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.

What is the naturebytes wildlife cam kit ?

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

Attention! This symbol is used to show you important information throughout the guide.

Appearance of parts, such as the insert may vary. During assembly you will be given the following options:

A. 'Standard' when using a powerbank, simpler option

B. 'maker' option when using alternative power sources, slightly more complicated

This kit contains small parts. DO NOT allow children under 5 years near this product.

Contents

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

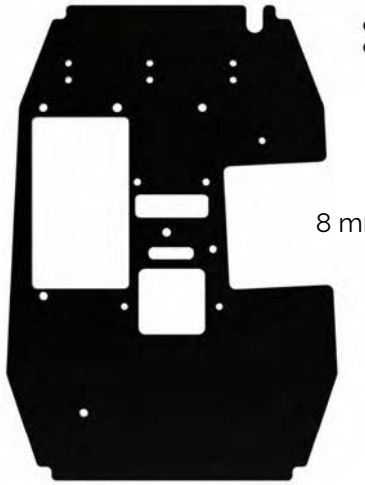
- [ ] Camera module
- [ ] Raspberry Pi - A+/B/B+/Zero
- [ ] Rechargeable Battery/powerbank + USB Wire
- [ ] 3 x Wires - Black, Yellow, Red
- [ ] RTC (Real time clock) - optional
- [ ] Lipo rider - optional
- [ ] Velcro dots - optional
- [ ] 3 x Wire ties - optional
- [ ] SD Card
- [ ] USB
- [ ] PIR Sensor


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


Wires


USB


PIR Sensor


Power Bank + USB Wire

Optional components


Rechargeable Battery


Lipo rider

RTC

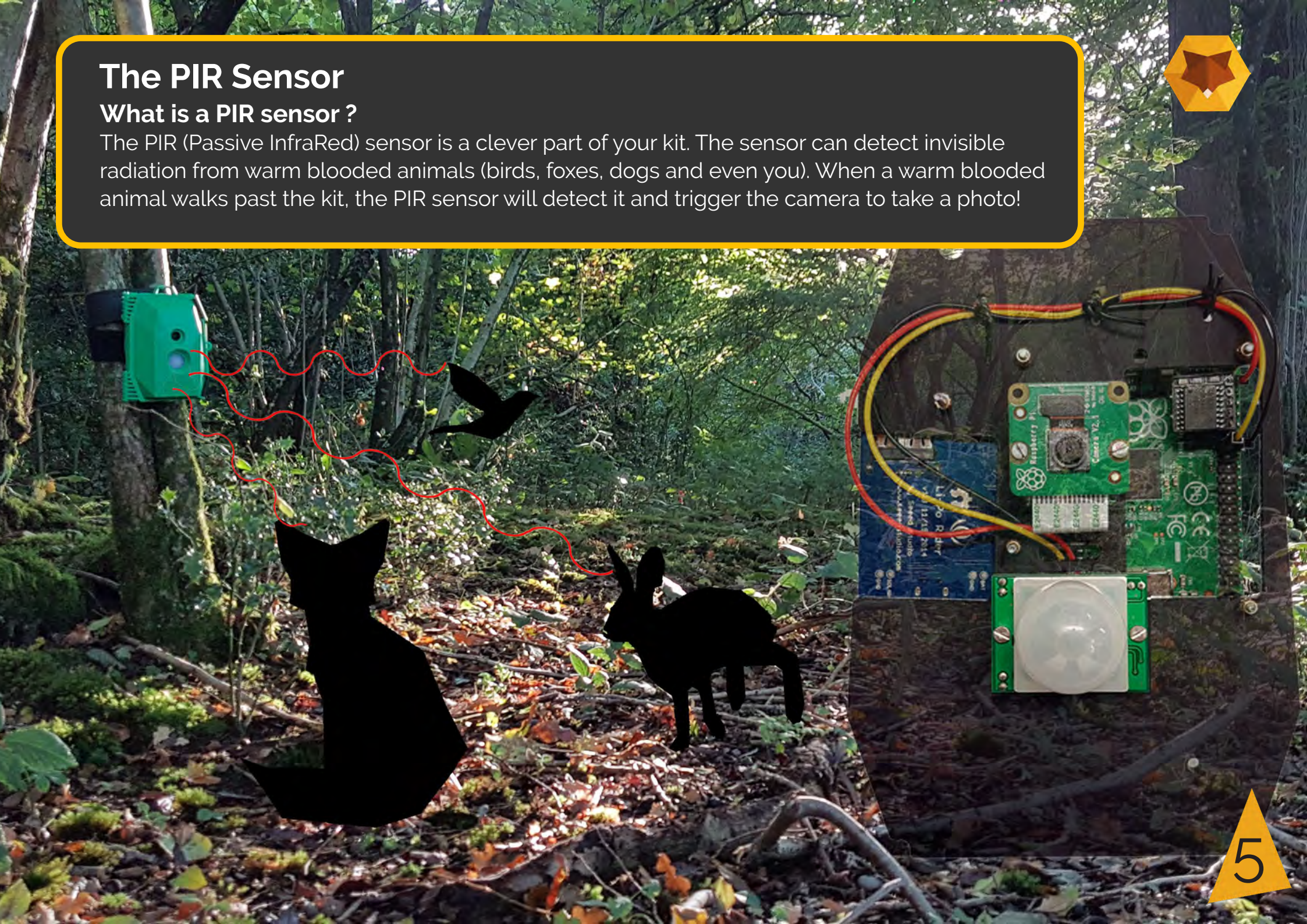

Wire ties


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 - Connect the PIR wires

Attach the three coloured wires to the sensor pins.

The three PINs are labelled (from left-right) VCC, OUT and GND.

Make sure the correct colour cable is connected to the correct pin as follows:

Red Wire - VCC (left)
Yellow Wire - OUT (middle)
Black Wire - GND (right)

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

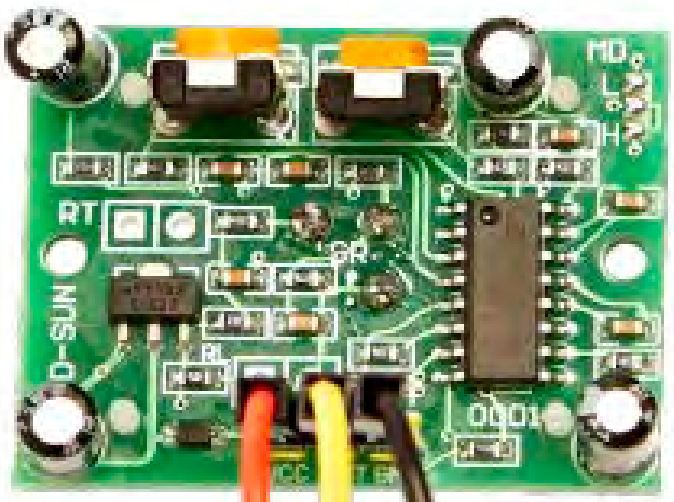
What you will need :

PIR (front)

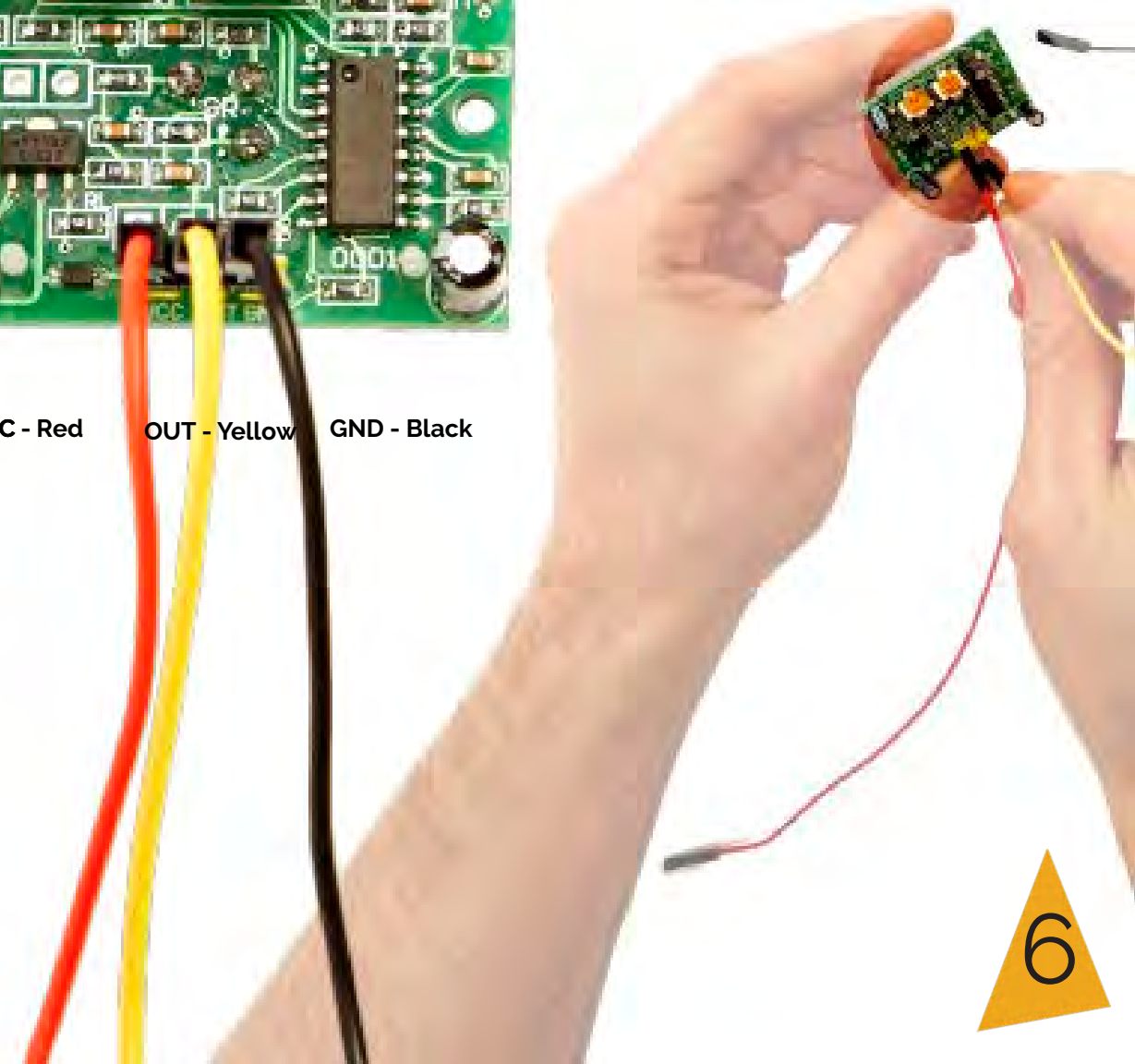
Wires

Red
Yellow
Black

PIR (back)
Pins at the bottom



VCC - Red **OUT - Yellow** **GND - Black**



The PIR Sensor

Task 2 - Feed the PIR wires through the insert

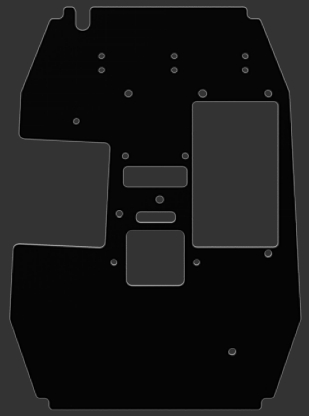
Identify the **front of insert** (see diagram)

Feed the wires through the insert **from front to back** through the lower-middle hole as highlighted (see diagram)

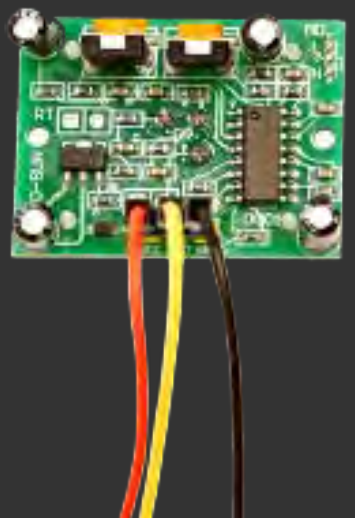
Make sure that the wires are fed through the correct side of the insert.

