

Institution: Goldsmiths, University of London		
Unit of Assessment: 32, Art and Design: History, Practice and Theory		
Title of case study: My Naturewatch self-build wildlife camera engages citizens with digital making and local wildlife		
Period when the underpinning research was undertaken: 2003 - 2020		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
William Gaver Andrew Boucher	Professor - Design Senior Lecturer	Nov 2005 - present Jan 2006 - present
Period when the claimed impact occurred: June 2018 – December 2020		
Is this case study continued from a case study submitted in 2014? N		
1. Summary of the impact My Naturewatch was a collaboration with the BBC's Natural History Unit to design a self-build wildlife camera that novice makers could easily construct at home. The camera featured on BBC Springwatch in June 2018 and resulted in 45,000 people visiting the My Naturewatch website to learn more about the project. This contributed to the BBC's overarching mission to 'inform, educate and entertain' the public and went on to inspire around 2500 people to make the camera, engage in a digital making project and gain a new understanding of their natural surroundings. In addition, around 25 schools, museums, conservation groups and nature reserves, as well as a self-sustaining community of independent makers have used the camera to inspire new audiences and organise their own making events.		
2. Underpinning research Since 2005, the Interaction Research Studio at Goldsmiths has been dedicated to practice-based research. We develop novel computational products that address a variety of topical issues (e.g. home computation, environmental concerns, the aging population) both to investigate those concerns and scope the potential for new digital technologies. Based on background empirical and scholarly research, the 'research products' (Odom et al) we make are highly finished, technically and aesthetically, for long-term trials in people's own environments. Originally, we only made one or two of each of the research products we designed and used these to perform intensive investigations of how a limited number of participants used them over time (R1, R2). Over the last ten years, however, we have experimented with producing more research products, both to enable larger-scale field studies and to enhance the impact of our designs. Initially we explored batch-production in a series of projects in which we produced and field-tested increasingly large multiples of research products. This included a trial of 130 handheld mobile devices called Datacatchers that explore big data in geographical context, and a study using 30 desktop devices named Energy Babble that create an automated audio stream – like a talk radio station – for energy conservation groups (R3, R4). However, batch production is prohibitively time- and money-intensive for a small group such as ours. Thus, our recent research has focused on self-build ICT, in which we support people to make our designs themselves. We tried this approach out in a project where we disseminated a series of ProbeTool cameras (R5), with about 200 having been built by international researchers to date. In the 'Citizen Naturewatch' project (2017-2020, funded by EPSRC grant (EP/P006256/1, G1), we consulted with the BBC's Natural History Unit (NHU) to design a series of computational devices that viewers of the BBC Springwatch programme could build at home and use to gather similar content to that shown on the show. The project was undertaken in collaboration with a team at the RCA (funded by a linked EPSRC grant: EP/P006353/1), who focused on using the devices in face-to-face events in museums, schools and wildlife trusts to promote engagement with the natural world.		

The Citizen Naturewatch project addressed three core research questions:

- 1) Can self-build ICT serve as a successful methodology for disseminating research products?
- 2) Can a self-build ICT product promote engagement with digital making to a wide audience?
- 3) Can a self-build product similarly promote engagement with nature?

We took a design-led approach, iteratively gathering concept proposals in design workbooks for discussion with the NHU team to decide what sort of device to make, then developing the camera and website through a series of technological and form tests. This culminated in the design of the My Naturewatch Camera (R6), which uses computer vision to take pictures when it 'sees' movement and can be set up outside with bait to capture images of local birds and animals. The camera can be assembled from components purchased online and cased in household materials such as food storage containers and recycled plastic bottles.



[Image: The My Naturewatch camera (right) and the My Naturewatch camera in situ (left)]

In line with our research hypothesis, our primary findings are:

- Self-build ICT is an effective approach for sharing computational products, and conversely for encouraging wide audiences to engage with digital making.
- The Self-build approach is a powerful format for increasing the engagement of the public with a topic area, in this case, nature.
- Empowering technically inexperienced people to make self-build ICT products is facilitated by minimising skill barriers via simple technical designs, well-packaged software and the use of household materials combined with carefully produced resources for instruction and community formation (i.e. the website).
- Coordinating designs with the interests of established institutions allows self-build ICT to be publicised by their existing networks.

