

## Foam Kernow activity report 2014/2015

Foam Kernow is a non-profit organisation inhabiting the spaces between society, research, education and policy. We enable people to develop creative and confident relationships with science and technology, merging our experience in science, programming and design in a broad range of transdisciplinary research and education projects.

Our projects range from creating games to engage people in scientific research or explore issues surrounding online privacy and political change, to providing scientists with exciting ways to reach out and talk to people, and giving local primary school children and teenagers new ways to learn programming.

Foam Kernow's work has been featured in The Economist, BBC's Click programme, The Guardian and Thinking Digital and has won the Soil Association's innovation award 2014 and the 2011 VIDA award. We have written for The Guardian and The Conversation on the rapid changes happening in research and education, and are committed to fostering a culture of free software, creative commons and open access through our work.

## Research in the arts

### Weaving Codes, coding weaves (2014-2016)

Funded by the UK Arts and Humanities Research Council Digital Transformations Amplification award, the Weaving Codes project is a collaboration between Foam Kernow, Leeds University and the Danish Centre for Textiles Research, and applies a five-thousand-year-long view of technology to programming which has allowed us to bring a discussion of what the word 'digital' means into surprising places.

Our role on the project has been to examine the computational nature of weaving and develop tangible programming hardware to provide ways of coding without screens – and trialling these in schools, care homes and museums.

### Museum for Plaster Casts of Classical Sculptures, Munich (May 2015)

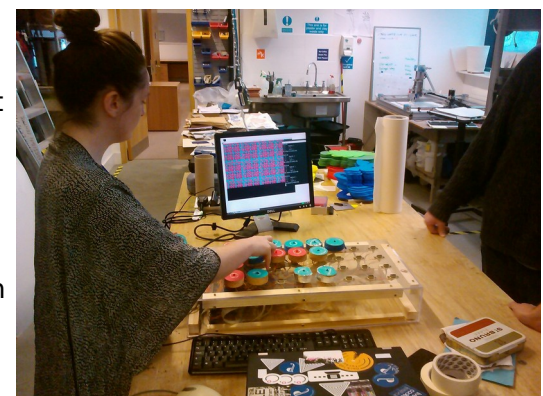
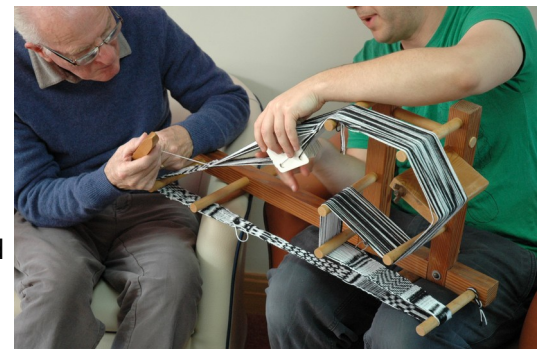
A week long workshop and interactive installation as part of Ellen Harlizius-Klück's "Textile Matrix" exhibition. Surrounded by the characters of classical myth and philosophy, we developed the 'pattern matrix' device for exploring the relationship between binary data and pattern generation inspired by the weaving technologies of antiquity. Culminating in a livecoding performance by Ellen, Alex McLean and Dave Griffiths where we provided musical sonifications of ancient Greek weaving for "people looking at sculptures".

### Future thinking for social living, Miners Court Extra care housing scheme, Redruth, Cornwall (April - July 2015)

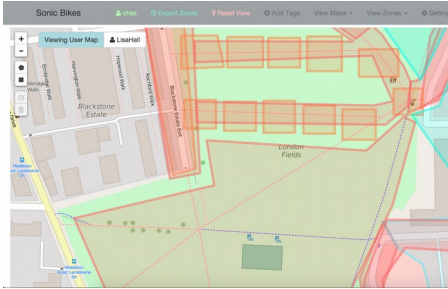
A series of 'pop up workshops' working with elderly people in conjunction with Falmouth University. Using mathematics, pattern making and Raspberry Pis as a way of widening participation of craft workshops to male residents, while collecting insights on attitudes to technology, home and well-being by exploring future thinking techniques together.

### Sonic Pattern and the Textility of Code 2 - Code as Material, Sheffield (2015)

A daytime symposium and an evening of audiovisual works concerned with how sound, image



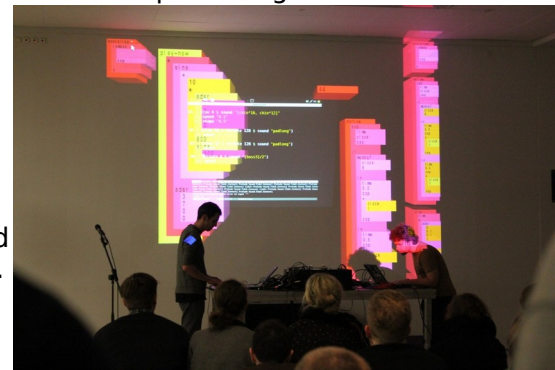
and threads allow us to both sense the abstract and conceptualise the tactile. A talk by Francesca Sargent and demonstration of the pattern matrix tangible weavcoding device.