What you will need :

Main Insert (may vary)



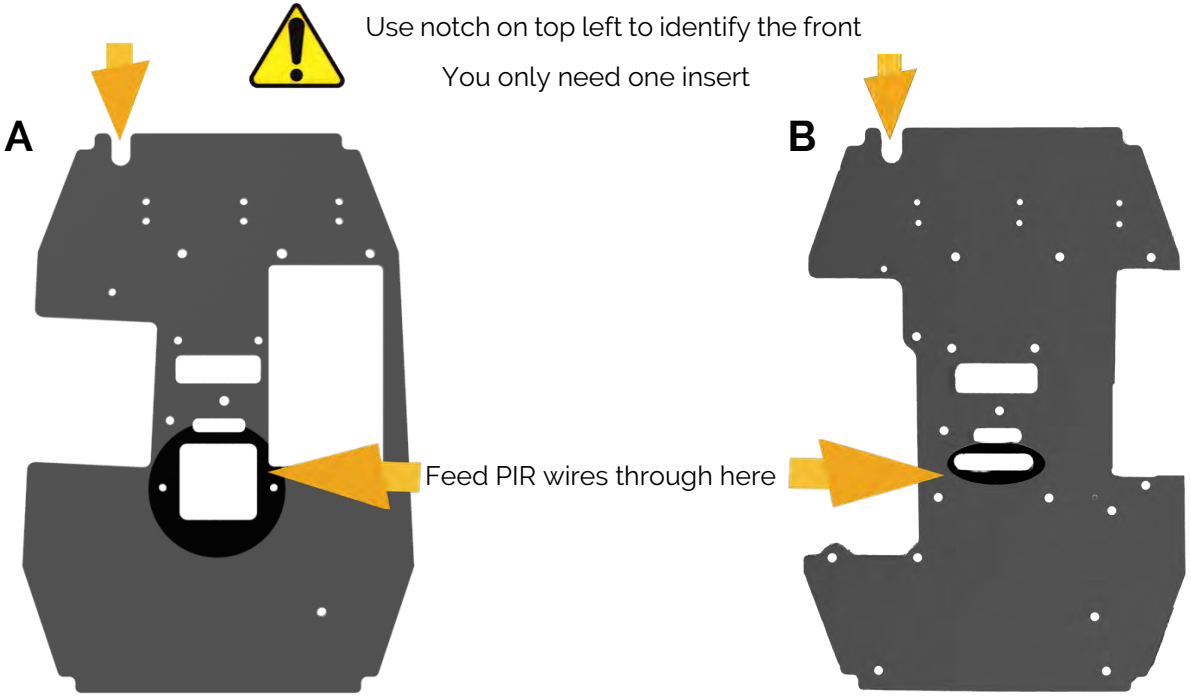
PIR Assembly



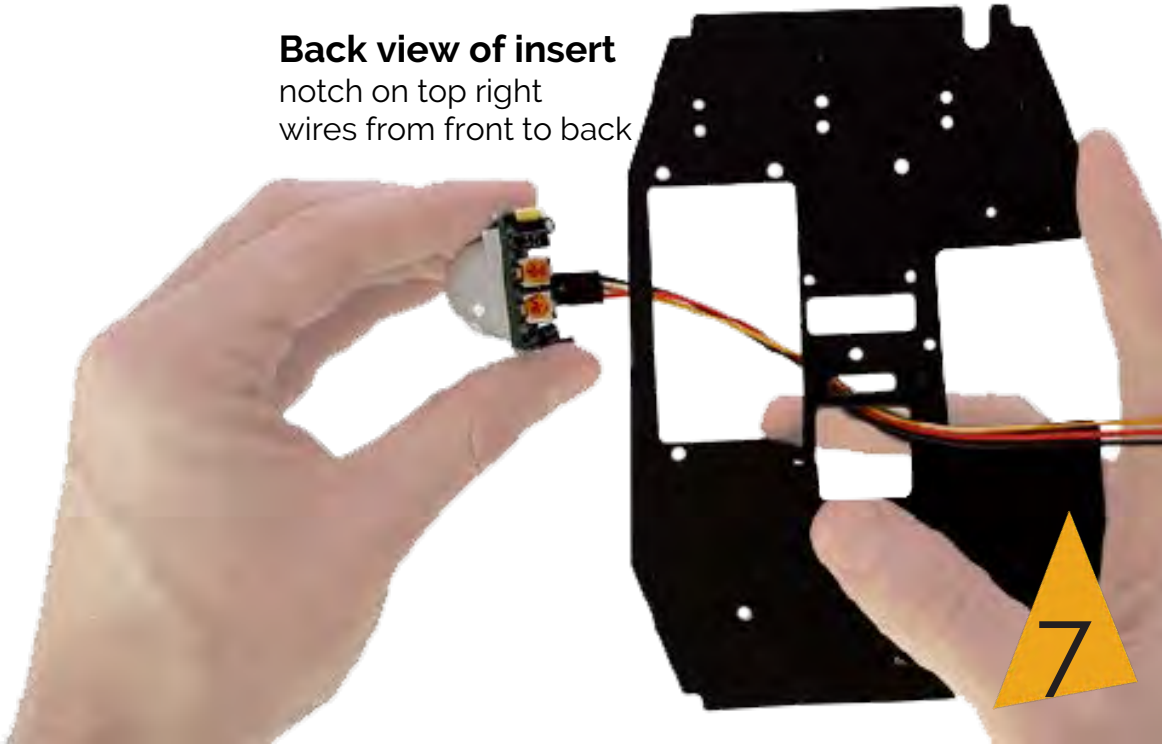
Front view of insert (different versions)

Use notch on top left to identify the front

You only need one insert



Back view of insert
notch on top right
wires from front to back



The PIR Sensor

Task 3 - Secure the PIR sensor

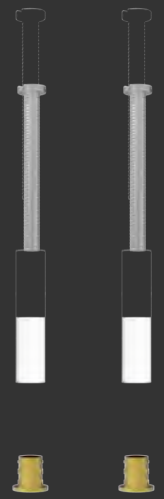
Screw the PIR onto the insert making sure the spacers go between the two. See the diagram for how the setup works.

What you will need :

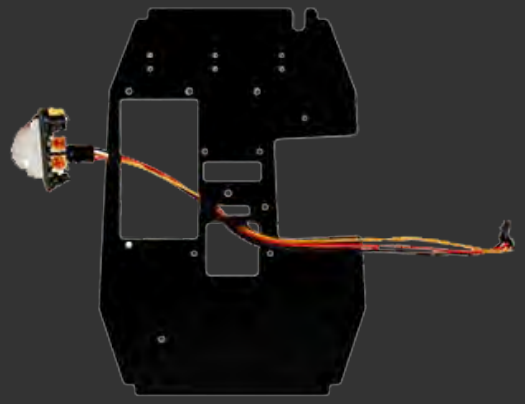
2 x 18 mm Screws

2 x 8 mm Spacers

2 x Brass nuts



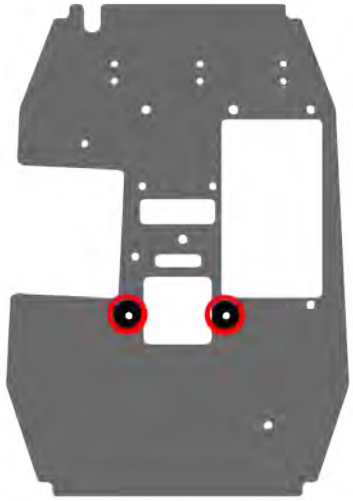
Insert



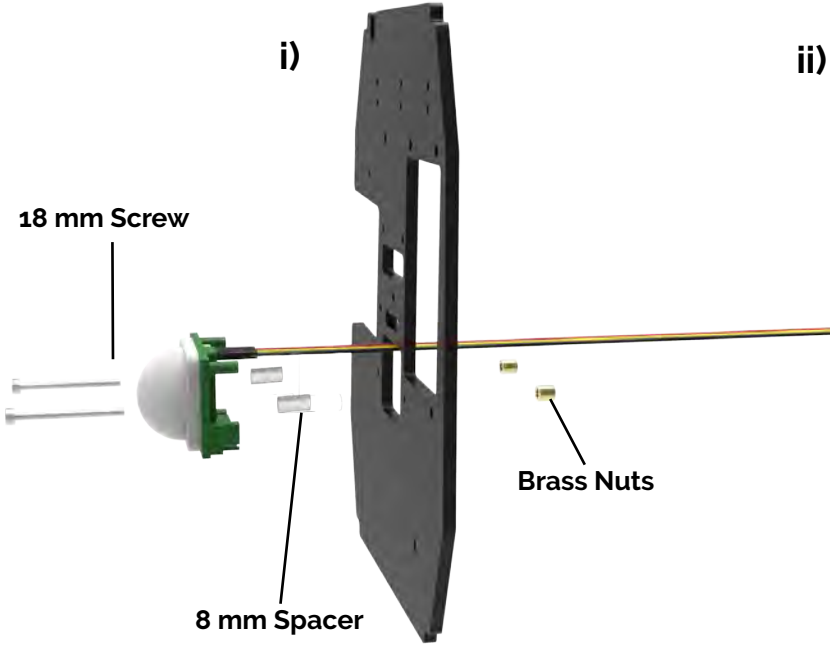
Use the correct size spacers and screws
Use a ruler to double check

8 mm Spacer **18 mm Screw**

PIR Screw location
front view



i)



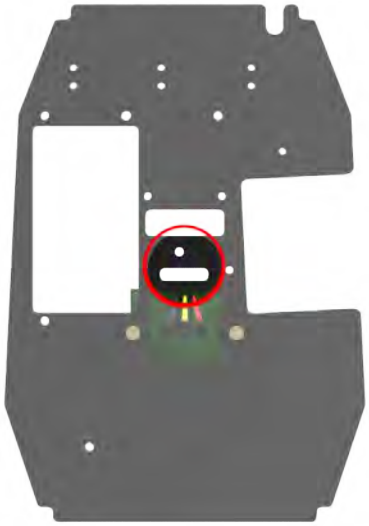
ii)

The PIR Sensor

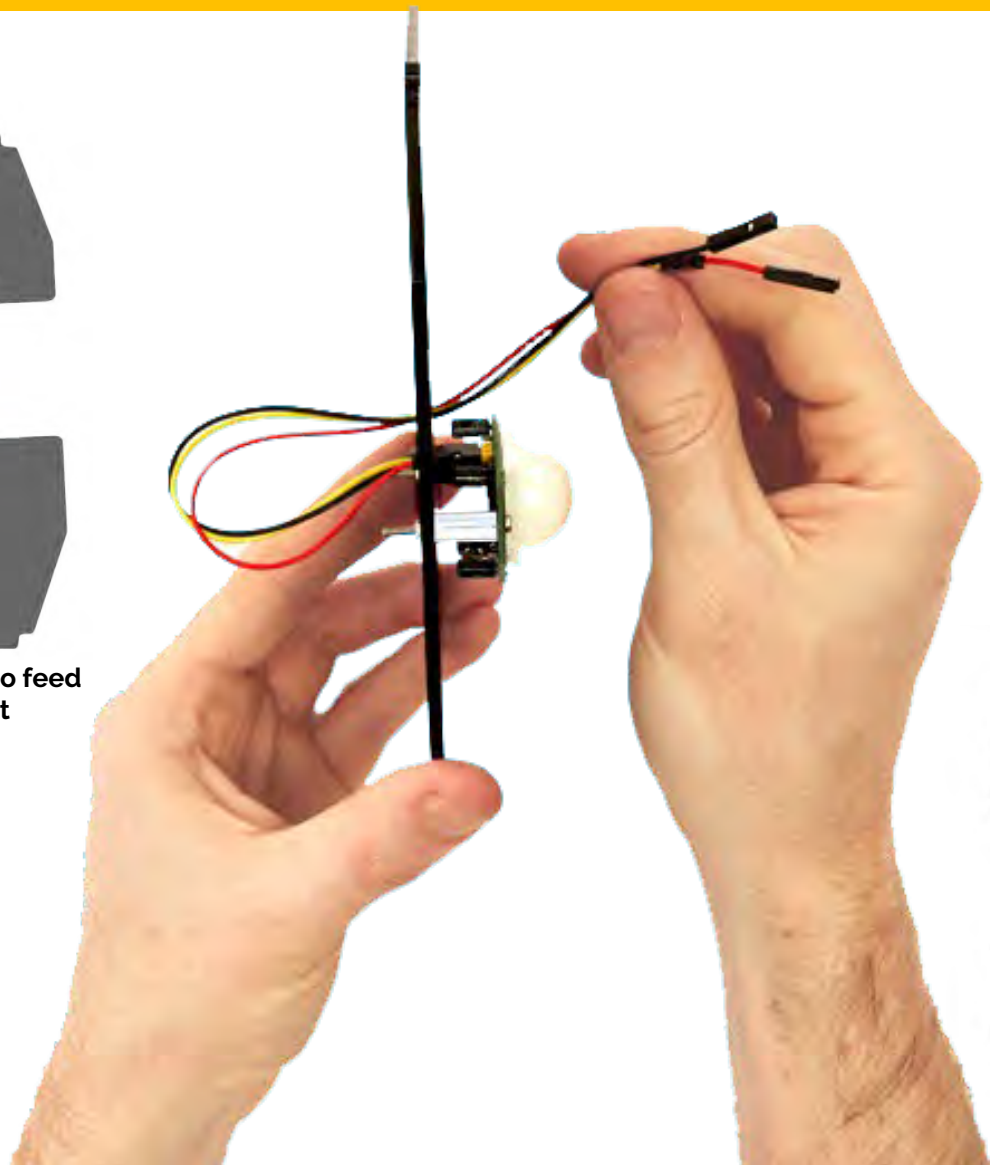
Task 4 - Feed the wires back through the insert