3. References to the research

R1. William Gaver, John Bowers, **Andrew Boucher**, Hans Gellerson, Sarah Pennington, Albrecht Schmidt, Anthony Steed, Nicholas Villars, and Brendan Walker. 2004. 'The drift table: designing for ludic engagement'. In CHI '04 Extended Abstracts on Human Factors in Computing Systems (CHI EA '04). Association for Computing Machinery, New York, NY, USA, 885–900. DOI:<https://doi.org/10.1145/985921.985947>. [Available on Request]

R2. William Gaver, Mark Blythe, **Andy Boucher**, Nadine Jarvis, John Bowers, and Peter Wright. 2010. The prayer companion: openness and specificity, materiality and spirituality. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '10). Association for Computing Machinery, New York, NY, USA, 2055–2064. DOI:<https://doi.org/10.1145/1753326.1753640>. [Available on request]

R3. Andy Boucher and **William Gaver**. 2017. [DataCatcher](#) [Portfolio: Submitted to REF2]

R4. Andy Boucher and William Gaver. 2018. [Energy and Co-Designing Communities \(Energy Babble\)](#) [Portfolio: Submitted to REF2]

R5. Andy Boucher and William Gaver. 2018. [ProbeTools](#) [Portfolio: Submitted to REF2]

R6. Andy Boucher and William Gaver. 2018. [My NatureWatch Cameras](#) [Portfolio; Submitted to REF 2]

Select Research Grants:

G1. William Gaver [PI], Andy Boucher [Co-I], [Citizen Naturewatch](#), Jan 2017 – Dec 2020, EPSRC (EP/P006256/1) £771, 440.

4. Details of the impact

In June 2018, My Naturewatch Camera featured on the BBC's flagship nature programme, Springwatch to a live audience of about 2 million viewers (and hundreds of thousands more on iPlayer) [S1] and on Wildlife Academy, a web-based programme that attracts several hundreds of thousands of viewers, including teachers showing it to students in schools [S2].

1. Supporting the BBC's mission to 'inform, educate and entertain':

Designing and developing My Naturewatch Camera in regular consultation with the BBC's NHU department ensured that the device was congruent with their interests. While Springwatch solicits user-generated content, almost always in the form of photographs taken with standard cameras, this is the first time (to our knowledge) that they featured a self-build ICT product that enabled viewers to capture content similar to that shown on the programme.

The My Naturewatch project and camera received the following commendations:

- "I'm impressed by the camera." [Chris Packham, Springwatch presenter, naturalist, and nature photographer, S1].
- "As a brand it has always been Springwatch's remit to encourage people to observe and connect with our British wildlife and, as such, **working in partnership with Goldsmiths has proved to be a rewarding experience.**" [Executive Producer at NHU, Rosemary Edwards, S3].
- The project allowed the team to: "**democratise the very workflows which make Springwatch so special** – putting small cameras in with wildlife and observing what it does... we received (and continue to receive) both footage from cameras [...] and testimonials from our audience who have made the cameras (often as families) saying how much they enjoyed the process and the result" [Springwatch Producer, Chris Howard, S3].

Howard goes on to state that the project "was of **genuine and lasting value to Springwatch and the BBC**"; and is seen as "**a benchmark and inspiration for developing new ideas**" having "**laid the groundwork for this deeper audience interaction**" that the production team took to new initiatives in the following seasons of the programme [S3]. The project has also gone on to impact on the BBC's approach to Research & Development (R&D). Senior Research Engineer, Robert Dawes, who has been working on bespoke camera systems for the NHU, states that the project helped highlight opportunities of involving the public in R&D projects:

"We have tried to take this lesson on board [...] we have been working to include elements of artificial intelligence and machine learning into our tools for monitoring wildlife cameras [...] we have developed prototypes that apply these tools to public facing social media platforms where the public could potentially engage directly with our algorithms. Not only would this be an engaging and possibly useful tool for members of the public, it would also help to educate about the existence of such systems, their limitations and their biases" [S3].

2. Engaging the public with digital making and nature:

The Springwatch broadcast helped attract around 45,000 visitors to the [My Naturewatch website](#), contributing to a total of 210,000 website views and 77,000 views of the camera building instructions as of 31st December 2020. By 2019, 1744 Naturewatch bundled kits have been sold by Pimoroni.com (a major but not exclusive source for the camera components). According to Mark Todd, Pimoroni Sales Manager, involvement in the project, “helped us to develop new and exciting kits based around the Raspberry Pi and micro:bit which **are helping ease the barrier for entry to the world of electronics and coding**” [S4].

An estimated 2,500 people have made the My Naturewatch camera, largely in the UK but also internationally, providing makers with a unique opportunity to engage in digital making, improve their IT expertise and view local wildlife in its natural habitat. As one camera maker describes here:

“I have **learnt loads about the wildlife in my garden [...]** **I would never, ever have attempted making a camera on my own.** I know you can programme the Raspberry pi to do all these things, but I would never have attempted it myself [...] From having my camera, I found out **some more wildlife that I didn't know we had**” [S5].

