nature**bytes** reconnect with wildlife

Educators Guide



Naturebytes provide unique electronic kits and educational courses for people of all ages to reconnect with wildlife.

We have created scientific-grade gadgets that anyone can build to develop STEM skills and experience wildlife in new and exciting ways.

Naturebytes is a growing community of makers, engineers, scientists, schools and individuals all transforming digital making for wildlife.

Naturebytes also provides unique educational courses for people of all ages to develop skills in computer programming, design, technology and natural sciences to enable everyone to connect with wildlife in new and exciting ways.

The Wildlife Cam itself can take stealthy snaps of any animals that wander into its view, giving you a unique insight into the secret lives of all the animals around you.

The Smart NestBox - uses similar technology to the Wildlife Cam Kit, enabling live streamo from inside the nest box, capture of videos, photos and monitor nesting birds.

Whether it's hedgehogs, squirrels, birds, foxes or cats, the Naturebytes Wildlife Cam Kit contains all of the parts and instructions you need to use digital making to connect with wildlife.

The naturebytes kits:





Introduction to Educators Materials

This pack assists teachers or educators when building a Naturebytes Wildlife Cam Kit and offers interesting and exciting activities and challenges, both in terms of digital making and exploring nature. Contact us if you are interested in Smart NestBox activites.

Introduction to the Wildlife Cam Kit Activities

These activities have been created to deliver an introduction to fundamental concepts in computing, technology and natural sciences through the application of project based learning.

The activities are built around The Wildlife Cam Kit, designed to be a fun and engaging tool that enables people develop skills through creative thinking, group-working, experimenting and experience.

We have designed these activities to be a source of guidance not a strict one size fits all lesson plan. The activities are flexible and adaptable to allow you to pick and choose aspects of the activities most suited to you.

How to use the activities

These activities provide an introduction to the Wildlife Cam Kit, how the associated hardware and software will work, and how to capture great images of wildlife. It can be taught as a discrete lesson, as part of a programme work, integrated into existing programmes or as a workshop.

You know your group better than we do, so take a read through the activities and use them to tailor your own workshop to your available resources, environment, preferred interests and desired learning outcomes.

Use this guide in conjunction with the "Wildlife Cam kit Guide" that provides easy instructions on how to assemble and set-up the kit.

Introduction to the Wildlife Cam Kit Activities

Preparation

Before you deliver the activity with a group it will be useful to do the following:

- Read through each of the 'Activities' numbered 1 3
- Read through the "Wildlife Cam Kit Guide"
- Make sure you have all the hardware and equipment required is available screens, pcs etc.
- Prepare photos of key/focus species and useful info sites
- Ensure you have assessed and mitigated for all potential hazards and e-safety risk
- Identify the software you are going to use for the different steps in activites 2 & 3 and prepare 'here's one I
 made earlier' graphs and edited photos for demonstration.

The Educators Pack

Included in the digital pack:

- Wildlife Cam Kit Guide digital version of the latest guide for assembling the Wildlife Cam Kit
- Educators Guide this document
- Activites editable document of the activites included in this pack allowing you to adapt the activity to suit your class
- Classroom slides explaining how the Cam Kit works
- Naturebytes online resources including the operating system, and 3D STL files
- YouTube online assembly guide
- FAQs



The naturebytes Wildlife Cam Kit is a motion sensitive, camera that anyone can build to remotely take stealthy high-definition images of wildlife. It is powered by the Raspberry Pi, a credit-card sized programmable computer, making it a fun way to develop your digital making skills and provide an exciting new insight into the natural world.



How the Cam Kit works

The PIR sensor used in the kit detects invisible radiation from warm blooded animals (birds, foxes, dogs and even you). When a warm animal walks past the kit, the PIR sensor will detect it and trigger the camera to take a photo!



Naturebytes.org - Our online community

Upload your photos and data to the Naturebytes online portal to monitor biodiversity in your area.



Individuals can provide comments, descriptions (meta-data) and other information to add value to the images you have captured.

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Activity Overview

The Wildlife Cam Kit uses project based learning to demonstrate how computing and technology can be applied to understand the natural world.

The activity provides an introduction into how computation, electronics and how these can be programmed to do perform different tasks, such as photography and video.

Learning Objectives

- Understand the function of different components and how they work together.
- Understand the difference between hardware and software.
- Know how to build the Wildlife Cam Kit, turn it on, deploy it and view and upload photos.

Learning Outcomes

All participants are able to:

- Plug the components of the Wildlife Cam Kit together
- Understand that computers are general purpose devices and individual components can have many different applications.
- Identify the basic architecture of a computer: processor, storage, input output, camera, PIR and other components.





Activity 1 - Steps

Estimated time: 50-60 mins

1. Introduce the activity, what Naturebytes is and the expected outcomes of the tasks.

Ask the group to lay out all the parts of the kit in front of them.
 Then ask them to identify the Raspberry Pi, the camera and the PIR. Ask the group to describe what they are and how they work.

3. Tell them they are going to construct the Cam Kit in the room, Test the kit indoors and check it's working on the computer or screen.