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

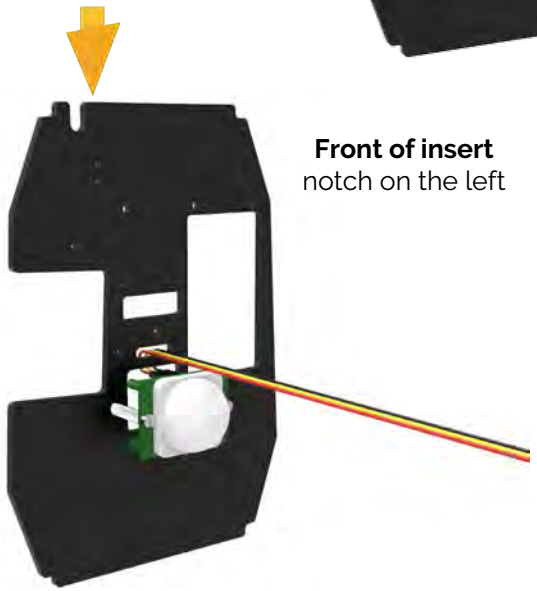
Back of insert
notch on the right



Location for PIR wires to feed from back to front



Back of insert
notch on the right



Front of insert
notch on the left

Controlling the power

Choose one of the two options below:

A: Direct connection to powerbank

'standard' option - go to page 12 'The Camera'd

or

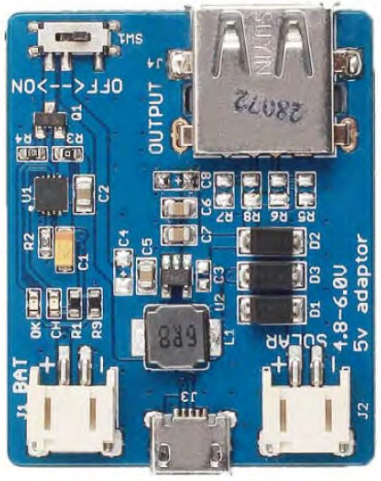
B: Using a Lipo Rider (available separately)

'maker option go to page 11 'The LiPo Rider'

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

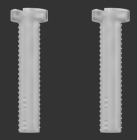
Task 5 - Secure the LiPo Rider

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

LiPo holder

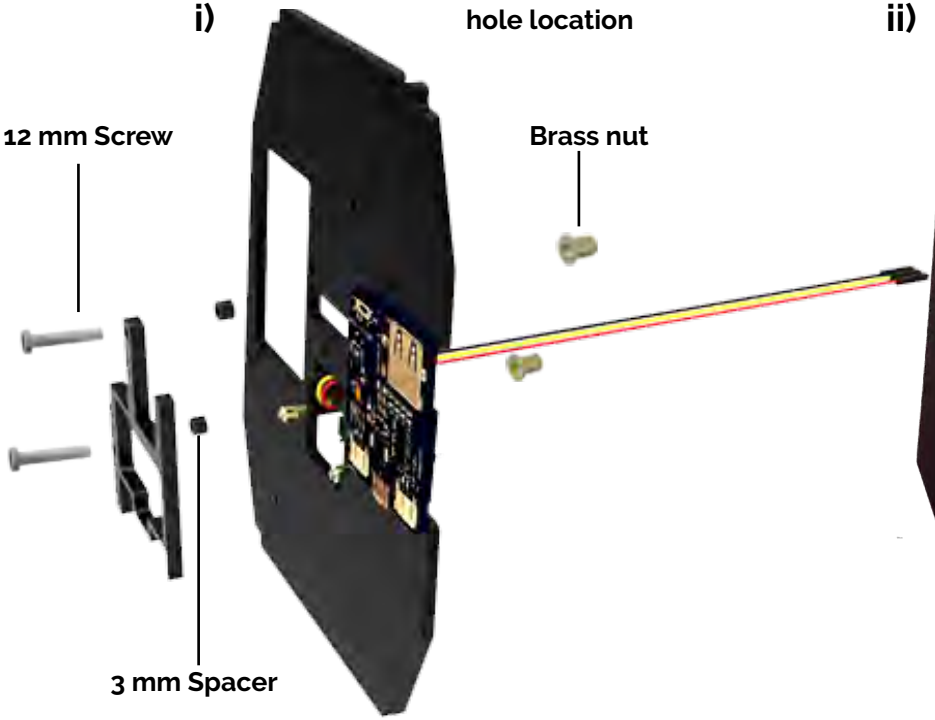
Insert assembly

Use the correct size spacers and screws.
Use a ruler to double check

3 mm Spacer **12 mm Screw**

LiPo Rider hole location

i)



ii)

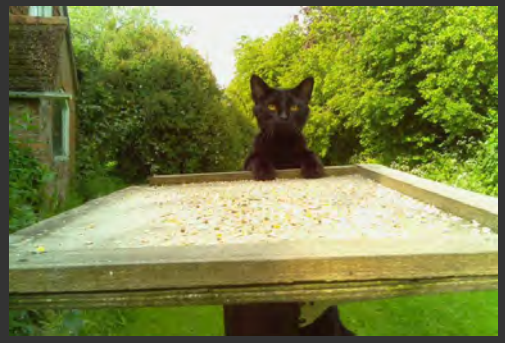
The Camera

About the Camera

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

ed focus camera that connects to the Raspberry pi through the ribbon.
If you are using a Pi Zero your camera ribbon might look a
erent

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

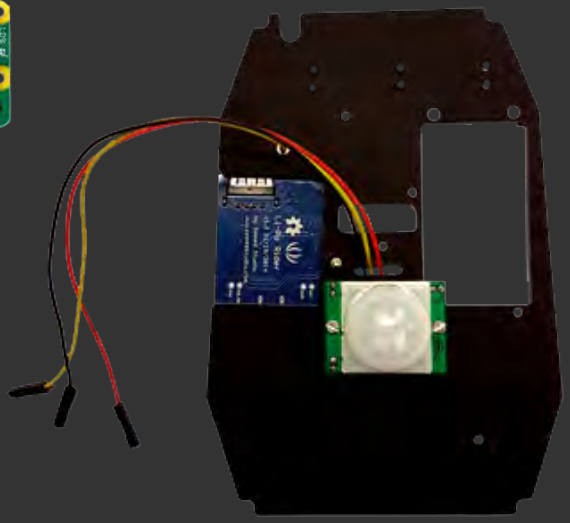
Task 6 - Feed the camera ribbon through the insert

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

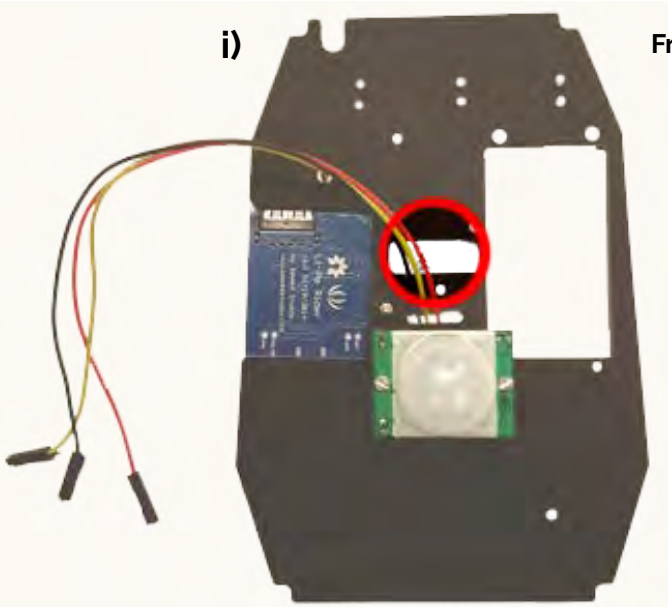
What you will need :

Camera

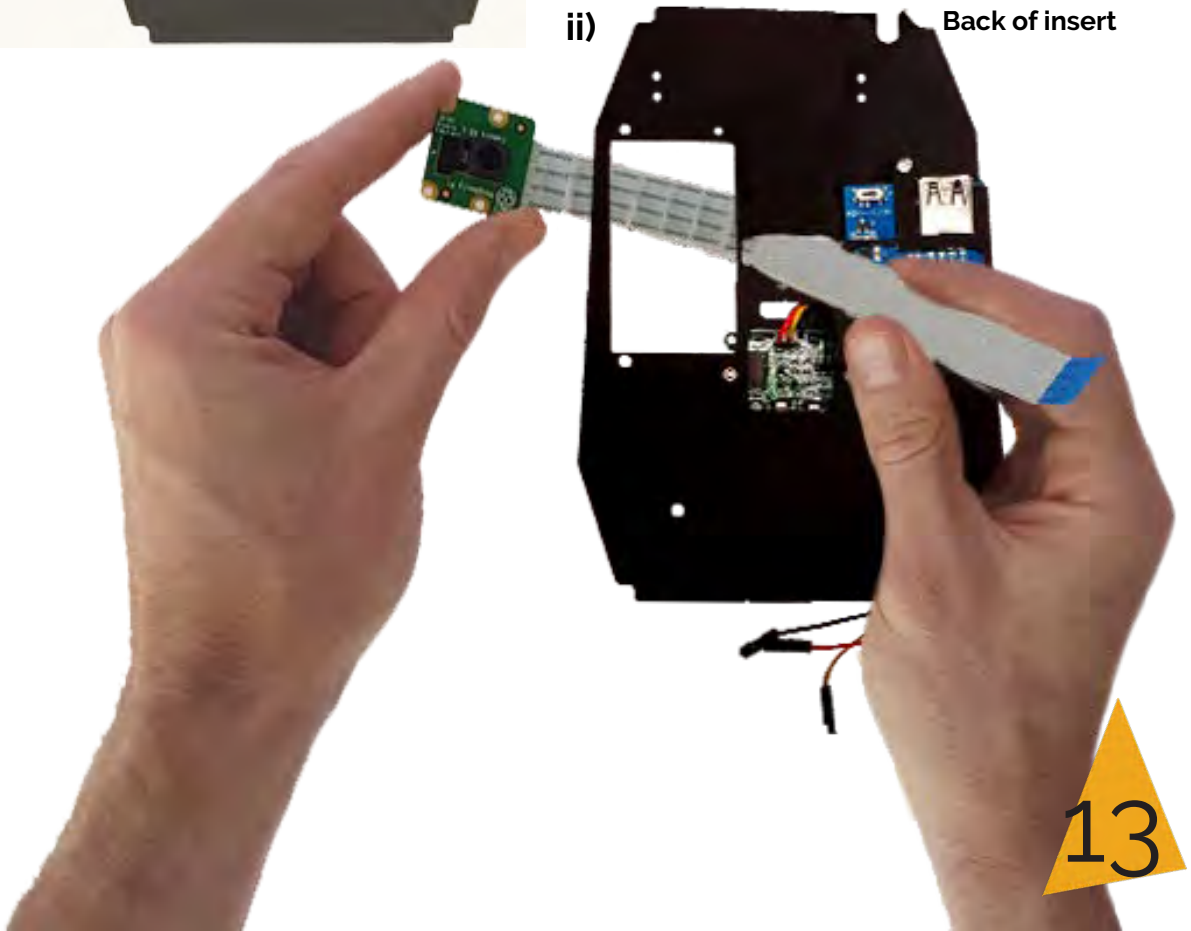
Insert assembly



i) **Front of insert**



ii) **Back of insert**



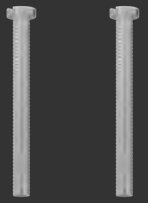
The Camera

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

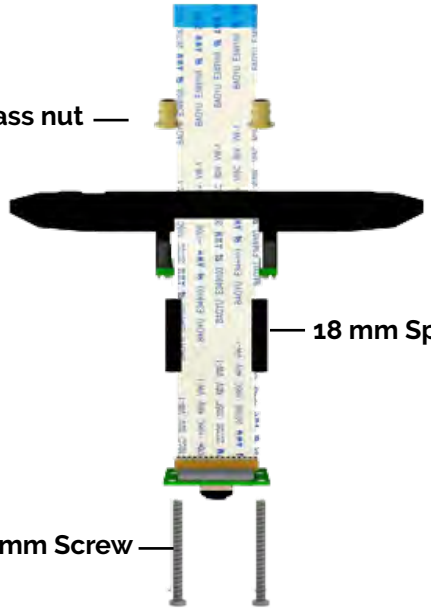
2 x Brass nuts

Insert assembly

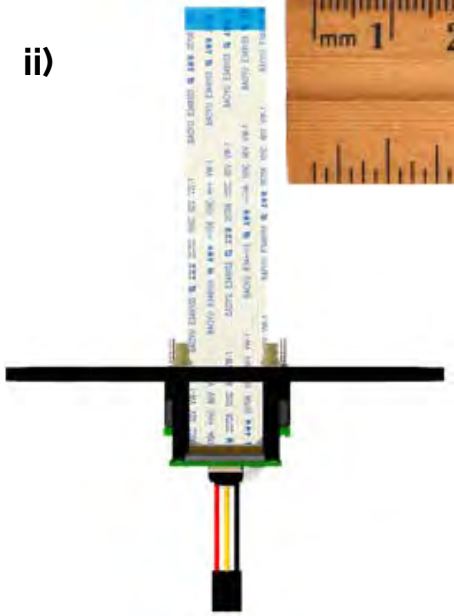
Use the correct size spacers and screws Use a ruler to double check

