Daylight Camera
Instructions

To build the infrared camera, download the additional instructions from https://mynaturewatch.net/infrared

The instructions are on the My Naturewatch website as part of an open source research project. Pimoroni has provided this downloadable, printable, copy for ease of use only, not for profit by either party.
The disclaimers...

Please note that this is a DIY camera, not a commercial product. We have done our best to make the instructions easy to follow, but there are some fiddly steps and it may take some experimentation and tinkering to make things work.

Some retailers (Pimoroni included) supply SD cards that already have an operating system called NOOBS installed. This is not the right software for the cameras and will be deleted when you install the My Naturewatch Camera software on them.
Before building your camera please read our guide for good practice!

When placing the camera kit:

- Consider your own personal safety when placing the camera. Do not do anything you don’t feel comfortable and safe doing. Work with a buddy to help each other out, if you like. Working at height and/or over water is discourages.
- Consider other people’s privacy when placing the camera. Connect to the camera to see what it sees and appropriately frame the image.
- Consider where it’s best to place the camera. We advise placing it on your own properly. Make sure to secure it.

Working alongside wildlife:

- Do not touch/handle animals under any circumstances.
- Do not disturb nests, setts, or any other animal homes.
- Keep noise and disturbance to a minimum.
- Do not disturb or destroy plants, eggs, animals or geological features.
- Check on your kit periodically for any defects.
- Take any litter home.
The Parts

Things in the Pimoroni supplies kit:
- Raspberry Pi Zero W
- Standard camera module
- Micro USB cable
- 16GB SD card

Things you will need to find yourself:
- A USB power bank / battery (ideally over 6000mAh)
- A USB charger plug (for testing, and for charging the power bank)
- A computer with internet access and a card reader

Materials you need to find:
- A heatsink or a metal bolt, nuts, and washers
- Cardboard
- Super glue
- Sticky pads
- Blu tack/sugru
- Waterproof container like a lunchbox
- Empty plastic drinks bottle
- Scissors
- A glue gun or strong tape
What actually happens - an overview

Download the software

You need to get it from the internet, and copy it onto the SD card. The Raspberry Pi Zero will read the SD card and run the My Naturewatch Camera.

Assemble the electronics

You will attach the camera to the Pi Zero using the built in connector.

Name your camera

You can use the default name or change it.

Test your camera

Before you do the next steps, you will test the camera and see it working.

Make the camera housing

Time to make a weather-resistant housing from easy to find materials.

Assemble the camera

Finally, you’re ready to fix the camera inside the housing and try it out!

Time for the whole thing: 60-90 mins.
Step 1 - Download the Software

On your computer, **download the disk image** (the whole bundle of software) from any of the following links (they’re all the same):

- http://interaction.gold.ac.uk/naturewatch-cam-v0p4p2.img
- http://pimoroni.com/naturewatch-software

Make sure you know where it’s being saved because you will need to find it!

**Download an app called Etcher from:**

https://etcher.io

Put the SD card in your computer using an adaptor or a built in reader.

**Open Etcher.** Choose the disk image you downloaded as “Image” and the SD card as “Drive”, then **press “flash”**. It will show you a progress bar.

When it’s finished, **the card is ready.**

(If it asks you if you want to format the SD card, click “no” because otherwise it will wipe it!)
Step 2 - Assemble the Electronics

A Put the USB power bank on charge. You will need to use it. Most of them have lights that show you how charged up they are.

B The fiddly bit - BE GENTLE! Unclip the black locking strip that is on the end of the white connector. It will only move a tiny bit and feel loose.

C Get the camera cable and make sure the metal patches are facing down. Gently push the cable in the gap between the black strip and the green Pi Zero base. It should look like this:

D Gently push the black strip back towards the white connector. This will hold the ribbon in.
Step 2 contd - Assemble the Electronics

The black square on the Pi Zero is the processor. The harder it works, the hotter it gets. If you have something to spread the heat out (a heatsink) it will work better.

The easy way to make a heatsink is to glue a lump of metal onto the processor. You can use a metal nut, or a bolt, or both!

You can also buy heatsinks for around £1.
Step 2 continued

The camera is joined to the Pi Zero by a tiny clip, so to stop them pulling apart we recommend you stick both to a piece of card.

The Pi Zero sticks on one side, then the cable bends over the edge, and the camera sticks to the other side.

You can trim off any spare card because this will need to fit in your container.

We used sticky pads.
Step 3 - Name your Camera

The camera makes its own wireless network which means you can control it through a web browser or any smartphone, tablet, or computer connected to it.

The default name is “MyNaturewatch” and if you’re happy with it, skip this step.

If you look at the contents of the SD card you will see it show up as “boot” on your computer. Pick that and scroll down until you get to a file called:

`naturewatch-configuration.txt`

If you open it (using Notepad) you’ll see it’s a simple text file with the name (MyNaturewatch) and password (badgersandfoxes). Change them in the text file, save it, and you have your new version.

