Project title Internet of Living Things: Smart monitoring of urban biodiversity for conservation and outreach

Supervisors with affiliations
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CASE partnership – Royal Botanic Gardens Edinburgh

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Project background - the rationale for the proposed project
Most people live in cities and their first-hand experience of biodiversity is therefore of urban nature. This provides both an opportunity and a challenge. The opportunity is that in urban environments, large numbers of people can be reached and can participate in the conservation of biodiversity. The challenge is that urban nature is little known and largely invisible to most people. This PhD project will explore the exciting possibilities to remedy this situation that are provided by internet technology. The idea is to test, through experiments in the City of Edinburgh, how electronic sensors designed to capture the sounds made by bats and other wildlife can be used to monitor urban biodiversity in real time as it changes from hour-to-hour and day-to-day. Sensor data can be gathered through Edinburgh’s Internet of Things network and shared with scientists and the public through Edinburgh Cityscope. This is a demanding project requiring wide collaboration across disciplines, but will be supported by supervisors and others in Edinburgh who are leaders in the fields of biodiversity research and informatics.

Key research questions
In the urban environment:
1. How do environmental variables influence bat activity?
2. Does local bat activity show top-down and/or bottom-up effects through the food chain?
3. How can IoT technology be used to involve the public in making an internet of living things?
Methodology

The key research questions will be tested using experiments deployed in the Botanic gardens and private and public open spaces in the city of Edinburgh. Public engagement will be an integral part of the research programme, involving citizen scientists in the city.

Year 1. Training. Design of pilot experiments, deployment and testing of sensors, connection to IoT, initial contact with interested members of the public.

Year 2. Refinement of hypotheses to be tested. Definitive experiments designed and deployed in the city. Further development of public engagement.

Year 3. Conclusion of experiments and public engagement activities.

Year 4. Data analysis, writing up.

Training

A comprehensive training programme will be provided comprising both specialist scientific training and generic transferable and professional skills. Specific training will be provided in IoT technology, statistics and public engagement.

Requirements

Applicants should have either a first class degree in ecology/biological sciences and demonstrable skills in quantitative methods including coding (for example Python) or a good degree in informatics (computer science) and a strong and demonstrable interest in ecology. An MSc in any relevant field would be an advantage.

Further reading or any references referred to in the proposal

Edinburgh Cityscope http://www.edinburghcityscope.org

“Why Conservation Scientists are listenining to nature” https://theconversation.com/why-conservation-scientists-are-listening-to-nature-73397

A project summary

The project will investigate how sensors that capture the sounds made by bats and other wildlife can be used to monitor biodiversity via the City of Edinburgh’s Internet of Things network.