3. Transforming how My Naturewatch camera makers and users engage with local wildlife:

Maker feedback is testament to the significance of the project to the people who make the cameras. This is evidenced through social media engagement in the project, including 234,000 Tweet impressions on the @mynaturewatch Twitter account and posts to the User Forum, which has 251 registered makers, 260 discussion topics and 1505 replies. The experience of building the My Naturewatch camera has inspired people to engage with technology in a new way, as explained here by one maker, Carole, on the My Naturewatch user forum: “I use a laptop, iPad and phone but that's it, I just use them...all in all a learning experience but easier than building flatpack furniture... **These are all things I would not have attempted without Naturewatch**” [S5]. Another forum user remarked on how the My Naturewatch camera encouraged his family to engage with local wildlife in a new way;

“The kids were very interested in the output of it. The first things downstairs would be go and get the photos and have a look, pre-breakfast, pre-telly. ‘Let's go see the camera. What have we got?’ [...] **It definitely makes you more aware of what's going on and to try and support that ecosystem a bit better**” [S5].

This feedback supports the RCAs findings on the transformative effects of making and using the My Naturewatch camera, recorded in a series of interviews in which makers reported that they,

“**engage with the environment in new ways [...]** **change their behaviour** and increase diversity in their garden [...] **change how they see** ‘garden pests’[...] gain a **‘new experience of the natural world’**, become more “in touch with nature” and benefit from digital making “**I evolved alongside it**” [S6].

4. Engaging young people with nature through new self-sustaining communities:

My NatureWatch camera makers have created their own self-sustaining community incorporating the maker ethos into their professional practice and encouraging others to take part. For example, French schoolteacher Nicolas Beunier, who works at a Parisian school, built cameras with primary school class and commented:

“But, once we worked with the device, the kids and myself began to mind the birds. So, when they see a bird, they stop and they look and they see what the bird is doing. Is it a male or female? Is it feeding? Is it a great tit, a blue tit? **They mind what is around them, that they didn't do before. So, it's a big difference**” [S5]

University of Sussex researcher, Rob Fowler, organised 10 local primaries to build the cameras engaging with hundreds of young people [S4]; British schoolteacher, John Johnson, reported on forum that he built camera(s) with his class; and Maddie Moate (BBC presenter) filmed a making video for her YouTube Channel (146k subscribers) which has had almost 50k views [as at 31st December 2020, S7].

5. Generating new information about the natural habitats of wildlife and endangered species:

Using the My Naturewatch camera, project partners at the RCA have led face-to-face engagement activities with Wildlife Trusts, conservation agencies and national museums (e.g., Natural History Museum, V&A and Design Museum) including a 'training the trainers' program which enables individuals within these organisations to run their own My Naturewatch camera making workshops [S8]. In addition, the Goldsmiths research team have been directly involved in running workshops with Key Stage 4 schoolchildren including workshops and presentations at three BBC STEM school events involving students from UK-wide schools and at St Margarets' School, Hampstead, in which students made cameras and captured images, several of which were subsequently shown on TV.

This activity has meant that the My Naturewatch camera has become an exemplar of how design can help people understand nature. This was evidenced in a workshop at the Design Museum in 2019 on the impact of the My Naturewatch camera on the work of conservation organisations, including the Suffolk Wildlife Trust, Spitalfields City Farm, White Stork Project, MyHoGwatch [part of the Wildlife Trust], The Jolly Geographer, Ouse and Adur River Trust and The Conservation Volunteers' who use it to track and record local or endangered wildlife. In the accompanying video, the Design Museum's Bernard Hay commented on the importance of the project in "**thinking about the way design can help us connect with nature in new ways**" [S9].

5. Sources to corroborate the impact

S1. BBC Springwatch broadcast 11 June 2018. [Video: Available on Request]

S2. BBC Wild Academy broadcast, 16 June 2018. [Video: Available on Request]

S3. BBC statements of impact contained in email conversations with Rosemary Edwards (Executive Producer, BBC NUH), November 2019; Chris Howard (Series Producer of Springwatch 2016-19), July 2020; and Robert Dawes (Senior Research Engineer, BBC R&D), July 2020. [Testimonials: Grouped Source]

S4. Testimony from 4x representatives working in education, museum, conservation and retail sectors, 2019 -2020. [Testimonials: Grouped Source]

S5. Selected quotes from My Naturewatch Camera makers taken from direct interviews, the My Naturewatch [user forum](#) and the My Naturewatch [Twitter account](#) collected during 2018, 2019 & 2020. [User Reviews: Grouped Source]

S6. Interviews with My Naturewatch Camera makers, made in person, over video conference and telephone though 2019 and 2020 [Transcripts]

S7. Instructional video, Maddie Moat [How to make a wildlife camera \(using a Raspberry Pi!\)](#): YouTube, 22 March 2019. [Video link]

S8. Interviews conducted during roundtable events led at the RCA & the Design Museum during 2019 and 2020. [Transcripts]

S9. Reflections on the design and uses of the My Naturewatch camera: '[My NatureWatch](#)', Design Museum. [Video link]