**Sonic Bike Operas (2011-ongoing)** – a series of public sound installations in collaboration with Kaffe Matthews. GPS enabled bikes with speakers play music as riders pass through different parts of a city. Long running public events in Ghent, Porto, Hailuto Island, Finland, Houston Texas, Brussels, London, Coventry. Foam Kernow provides sonic map drawing software (used in workshops as well as for performance production) and an on-bike audio playback system using Raspberry Pis and Beagleboards.

### Livecoding performances [placeholder]

Livecoding is an emergent performing art in which software writing is improvised in realtime in front of an audience that can watch every keystroke unfold before them. Computer coding and algorithms are celebrated as aesthetic objects in their own right. Partly a reaction to a lack of audience engagement in traditional laptop performances, the origins of Livecoding lie in computer music, but fluxus – a rapid prototyping, playing and learning environment for 3D graphics, sound and games – has played its own part as one of a small number of tools designed for graphical live coding.



## Science for Citizens

One of Foam Kernow's core activities is concerned with bringing artistic expertise and practice into the service of scientific research, particularly in the area of the natural sciences.

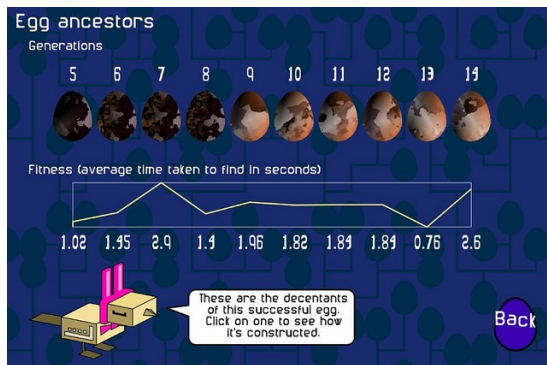
### The Heliconius Butterfly Wing Pattern Evolver (2014/2015)

A game where the player takes the role of a hungry bird, and drives the evolution of an edible butterfly species to mimic the patterns of a toxic species. The game is based on genetic models used by the researchers at Cambridge University and was commissioned for use at the 2014 Royal Society Summer Exhibition in London.

The game was further developed into a citizen science exhibit for the Paris Natural History Museum where it was used to collect data on pattern recognition between toxic and edible species by turning visitors into predators with a touchscreen.



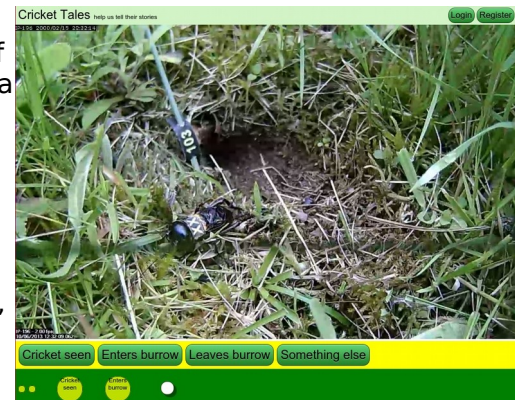




**Egglab (2014)** is a citizen science browser game commissioned by Exeter University in 2014 which evolved camouflage patterns based on the combined efforts of over 50,000 players searching for artificial eggs using background images from the nesting sites of African nightjar birds. The artificially evolved patterns can be compared with the real organisms in order to determine how camouflage has evolved in the ecosystem. Featured in the Economist and the Guardian.

### Cricket tales (2014-2017)

Insect behaviour citizen science for Exeter University - hundreds of CCTV cameras record around the clock for 4 months collecting data on cricket behaviour in the wild. Foam Kernow has been commissioned to invite citizens to help with the task of watching and identifying different events in the active lives of these insects.