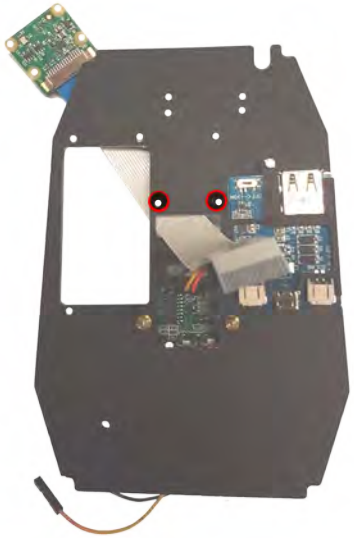
18 mm Spacer **25 mm Screw**

i)

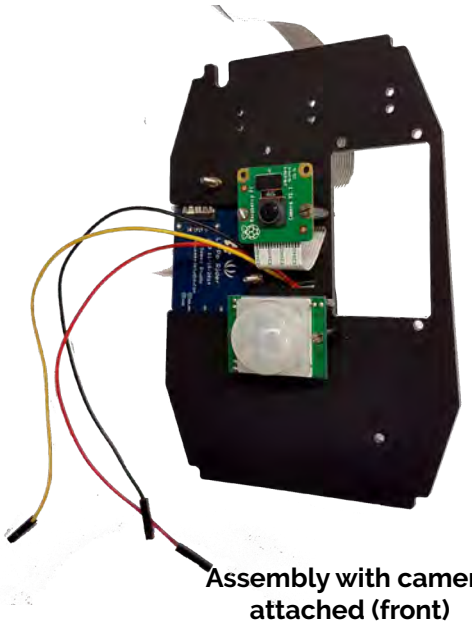


ii)





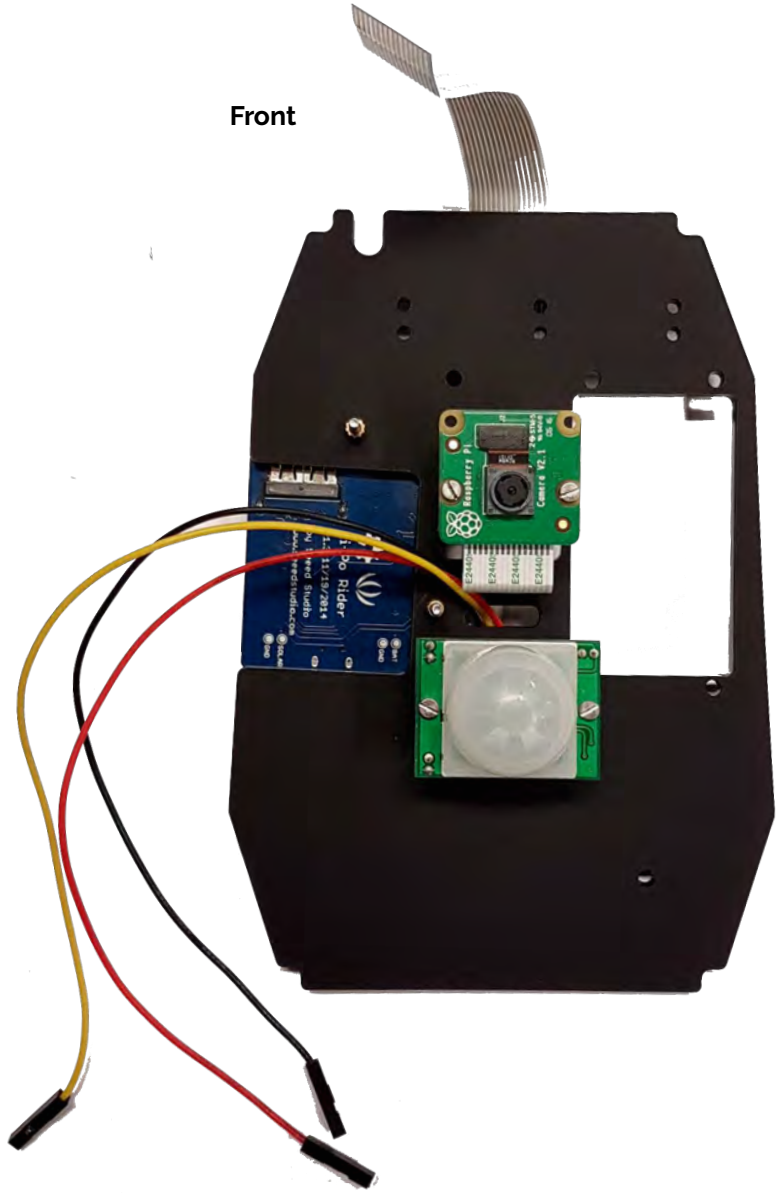
Camera hole location (back)



Assembly with camera attached (front)

Your assembly should look like this (LiPo rider optional)

Front



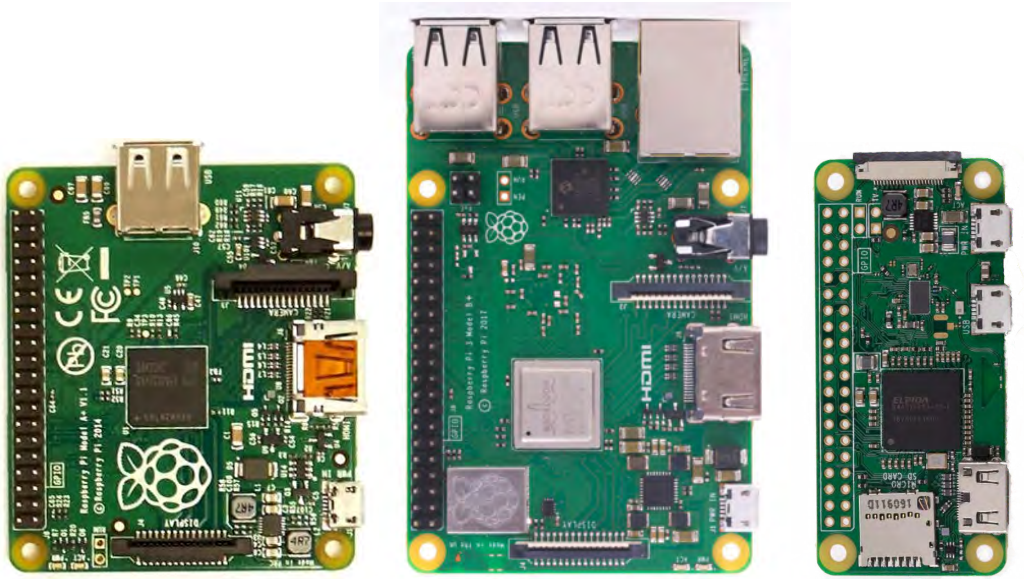
Back

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.
We prefer the model A+ but you can use any Raspberry Pi model with the wildlife cam kit.

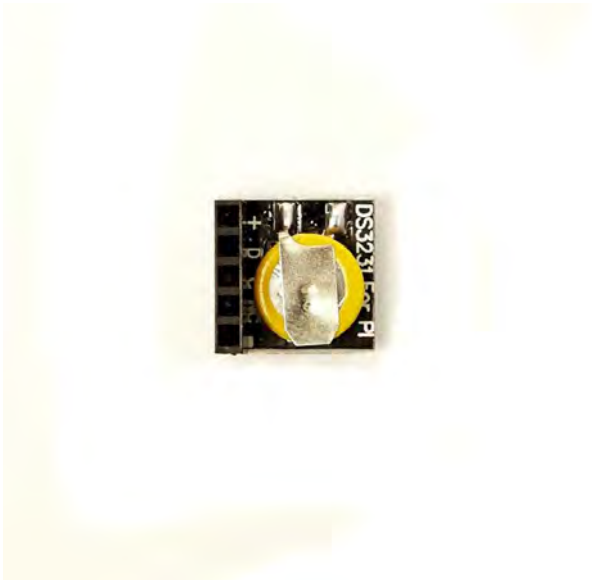
If you have purchased the **case only** you can download the cam kit image file (operating system) from:
http://naturebytes.org/wildlife-cam-kit-resources/



Raspberry Pi Model A+

Raspberry Pi Model 3B+

Raspberry Pi Zero W



Choose one of the two options below:

A: Attach Pi with no RTC

'standard' option, go to page 18

or

B: Attach a Real Time Clock (RTC) (available separately)

'maker option' go to next page

The Real Time Clock

The Real TIme Clock (RTC) is the time-keeper of your kit. It records the time each photo or video is taken. You can even code your kit to timestamp each image.

Attach the Real Time Clock to the Raspberry Pi

Task 8 - Attach the RTC

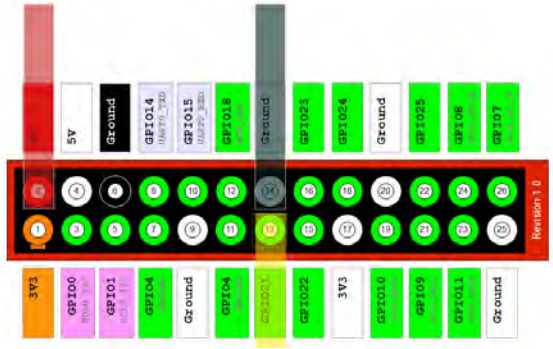
Attach the RTC to the Raspberry Pi, positioning it on the pins shown to the right.

What you will need :

Real Time Clock

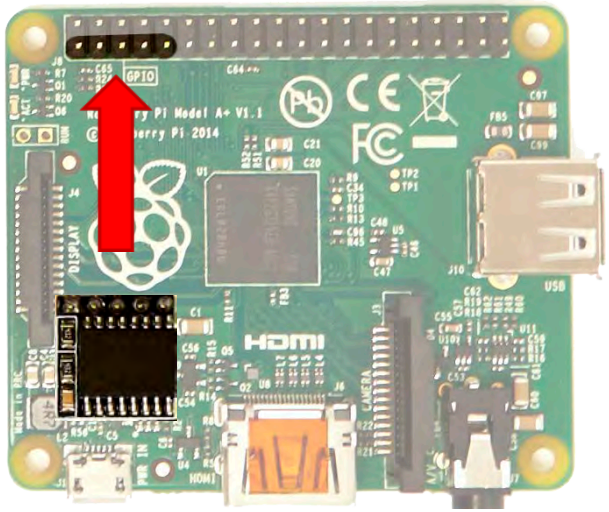
Raspberry Pi A +

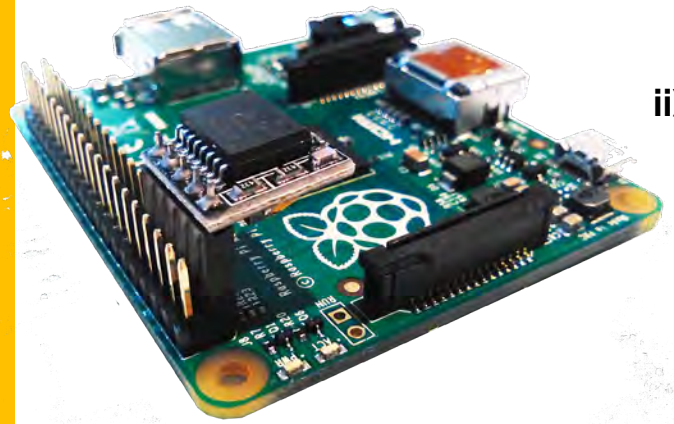
Make sure the real time clock is positioned the right way round. Compare your Raspberry Pi with the images on the bright to check its correct



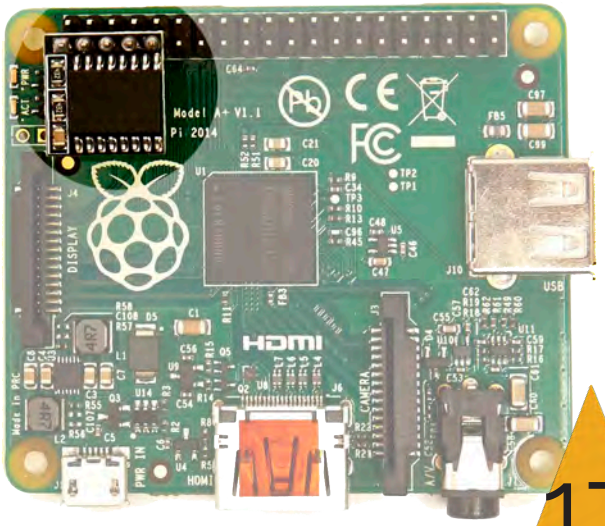
Whatever model of Raspberry Pi you have the pins the RTC attaches to are 1,3,5 & 7.

)





ii)



Attach the Raspberry Pi

Task 9 - Connect the Camera to the Raspberry Pi

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

Use this explainer video to help:

https://youtu.be/VzYGDq0D1mw

or, follow the 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.

