The CharIoT project

Joel Fischer talks to us about CharIoT - a home energy advice toolkit to show how far a home is providing a comfortable and healthy environment for the people who live in it.

How did the CharIoT project begin?

CharIoT developed from a collaboration between the Centre for Sustainable Energy (CSE) - a national charity delivering energy advice - and the Universities of Nottingham and Southampton. The project was set up with the aim of providing better advice to householders in fuel poverty, focussing on vulnerable people who may suffer serious health impacts from living in cold, damp homes. Fuel poverty is a major societal problem, affecting around 4.5M people in the UK alone.

Energy advisors have little data to work with on property and lifestyle, and this means they struggle to provide personalised advice on how to reduce energy use while keeping warm at home. The Initial stages of the project involved the development of an internet of things (IoT) sensor kit to provide information on the temperature, humidity and energy consumption in the home, and importantly a process to enable analysis of the data and diagnosis of issues such as damp, mouldy and cold conditions, and unaffordable energy bills. This toolkit is of particular interest to energy advisors, housing associations, public health professionals, health visitors and social housing managers.

How has the project developed?

Later stages of the project involved working with householders who contacted the Centre for Sustainable Energy Helpline to gain advice on energy consumption. We invited them to test an early stage energy kit with small wireless sensors placed in key areas around the home, such as the kitchen and living room. Electric and gas consumption was monitored and sent, along with anonymised temperature and humidity data, to a secure server.

The data was visualised in interactive graphs and viewed on tablets, showing a story about householders' living patterns and their energy use. Maximum, minimum and average values of temperature, humidity and carbon dioxide levels, along with electricity and gas prices, were also provided which allowed energy advisors to discuss energy issues with householders.

As an example, the kit demonstrated that one house was being heated during times when it appeared no-one was in, and we were able to discuss this with the home owner and provide rapid solutions to address this issue. Feedback from participants was very positive – they found being able to access visual information was more engaging to them, and they were more likely to respond to the advice and make the necessary beneficial changes.

With funding from Horizon, we have further developed the hardware and software to maximise scalability and promote further deployment of the kit. In addition, new data analytic capabilities are also being considered to advance further research into this area.

Where else has the CharIoT kit been used?

CharIoT is available open source and an article appeared in Energy World – the magazine of the Energy Institute. CharIoT technology has also been used in a number of other projects. Recently, CSE is using the toolkit in a the "Quantum heater trials" project with Bristol City Council to test the performance of new storage heaters before the council invests in installing them at scale. Chariot is also used in the InnovateUK-funded Energy Game Changer project "MyHouse", which aims to create an online game using real world data from the Chariot kit to help users reduce their energy use in a playful way.