### Marine fisheries genetics and policy

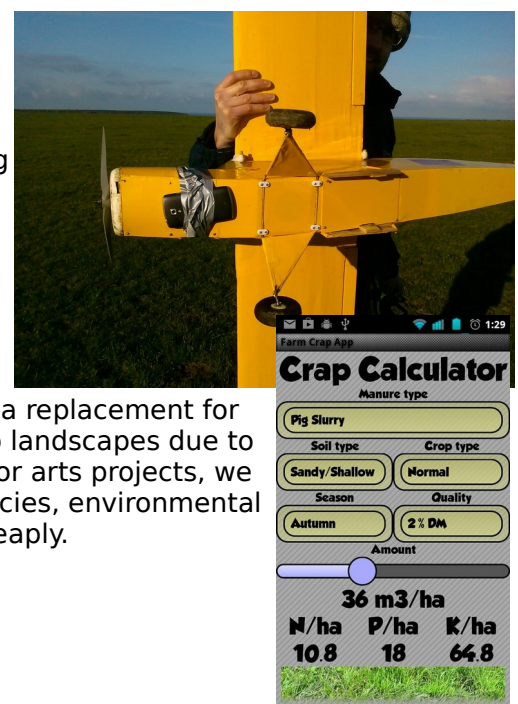
Most European fish stocks are being fished at unsustainable levels, and many are close to collapse. The use of science in the development of fisheries policies has undeniably improved, however despite a wealth of potentially useful research from the field of genetics there seem to be substantial barriers to its use in fisheries legislation. Through interviews and surveys with EU policy makers, NGOs, and industry actors, FoAM Kernow in collaboration with social scientists Kirsten Abernethy and Rachel Turner, and geneticist Andrea Miraldo are working to establish a clear understanding of the exposure to, perceptions of, and barriers to, the use of genetic data in policy and fisheries management practice. A key area of interest is communication and design of genetics research, and what is required for academic and professional scientists to link their research with policy design to have a greater policy impact.

## Appropriate Technology

The concept of *appropriate technology* has been key to Foam Kernow's work, the idea of decentralized, energy-efficient, environmentally sound, and locally controlled solutions to specific problems. These projects often use specific solutions with an eye to more international issues, such as technology use in developing countries.

### UAV toolkit (2015-2016)

An ongoing project with the UAV research group at the University of Exeter's Environment and Sustainability Institute. We're developing commodity technology such as android phones for environmental research with drones and kites. Ecology research groups and environmental agencies have started using drones as a replacement for expensive and risky light aircraft for gathering data on changes to landscapes due to climate change and erosion. Drawing on our livecoding research for arts projects, we are building and testing flexible tools that allow government agencies, environmental charities and farmers to create photographic maps simply and cheaply.



### The Farm Crap App (2013-2016)

A educational tool for encouraging sustainable agriculture commissioned by the Duchy College, Cornwall. A calculator app based on DEFRA published data to promote the use of natural fertiliser. Includes recording features for farm wide use with multiple fields, soil and crop types, camera and gallery features, emailing data for reports. The app won the Soil Association Innovation Award 2014, and is being used by farmers in the south west of the UK and internationally.

### Mongoose 2000 (2014 - ongoing)

A behavioural research tool for use in remote areas in Uganda lacking reliable internet connectivity or power. Developed for the Banded Mongoose Research Project for use at their field site, Mongoose 2000 uses a Raspberry Pi to synchronise behavioural observation data across multiple Android tablets used for daily recording of mongoose behaviour.



### Symbai (2014)

Symbai is a project in collaboration with [Dr Shakti Lamba](#) who studies the evolution of sociality and culture in humans. Shakti collects detailed networks of knowledge, prestige and friendship in villages with contrasting cultural structures in rural India.

Symbai is a solar powered Raspberry Pi/Android anthropological research tool allowing Shakti and her field assistants to work collaboratively in areas with no power or internet connectivity. Data collected is synchronised automatically at the end of each day, and includes hundreds of photographs for people to identify each other (in places where names are used differently to western culture), audio recordings of verbal agreements (a requirement in preliterate societies), and information of who knows who.

Raspberry Pi networking is a direct descendant of the experiments we carried out in London during the Sonic Bike workshop.

### Bumper crop (2014)

Bumper crop is an android game commissioned by Falmouth University as part of the AHRC Play to Grow project: “exploring and testing the use of computer games as a method of storytelling and learning to engage urban users in complexities of rural development, agricultural practices and issues facing farmers in India.”

The project began by developing a board game, which allowed the researchers to flexibly prototype ideas with farmers without needing to worry about software related matters. This resulted in a great finished product, super art direction and loads of assets ready to use. I very much like this approach to games design.



### Machine Wilderness (2015)

**Machine Wilderness** is a free workshop, open to all, crossing thearts-sciences boundaries and merging ecology and design. This workshop is run in collaboration with Theun Karelse from FoAM Amsterdam. Humans have changed animals, crops and landscapes to fit with industry. We've designed machines and technology to efficiently harvest our landscapes. What would a machine look like that feeds a landscape? That is not efficient, but subtle, or graceful? Machine