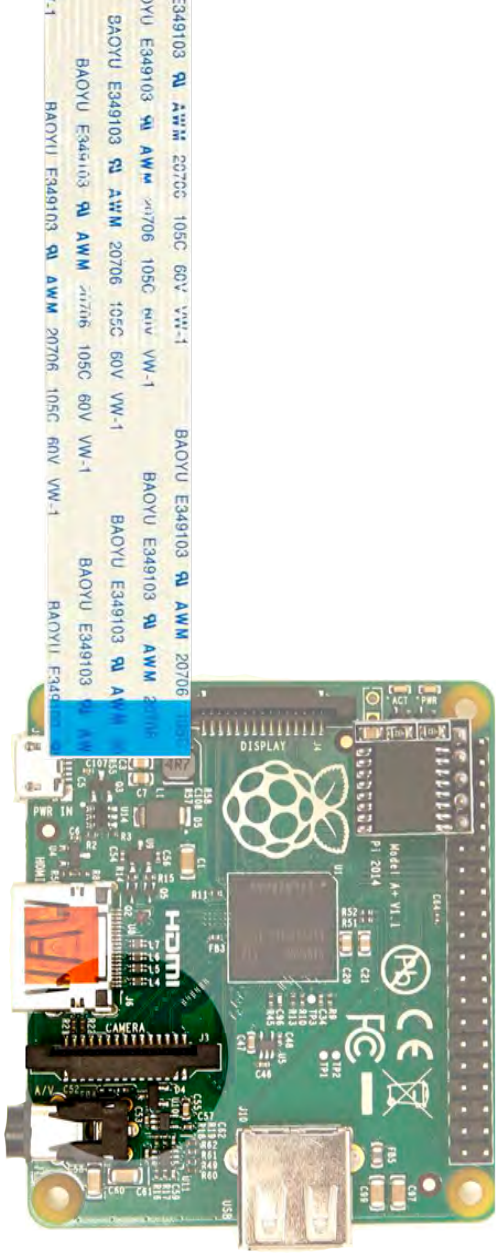
II) Insert the camera ribbon into the port ensuring the blue tab on the ribbon is facing away from the HDMI port (labelled on the Pi) as seen in image on the following page.

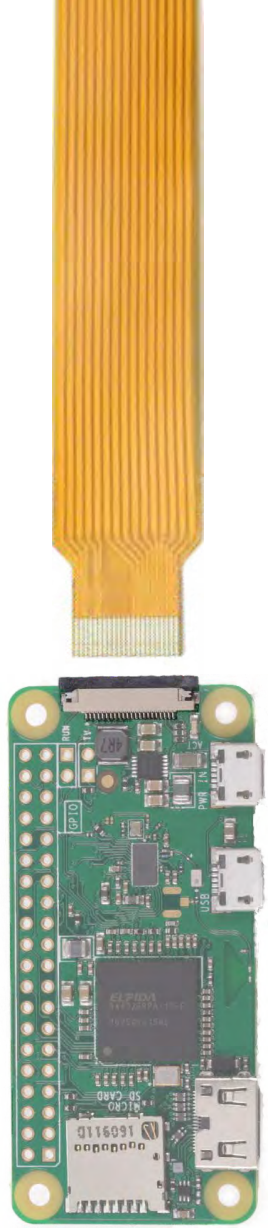
III) Secure the ribbon by holding it in the port and gently pushing down on the clasp. Make sure the ribbon is pushed down evenlyand not at an angle.

What you will need :

Raspberry Pi

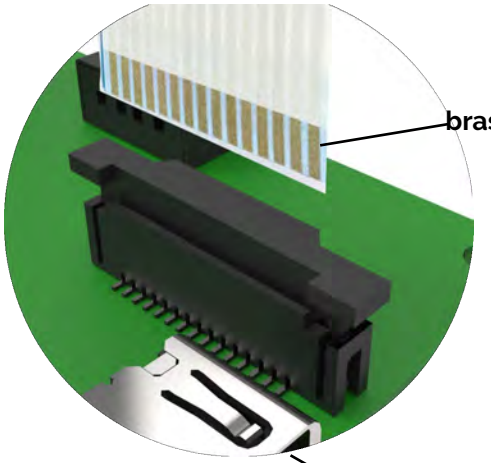
Insert Assembly





Connect the Camera Ribbon

i)

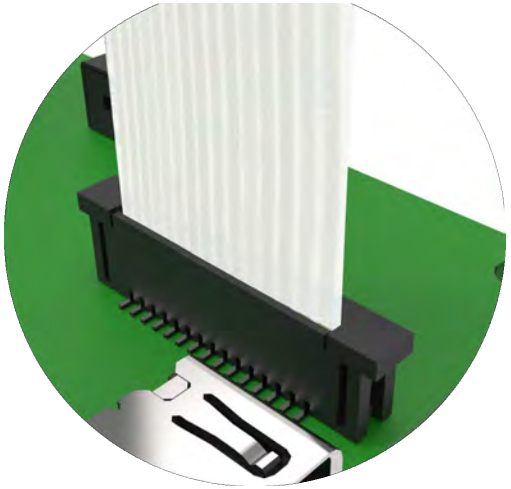


brass contact points

HDMI connector

ii)

iii)



The brass contact points on the ribbon facie the HDMI plug on the Raspberry Pi

If using a Raspberry Pi Zero - the brass contact points on the ribbon face down to the back of the board

Finished Assembly
example with additional LiPo rider

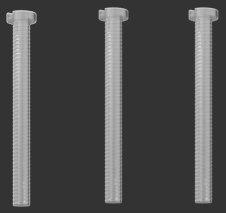
Attach the Raspberry Pi

Task 10 - Connect the Raspberry Pi to the insert assembly

Attach the Raspberry Pi to the **back of the insert** using the **three screws and spacers**. Use the nuts to secure the screw from the front (see ii)
See next page for attachment points for different Pi models

What you will need :

3 x 25 mm Screws

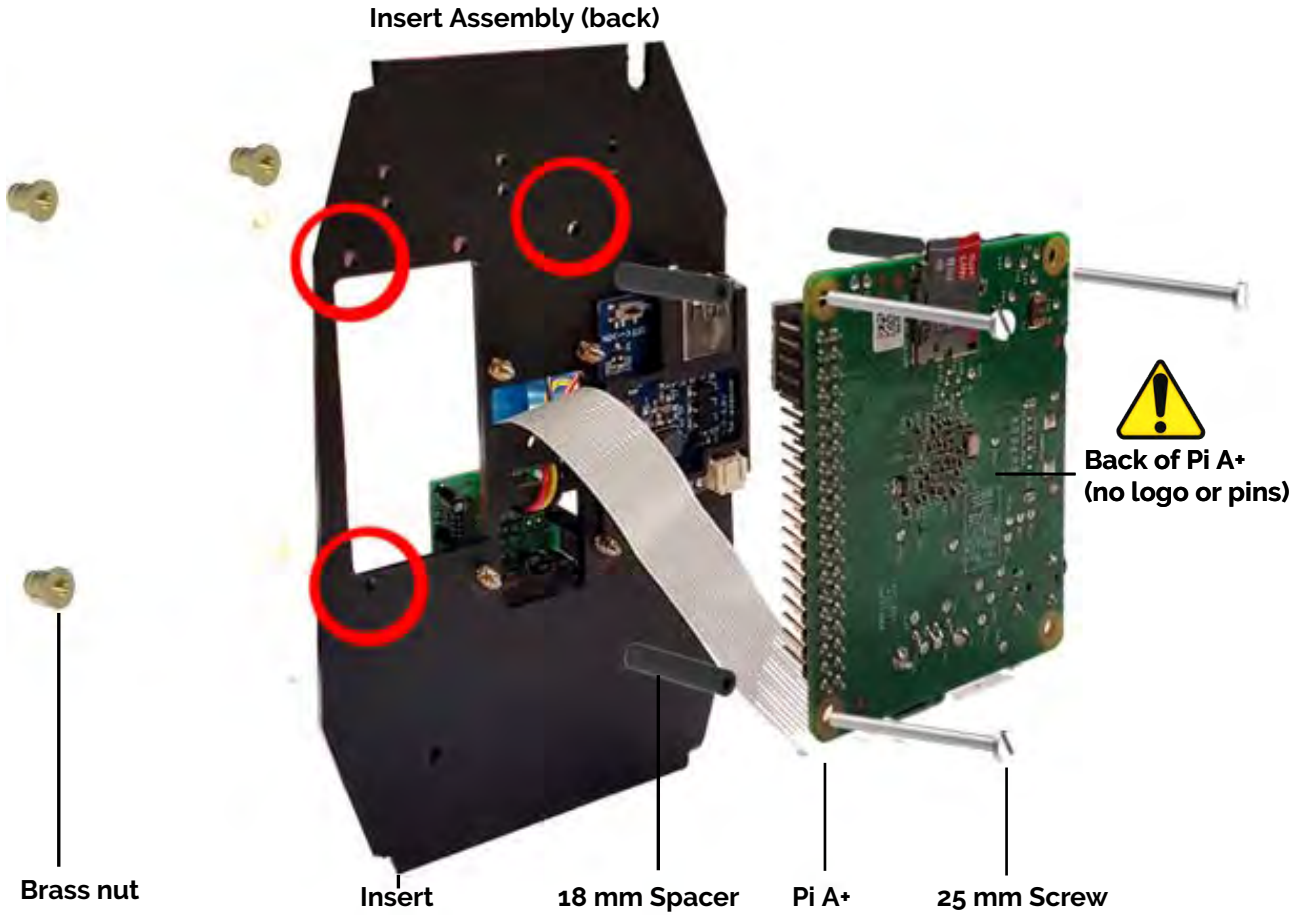


3 x 18 mm Spacers

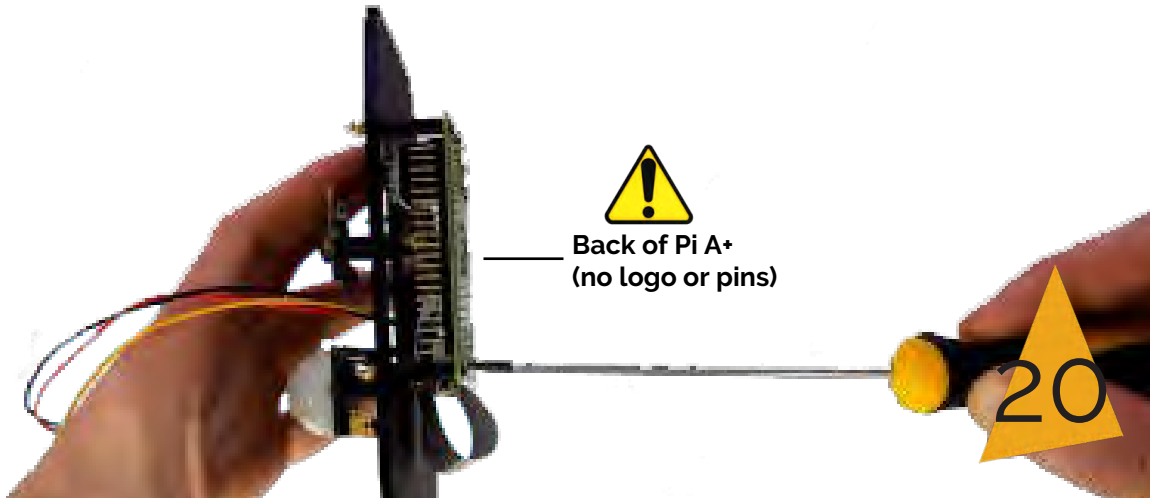
3 x Brass nuts

Insert Assembly

i)

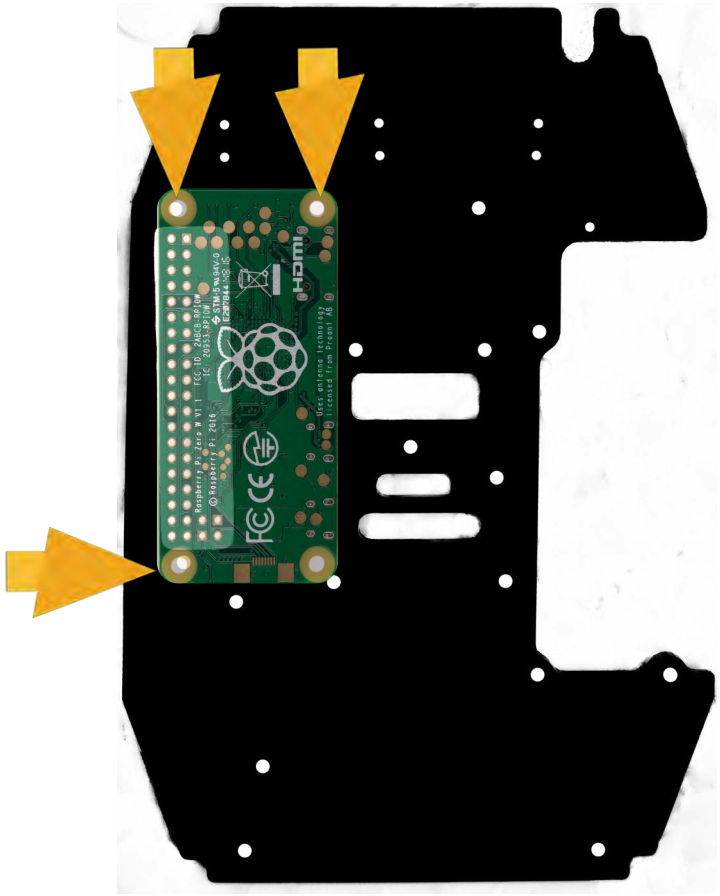


ii)



Securing the Raspberry Pi - different footprints, same insert

Insert (back) & Pi Zero



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

Insert (back) & Pi A+ or B+

For the **Raspberry Pi A+ & B+** models use the same holes as demonstrated on the previous page

Connecting the Raspberry Pi

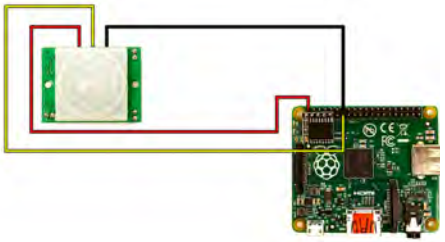
Task 11 - Connect the PIR wires to the Raspberry Pi

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 or PIR and onto the correct pins.