Make sure you make a note of them because you’ll need them later!
Step 4 - Test your camera

Take the SD card out of your computer and push it into the silver socket on the Pi Zero - the metal contacts should be facing down and the printing on the card should be facing up.

Power the whole thing by connecting the USB power bank to the Pi Zero, using the silver connector closest to the camera. The LED should light up green and flash a bit. It will take about 60 seconds.

Look at the camera ribbon cable - there is a little LED on that. It will light up red when the system is ready to go.

If the light doesn’t go red, it might be that the camera cable isn’t in properly.

Go back to step 2 and see if you can fix it.

If not, contact us: https://mynaturewatch.net/support/

On your smartphone, tablet, or computer, connect to the camera’s wireless network. The name will be “MyNaturewatch” unless you changed it, and the password will be “badgersandfoxes” unless you changed that too.
Step 4 continued..

So now you are connected to the camera.

Open a web browser and go to

http://camera.local

You should see the live preview from your camera, with the buttons “image capture”, “image gallery”, and “settings”,

...
Step 5 - Make the camera housing

If you’re going to stick the camera outside, it should be protected.

Get a tupperware box and put a hole in the side of it that accommodates the camera lens. The hole should be roughly 10mm in diameter, and can be made with scissors or a drill.

Cut around a plastic bottle with scissors to form a lens cover. Position the bottle opening around the camera hole of the tupperware and attach with sugru, blu tack, or a hot glue gun.
Step 6 - Assemble the Camera

Tape the cardboard camera mount inside the tupperware, with the lens positioned to look through the hole you drilled, and place the attached battery pack inside.

If you have a pack of silica gel it will help absorb any moisture in the container.

Seal the lid - you now have a weatherproof myNaturewatch Camera!
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Using your camera
Using the camera

Using the camera is straightforward:

Power up the camera by plugging the cable from the camera to a charged USB powerbank.

Enclose the camera in the case you’ve made.

Position the camera in a good place to spot wildlife, trying to avoid busy backgrounds.

Scatter bait about 0.5-1m from the camera for optimal focus.

Use the web interface to control the camera and see pictures.
Using the web interface

You can connect to your camera using your computer, tablet, or smartphone. The screenshots here are from a smartphone.

Using wi-fi settings on your device, look for the wi-fi network name of your camera. It will have the default name of MyNaturewatch with the default password of badgersandfoxes or it will have the name and password you entered in the configuration file when building your camera.
Using the web interface

In your web browser, type out the following address:

camera.local

You should see the live preview feed from your camera along with the following simple control buttons:

Start Image Capture

Image Gallery

Settings

If it doesn’t connect, try typing http://camera.local or 192.168.50.10
Using the web interface

The camera takes photos by continuously monitoring the live preview feed for movement. When you want to begin this process, press the **Start Image Capture** button.

The camera will be taking pictures automatically and the button will change to a red **Stop Image Capture** button. All the recorded images will be stored in the Image Gallery. Press the **Stop Image Capture** button to cease capturing.
Using the web interface

The camera takes photos by looking for a significant change in what it can see. The square outlines on the preview image represent the size of change the camera looks for to determine whether or not to take a photo.

The sensitivity of the camera can be altered to prevent false positives - unwanted photos taken when there is no wildlife in the camera frame.

The small grey square symbolises the smallest change and the bigger cyan square the largest. In this screenshot, the grey square is about 15% of the image, so it will take a photo each time the camera sees at least 15% change across the whole image.
Using the web interface

To adjust sensitivity, click the blue Settings button then Movement Sensitivity. If you choose More sensitivity, it will look for very small changes, and Less will only capture big changes.

Depending on how you built your camera, the image may appear upside down. To correct this, click Image Orientation and Flip 180.

The other option in settings is Exposure Mode. By default, this is automatic, but you might want to change the shutter speed to create different effects.
Image Gallery - how to save your photos

Press the blue Image Gallery button and it will take you to a new page showing all the pictures the camera has captured.

On a phone, save photos by tapping and holding on them. Once you have saved all the ones you want, delete the photos from My Naturewatch Camera by clicking the red Delete all photos button.

On a computer, you have the option to Download all photos. If you select this, the camera will add all the photos to a .zip file and send it to your computer.
Top tips Part 2

Do not leave the camera in direct sunlight because it can cause overheating issues.

You do not need to stay connected to the Camera’s wifi for it to work and continue recording.

If you leave the live preview window open on your phone or computer, it will drain the battery on the Naturewatch camera.

The battery pack will have to be charged every 12 hours or so (depending on the battery).

For best results, try to frame the image of the camera so that the action you expect to capture will be 0.5-1 metre away.

Experiment with different ways of mounting My Naturewatch Cam. Near a bird feeder, hanging in a tree, pointing at the ground...

Try different types of bait. Lots of animals - birds, foxes, rats, badgers - like apples!

Using a wildlife camera can be like fishing: sometimes nothing bites. Be patient and keep trying!