4. (optional) If you wish to include in your workshop completed the following steps: Inform the group you will deploy the Cam Kit for a period of time before recovering it, uploading data and analysing it in the classroom

5. Allow the participants to work through the "Wildlife Cam Kit Guide", working in pairs or groups ensuring it is a team effort.

6. Once complete ensure everyone has a complete and fully functional kit. ("Switching on your camera" pg 31 Wildlife Cam Kit Guide)

7. Discuss advantages of a camera trap, how you could deploy the camera trap to get photos and how conservationists and scientists can use the information provided by camera traps.

8. Discuss which animals are likely to find and how they can be identified and other ways they might use the Cam Kit and electronics to better understand or help wildlife eg. slow-motion, video, time-lapse photography.



Activity 2 - Field Work and Recording Data

Activity Overview

The field work activity provides an opportunity to use the Wildlife Cam Kit outdoors to capture images and learn about different animals and their behaviour.

Learning Objectives

- Understand how the set-up and deployment of technology influences the data/images it records
- Understand different kinds of observational environmental data that be recorded
- Understand how safety and data privacy considerations of the use of Cam Kits

Learning Outcome

All participants are able to:

- Deploy the Wildlife Cam Kit to target particular species
- Identify species and able to record useful environmental data
- Use technology outdoors in a safe and considerate way



Above: Naturebytes Cam Kit and bird-feeder arm. These kits are used for national bird monitoring surveys.



Above: Naturebytes Cam-Kit attached to a tree. This set-up is used to monitor mammals.



Activity 2 - Sessions 1 & 2 Estimated time: 2 x 50-60min workshops/sessions

Session 1

1. Outline the field survey area and discuss which area you would like them to use, remember to secure the Kit safely and not to infringe on anyone's privacy, record private information or take images of those people who might not like it.

2. Group the participants into pairs or groups and identify which animals and information they would like to capture and how they will deploy the camera to do so (see "Think about a suitable location" pg 33-35 in Wildlife Cam Kit Guide for more information)

3. Ask them to record the location of their camera, habitat type, time it was deployed, weather and any other features or variables you would like to compare.

4. Give the group an opportunity to experiment with different set up and triggering the camera

5. Allow the group to explore the area and deploy the camera on their preferred site

6. Decide whether you would like them to bait their camera with bird food, dog food anything else, or set it up by bird bath etc. and the implications of this (attracting rodents, encourage dependency)



Activity 2 - Sessions 1 & 2^{Estimated time:} 2 x 50-60min workshops/sessions

Session 2

1. After a set period of time, we recommended between 4 - 48 hours, ask the group to collect their cameras.

2. Ask groups to review their photos and delete any images that have no identifiable animals or anything of interest.

3. Allow the group to use either their own photos or the whole group, judge by the volume of animal photos and what suits your activity/ aims.

4. Upload the images to the group portal website or view on the raspberry Pi.

5. Show them how to upload photos to their individual computer profile and either the school profile or individual profile on the Naturebytes online portal (Naturebytes.org).

6. Ask them to use the internet to confirm the ID of any species they identify - if using birds use RSPB ID key (http://www.rspb.org.uk/ discoverandenjoynature/discoverandlearn/birdidentifier/)

7. If participants are not able to ID any of the animals, ask the group and upload to iSpot (community species ID website http://www. ispotnature.org/communities/uk-and-ireland)

8. Ask the group the present their chosen images and interesting discoveries to the group.





Activity 3 - Analysing and Presenting Data

Activity Overview

This activity uses widely available software to analyse and present data to provide discover information and assist in reaching conclusions about the studied environment.

Learning Objectives

- Understand how to record, sort and input data in Microsoft Excel
- Understand how to interpret basic charts and presented data
- Understand how to generate different charts and optimise them to present data clearly

Learning Outcomes

All participants will be able to:

- Generate graphs that present data in a clear way
- Explain graphs and their findings to a group of people.
- Identify limitations of their data and how these might be addressed through improved data collection.



Above: Bird seed preference showing the amount of birds counted using different feed.

Painted lady butterfly 11 million	
swallow 1,720,000	*****
Fieldfare 720,000	KKKKKKK
Manx shearwater 640,000	444444
Brent goose 120,000	~
^{Cuckoo} 32,000	
Bewick's swan 7,000	6

Above: Migration in numbers in the uk



Activity 3 - Steps

Estimated time: 50-60 mins

1. Let the group know that they can use their Cam Kits photos and data to create charts and present information on the wildlife the group capture.

2. Discuss what data they have on species and how it might be displayed and any useful information like location, time of day, number of species.

3. Explore the different ways in which information can be presented, different types of chart and graphs and how they might be best used.

4. Demonstrate changes to graphs type, colour, and the impact it has on interpretation and usefulness.

5. Present some examples of graphs to the group, how data can be input, then ask group to create charts using data from the group or their own data if there is sufficient.

6. Ask the group to present their graphs, explain any patterns or interesting points and potential reasons behind them, if they only used their individual data, ask them to compare it to others and explain how it different from the whole group, and what results you might get if you had your camera trap deployed in other habitats.

7. Discuss as a group what they have learned, any interesting findings, how their survey might be improved and if they would do anything different next time.

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www.naturebytes.org