What you will need :

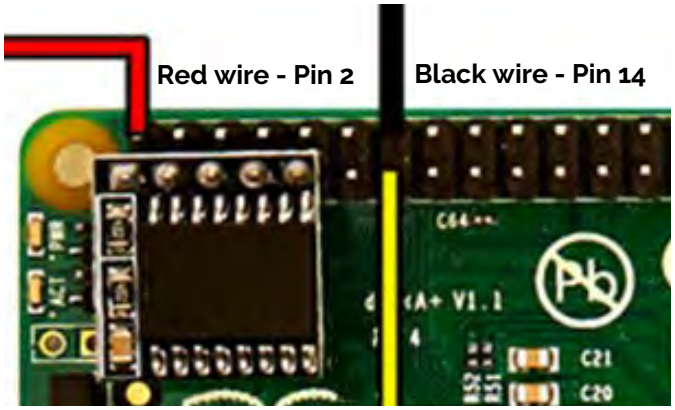
Insert Assembly only

Pins used are the same for all Pi models



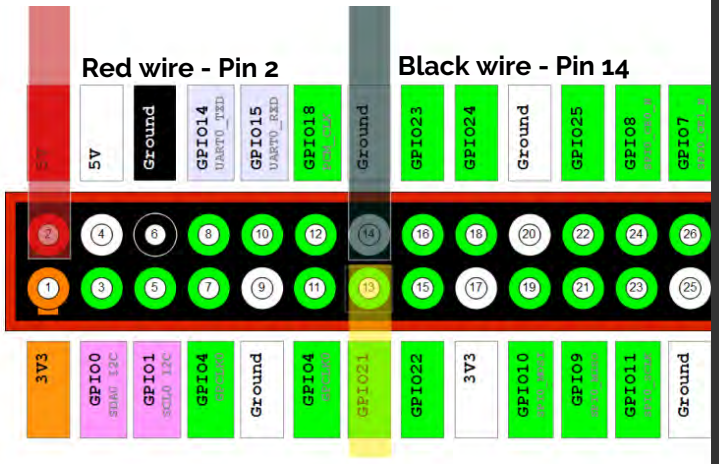
i) Connect wires to pins:

Red: **Pin 2**
Black: **Pin 14**
Yellow: **Pin 13**

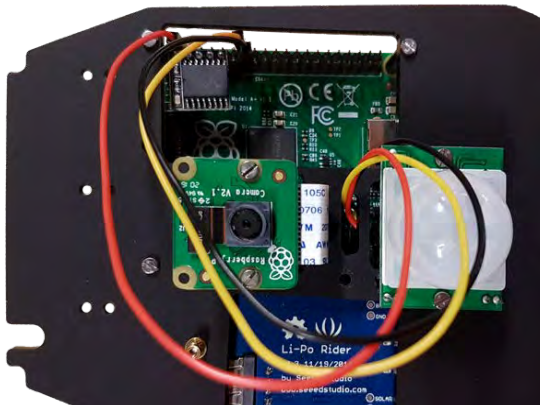


ii) Diagram of Pin Numbers:

Labelled 1 - 25 as on the Pi
Required pins highlighted



iii) Image of wires connected



Optional: Securing the wires

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

What you will need:

3 x Black cable ties (or wire)

Insert Assembly

i)

use wire or cable ties to attach wires

Insert Assembly - showing the LiPo Rider power option

The Case

About the Wildlife Cam 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, it can fit all Raspberry Pi models, additional add-on modules and power options.

Controlling the power

Option A - Using a powerbank (standard option)

go to page 29 'Attach insert assembly and powerbank"

Option B - Using a lipo rider (maker option)

go to 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

II) Secure with **large screws** at the **four corners**

III) Connect the **LiPo Rider** to the **Raspberry Pi** using the **USB cable**

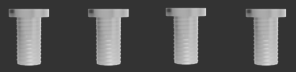
What you will need :

Insert Assembly

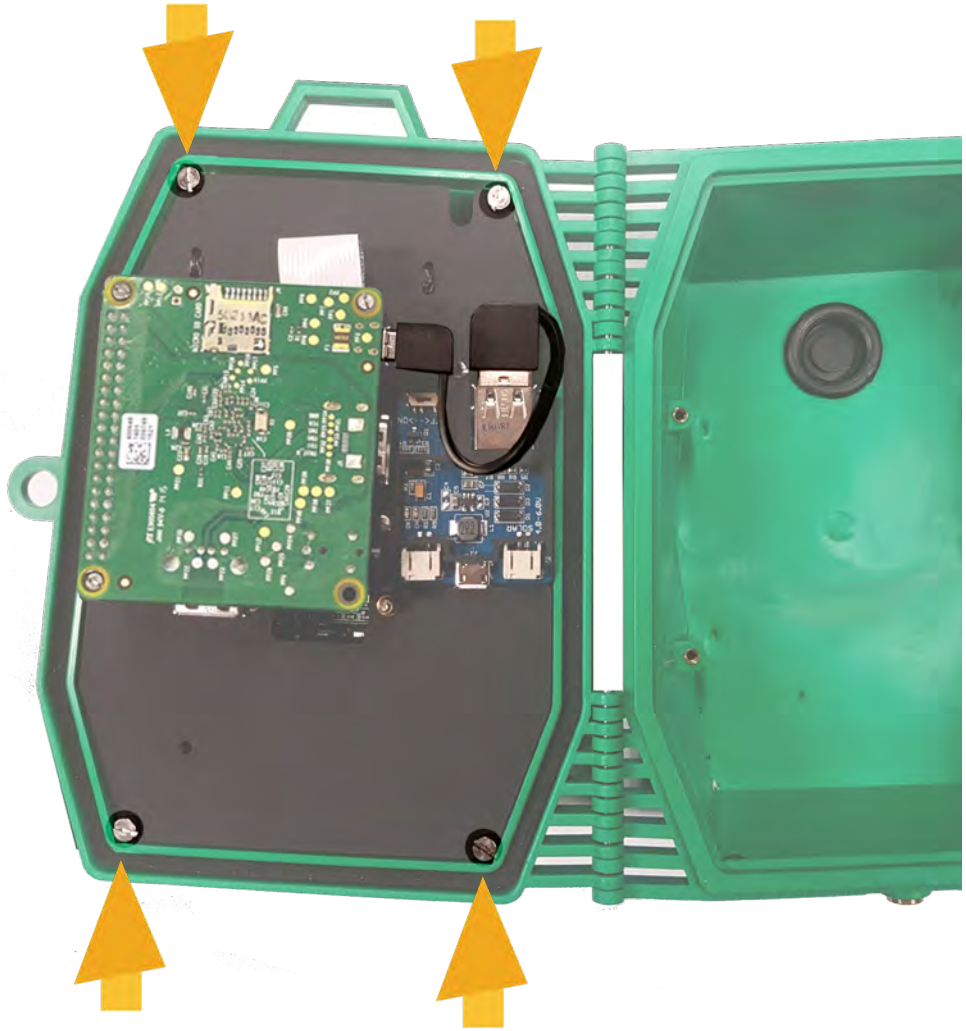
Case

USB cable

4x Large Screws 6mm



Secure with 6mm screws



Connecting the battery

Task 13 - Attach and connect the battery pack

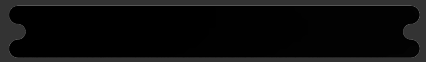
The battery pack sits in the back of the case and is connected to the LiPo Rider. Use the screws to secure the battery holder. Now plug the battery into the LiPo Rider socket labelled “BAT”.

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

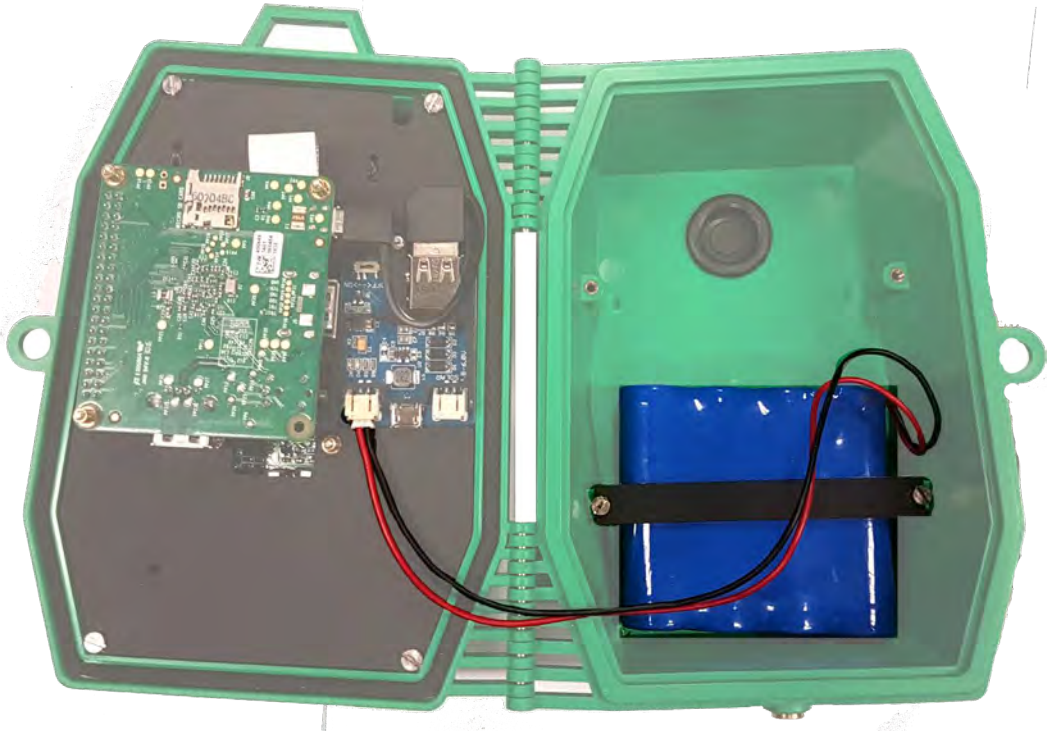
Insert Assembly

2 x Large Screws 6 mm

Battery Holder



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



Attach insert assembly and 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

II) Secure with **large screws** at the **four corners**

III) The powerbank sits in the back of the case. Use the screws to secure the battery holder.

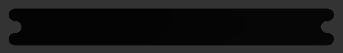
What you will need:

Insert Assembly

Powerbank

Case

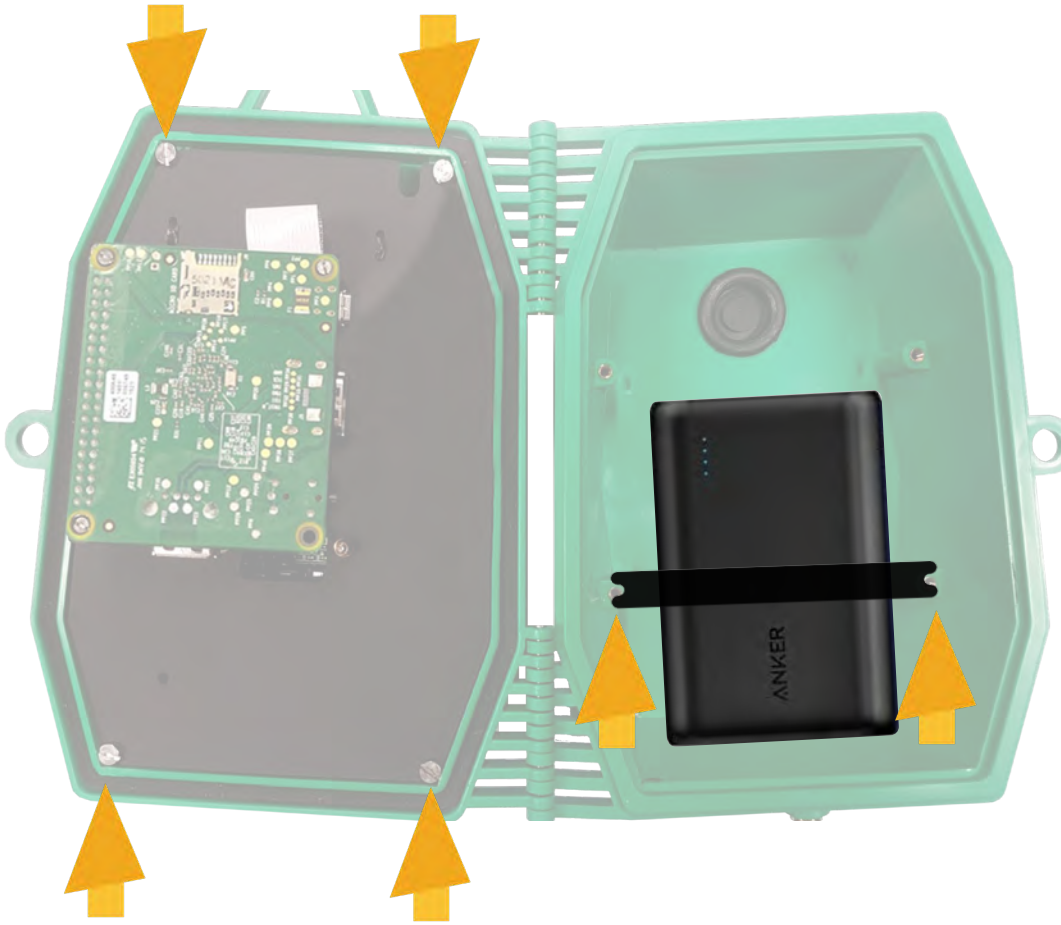
Battery Holder



6 x Large Screws 6mm

Place the insert assembly into the front of the case

Place the powerbank into the back of the case



Secure with 6mm Screws

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 t insert the SD card into the top slot.