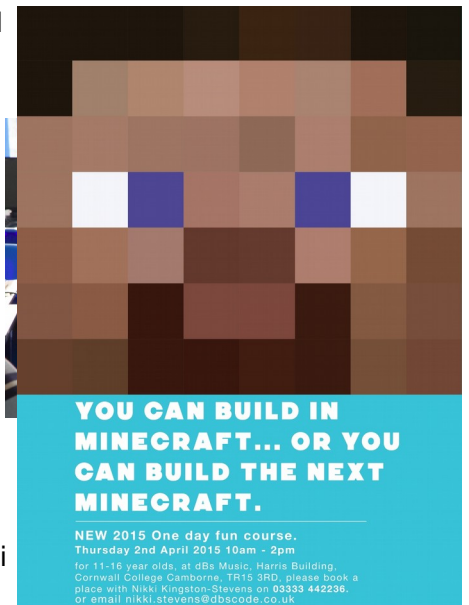
Wilderness asks if we can adapt our tools to living landscapes; play by their rules. Can we design technology in terms of organisms and living processes? Investigating the relationship between human-made machines and the local environment, we will use design exercises and field explorations to prototype machines adapted to natural systems.

## Education

Fundamental to many of the issues Foam Kernow is addressing are challenges and inadequacies in education. As an independent organisation, we have been able to successfully engage with education on levels from primary schools to further and higher education - as well as adult education.

### Teacher training at Primary level (2015)

A UK Department of Education funded project to join up 10 primary schools in Cornwall, increase digital literacy and get them programming. The teachers are very important people in this equation, so we have been providing inset training days for 10-20 teachers, getting them confident and familiar with the Raspberry Pi and trying out some programming. Foam Kernow has additionally been using this opportunity to gather research on feasible projects that can result in long term benefits for the schools involved.



### Raspberry Pi Foundation Picademy (June 2015)

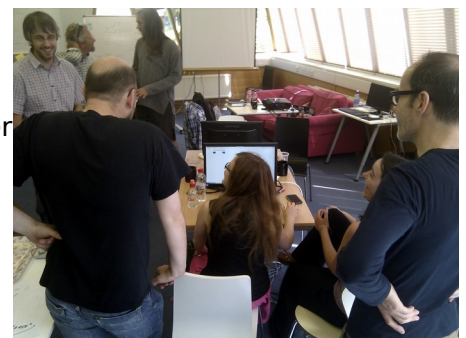
Foam Kernow helped out with the Raspberry Pi Foundation at their Picademy teacher training event in Exeter. These are designed for local teachers to get more confident with computers, programming and electronics to the point where they can start designing their own teaching materials on the second day of the two day course.

### Minecraft Hacking taster workshops (2014-2015)

Two one day long easter schools for Cornwall College (local further education college) to give budding programmers between 11 and 16 a taste of professional games development. We use 20 Raspberry Pi's, which we network together to teach python programming using the Minecraft API to build a number of projects involving castles, spiders and an infinite house generator.

### Agile Summer School (2014)

A two week course with Cornwall College to encourage algorithmic literacy, with focus on employment - agile methods and test driven development (TDD), and aimed at people about to enter, or re-enter employment. We taught the culture the participants would encounter in modern software development, and this was driven by Cornish embedded technology company [Bluefruit](#) alongside Foam Kernow. We worked with nine participants from a mix of backgrounds, some recently graduated students and some experienced programmers wanting to catch up with software engineering practice. Based on feedback from the recently graduated students we were able to provide a totally different approach to that currently taught in colleges and universities.



## **Yeastogram workshop (2015)**

A collaboration with the London Biohackspace at Foam Kernow making images from yeast, fusing art and science with the aim of exposing everyone to something new. Attended by a mix of artists, scientists, local farmers and web designers, we made agar from potatoes, coloured with activated charcoal and food colouring. The yeasty petri dishes were then exposed to high-powered UV LEDs overnight to selectively kill the yeast using patterns designed by the participants. A patient 24 hours later, and the beautiful yeastograms were ready.

## **PhD students**

At FoAM Kernow, we are formal external supervisors for two PhD students working in the sciences. Charlie Ellis' project involves understanding the impacts of stocking activities performed by a local charity, the National Lobster Hatchery, on the lobster fishery – so far this has combined laboratory work, sampling on commercial fishing boats, and developing a bespoke smartphone app. Lewis Campbell's project uses citizen science to look at how epidemic diseases change the behaviour of wildlife populations – this is in collaboration with the Zoological Society of London, and the University of Exeter. We offer students a new environment to work in, outside formal education institutions, and encourage them to draw from a greater breadth of inspiration and approaches.

## **Human in Residence**

At FoAM Kernow we offer residencies providing an opportunity for people to develop their more ambitious projects. We give free access to a physical space to work, and support the expansion and realisation of ideas, the formation of networks, and the practicalities of seeking funding. Our current Human in Residence is [Jo McCallum](#) - Jo trained as an architect, has an NVQ in Constructed Textiles (Basketry), and worked in public engagement for the School of Law at Queen Mary University of London. Jo is now doing a PhD merging biomimicry, basketry and material computation, a project that she hopes will be of interest to artists, architects and transdisciplinary thinkers.