 years old to play with or near this product.

Li-ion battery packs may leak, overheat or explode if abused or incorrectly used. Ensure you read and adhere to the following safety warnings.
Lithium Ion batteries are a great power source for naturebytes kits but they require care during use and charging. The batteries as part of your kit have passed testing and certification but you must be careful and follow the warnings and cautions listed below:
WARNING!
Do not short-circuit the battery by directly connecting the positive (+) and negative (-) terminal with metal objects such as wire. Do not reverse the position (+) and negative (-) terminals.
Do not expose the battery in water, seawater or allow the battery to get wet. Keep the battery in a cool dry environment during stand-by period.
Do not carry or store the battery together with necklaces, hairpins or other metal objects.
Do not pierce the battery with nails, strike the battery with a hammer or other object, step on the battery or otherwise subject it to strong impacts or shocks.
If you are unable or unwilling to follow these instructions, please do not use the battery and return it immediately to naturebytes. Email info@naturebytes.org
The battery is not for use by small children. Please ensure proper supervision of children by an adult at all times.
Switch of the cam kit and battery when not in use.
Do not use or leave the battery in a high temperature location or near a heat source such as fire or heater.
Do not use or leave the battery in direct sunlight, or in a vehicle in hot weather. Doing so may cause the battery to overheat, ignite or explode. Treating the battery in this manner may also result in a loss of performance and shortened life expectancy.
Do not disassemble or modify the battery or plastic casing. The battery contains safety and protection devices, which, if damaged, may cause the battery to overheat, explode or ignite.
When recharging, use a specified battery charger. Do not connect the battery to an electrical outlet.
Do not charge unattended.

CAUTIONS
In the event the battery leaks and fluid get into one's eye, do not rub the eyes! Rinse the eyes with clean running water, and seek medical attention immediately. If left untreated, the battery fluid could cause damage to the eye.
Do not use it in a location with high static electricity or magnetic fields as the safety devices may be damaged, without the damage being visible.
If the battery gives off an odor, generates heat, becomes discolored or deformed, or in any way appear abnormal during use, recharging or storage, immediately discontinue use of the battery, remove it from the device or battery charger and place it in a sealed container or box. Contact Naturebytes if this occurs.
If the battery terminals are contaminated, clean the terminals with a dry cloth before use. Poor connection between the battery and the electronic circuitry of the instrument may cause power failure or charge failure.
Be aware discarded batteries may cause fire, tape the battery terminals to insulate them before disposal.
Do not dispose the battery in fire or heat.

Disposal of batteries and Electronic Equipment
If you live in the UK, you can find your local recycling facility at www.recyclenow.co.uk.
Most supermarkets and shops that sell batteries will have collection bins for used batteries, and some town halls, libraries or schools may also set up collection points. Customers may find stores in their local area more accessible.

Electronic Equipment Disposal Information

In common with all Electrical and Electronics Equipment (WEEE) regulations, The Naturebytes Wildlife Cam Kit should be disposed of separately from household waste and recycled where possible.

Many electrical items can be repaired or recycled, saving natural resources and the environment. If you do not recycle electrical equipment will end up in landfill where hazardous substances will leak out and cause soil and water contamination – harming wildlife and also human health.