What you will need:

USB

SD Card

Congratulations! Your kit is fully assembled, move on to testing.....

Testing, the next Steps...

Power-up and test your kit

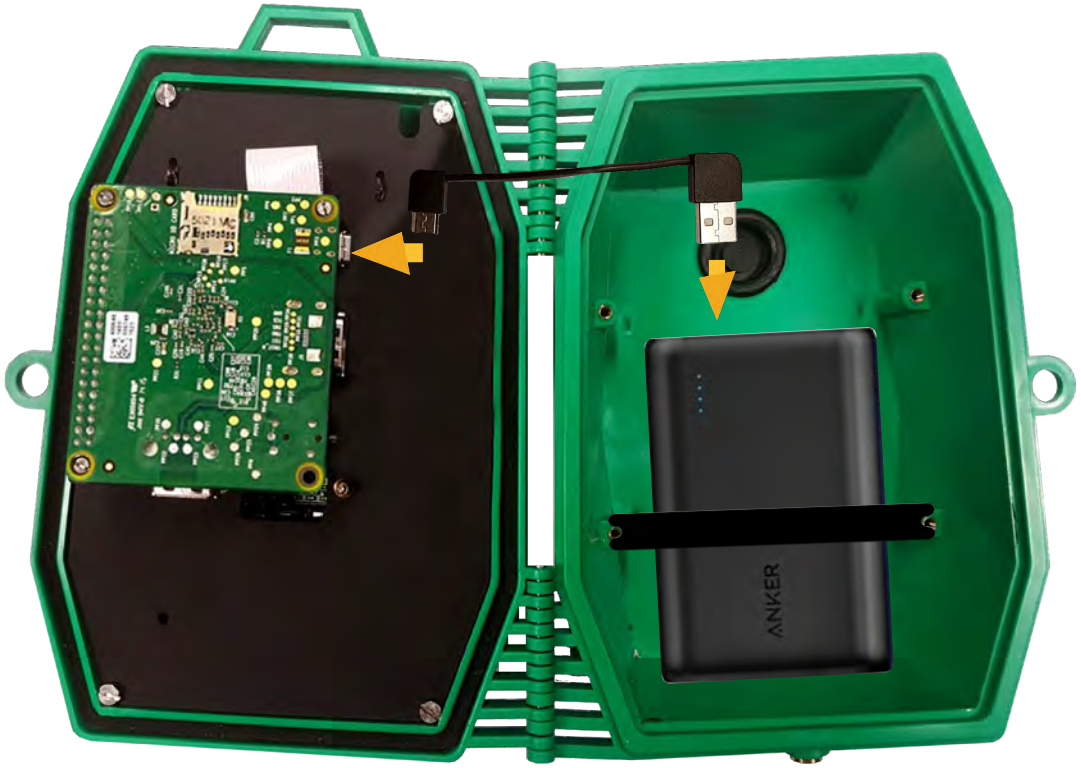
Viewing your images

Tips for great images

Power-up and test your kit (option A)

You should fully charge your powerbank before using it. This will ensure you get the best performance out of your kit and the most out of your battery life.

If you are not using a power bank and are using a LiPo rider (option B) go to page 41



i) **Power on your Raspberry Pi** - connect the powerbank to the Pi using the correct USB cable (micro-USB fits the Pi power socket)

ii) **Leave the camera face down** as the Raspberry Pi boots so it can calibrate.
You will see the LEDs flashing indicating it is loading. This should take approximately 1 minute.

iii) **Selfie test** - close the case and turn the camera to face you. This will 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 page to learn how to view your test images

Viewing your Images

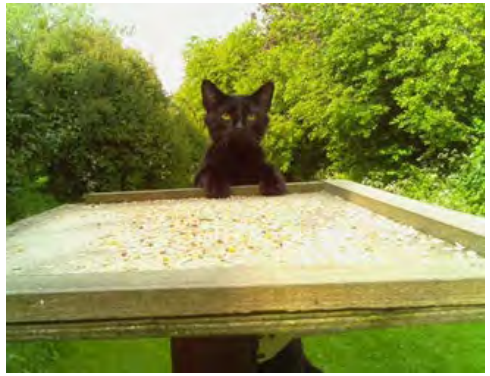
To view your test images:

i) Remove the USB flashdrive from the camera and plug it into a laptop or computer.

ii) Open and view your images

If you can view them your camera is working correctly.

Your Cam Kit is ready to go out into the wild!



Troubleshooting

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

To troubleshoot the PIR and Camera with a computer screen you can see this video guide:

http://naturebytes.org/faq/

To see how to connect the kit with a screen see the page 39

Tips for great wildlife images

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

1) Choose target animals - think about which animals are regular visitors that you can photograph and thinkk about their behaviour.

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

3) Choose the height and direction - would you prefer a view of a bird table or are you focusing on ground mammals close up?

Tips for getting great wildlife images

4) Avoid direct sunlight - make sure the camera is protected from sunlight shining onto the face of hte kit.

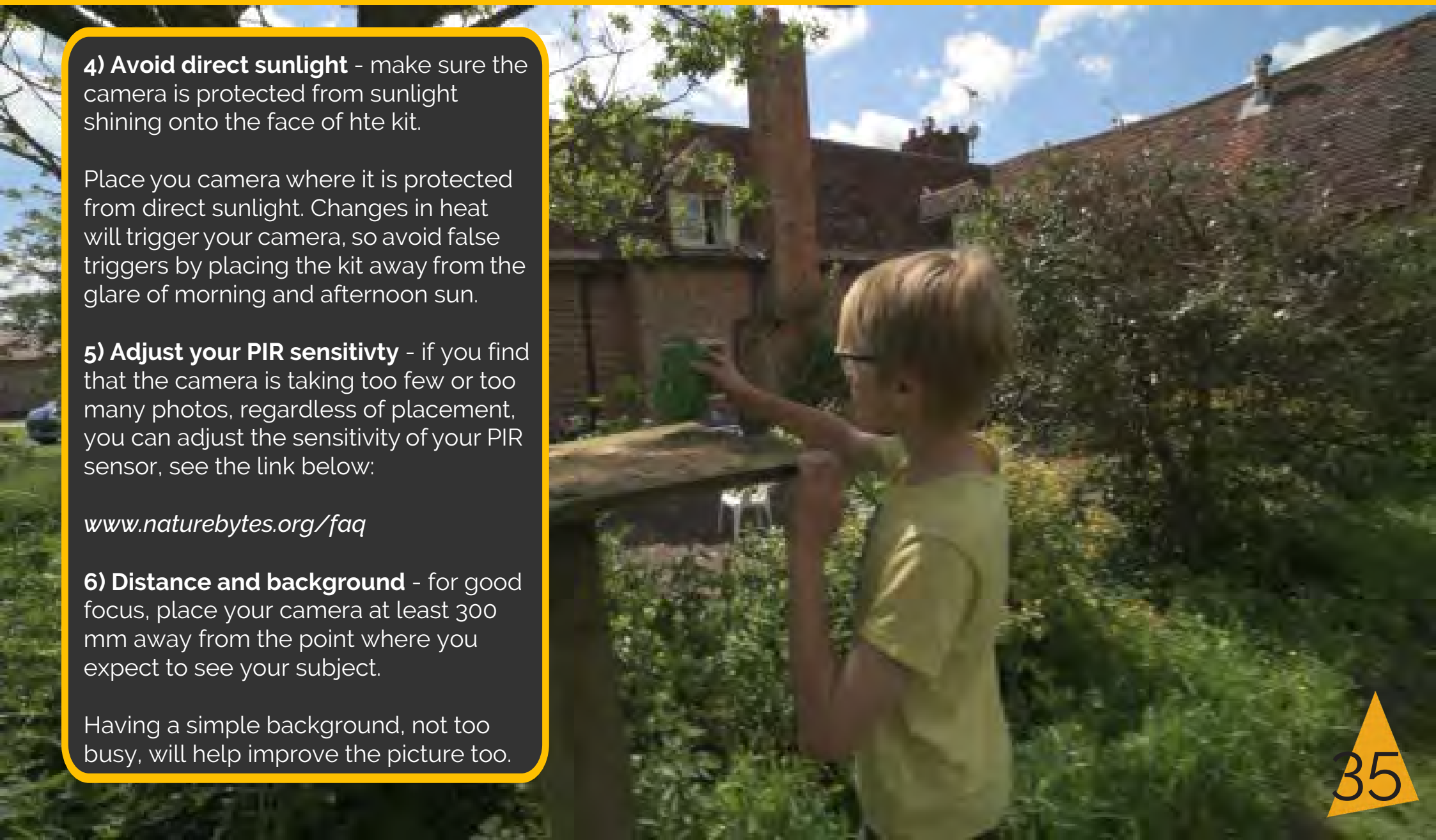
Place you camera where it is protected from direct sunlight. Changes in heat will trigger your camera, so avoid false triggers by placing the kit away from the glare of morning and afternoon sun.

5) Adjust your PIR sensitivty - if you find that the camera is taking too few or too many photos, regardless of placement, you can adjust the sensitivity of your PIR sensor, see the link below:

www.naturebytes.org/faq

6) Distance and background - for good focus, place your camera at least 300 mm away from the point where you expect to see your subject.

Having a simple background, not too busy, will help improve the picture too.

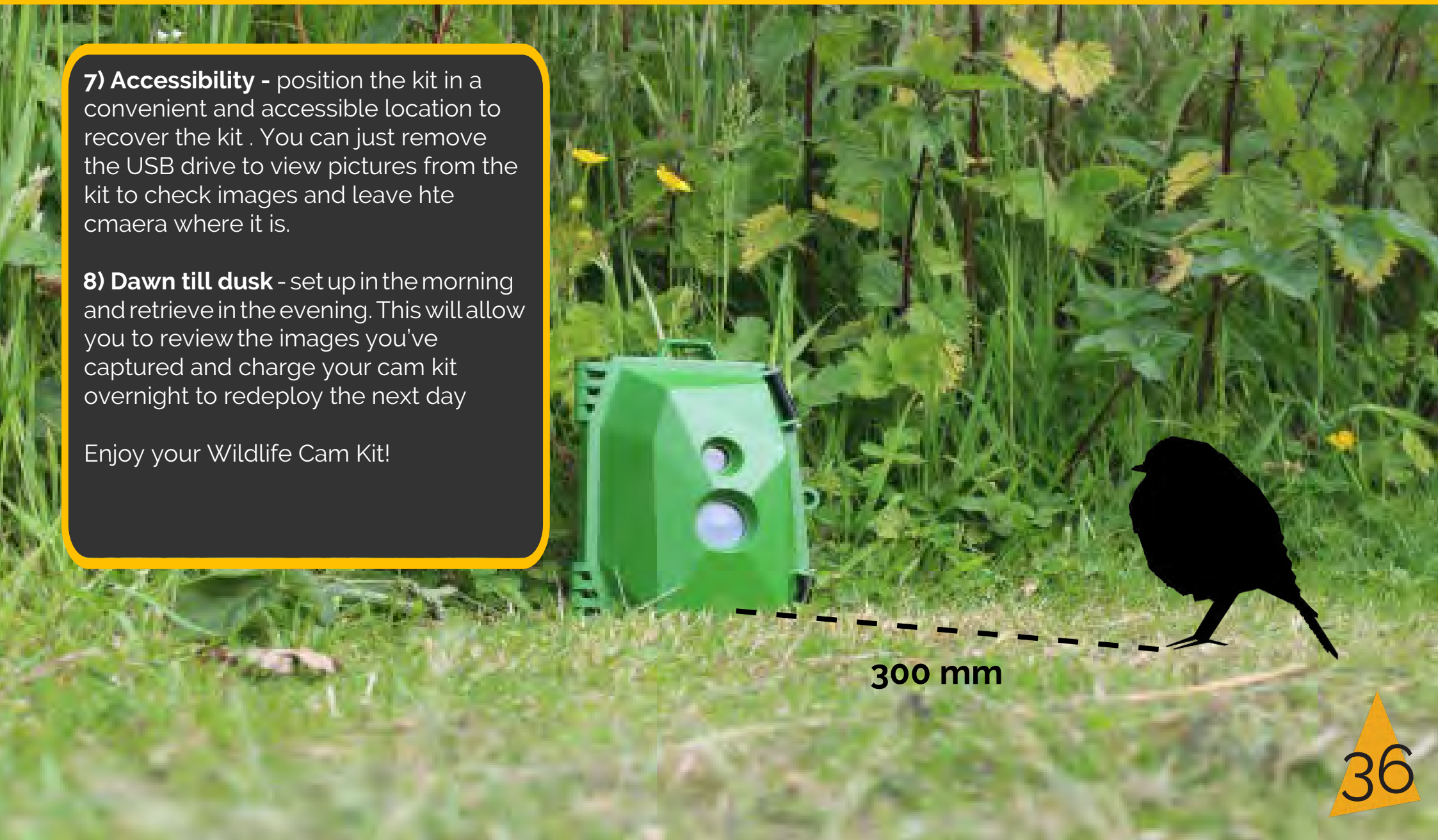


Tips for getting great wildlife images

7) Accessibility - position the kit in a convenient and accessible location to recover the kit . You can just remove the USB drive to view pictures from the kit to check images and leave hte cmaera where it is.

8) Dawn till dusk - set up in the morning and retrieve in the evening. This will allow you to review the images you've captured and charge your cam kit overnight to redeploy the next day

Enjoy your Wildlife Cam Kit!



Additional Features

Using my kit as a computer

To benefit from additionalfeatures, you can use the kit as a desktop computer and access the code that runsyour kit.

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.

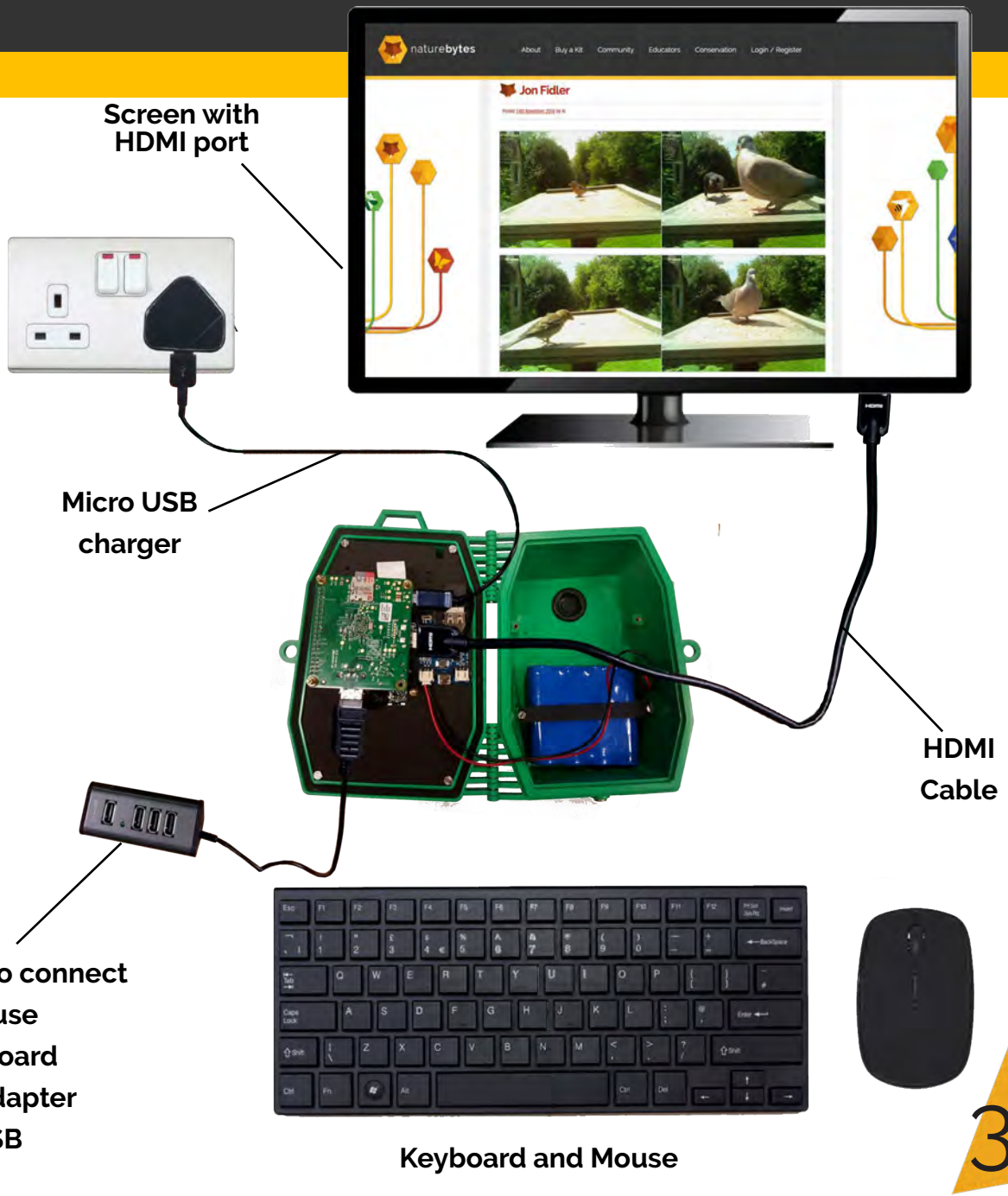
You will then need a mouse in order to navigate the interface and a keyboard totype. We suggest using a wireless keyboard and mouse forthis as the dongle will plug straight into the single USB socket on the Raspberry Pi A+.

If you don't have a wireless keyboard you can use a USB splitter to connect multiple devices.

The image (right) illustrates howto set up the kit. Instead of using a battery, you can power your kit with a 2A mains supply and a micro-USB, similar to charging a mobile phone.

You read more about setting up your Raspberry Pi here:

https://projects.raspberrypi.org/en/projects/raspberry-pi-setting-up/3



What you will need:

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

Setting the time module

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.

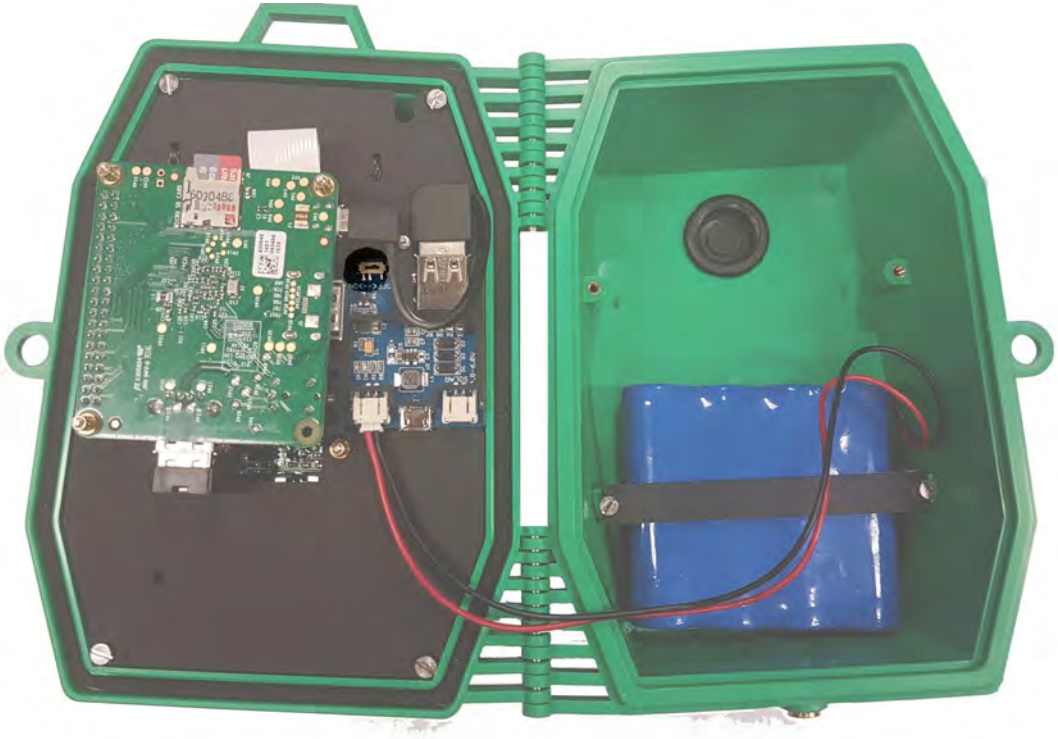
```
63      if(!isBuilding)
64      {
65          if(GUI.Button(new Rect(Screen.width - btnWidth, Screen.height - btnHeight, btnWidth, btnHeight), "Tower One"))
66          {
67              buildGrid.transform.position = buildGridOriPos;
68
69              for(int i = 0; i < availableTowersList.Count; 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      }
```

Powering up with the LiPo rider

(Option B only)

LiPo rider Power-Up and test (maker option only)

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



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 ting itis loading. This should take apprximately 1 minute.

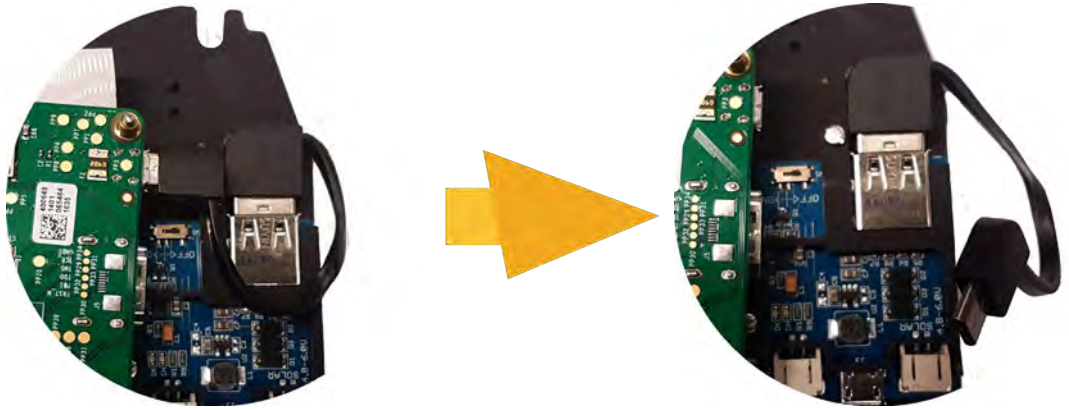
iii) Now tak camera to face you. You should trigger the camera.

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

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

Charging with the LiPo rider (Maker option only)

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.

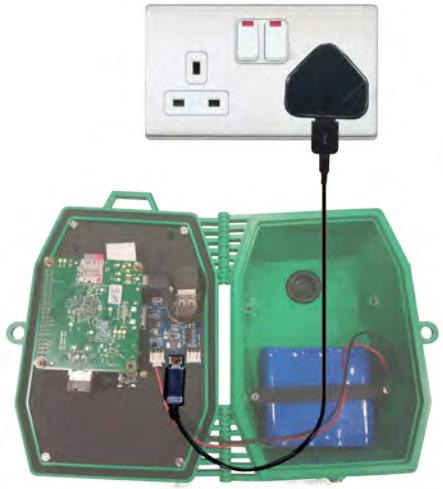
ii) Plug a micro USB cable into the LiPo rider as illustrated in the image below

iii) Connect the micro USB charging device. A plug adapter or computer will do.

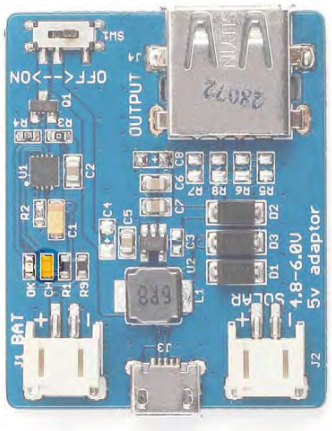
iv) When charging, the Orange LED will light up

v) When fully charged, the Green LED will light up. The initial full charge will take approximately 8 hours.

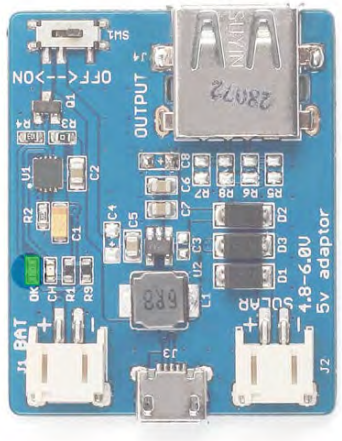
vi) When fully charged disconnect the LiPo Rider from the charging device and reconnect the LiPo Rider and Raspberry Pi.



Charging - orange light



Charged - green light



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.