Background

With its partners Designability, Energy Efficient Widcombe and the University of the West of England (UWE), ContinuumBridge Ltd has won a Technology Strategy Board grant to study the feasibility of a multi-purpose system of in-home sensors. Part of this study involves deploying systems in homes and collecting and analysing the resulting data. The particular areas of interest are wellbeing in the home ("Assisted Living" for the ageing population) and energy efficiency.

One of the unique features of the system is that the sensors can be used for more than one purpose. For example, you may have a burglar alarm that has several movement detectors and door switches around the house which can only be used by the burglar alarm. In contrast, our sensors can easily be used by services for assisted living and energy efficiency as well as for a burglar alarm. They can also measure the light level and temperature.

What will be monitored?

In order to demonstrate the flexibility of the system we will be looking at some simple activity recognition for assisted living and measuring temperatures, room usage and maybe appliance use for energy efficiency.

Assisted Living

UWE will be performing the assisted living research. For this we will monitor one or both of the following:-

1. When the front door or main entrance is opened and closed, and when there is any movement just inside and outside that door. From this we can begin to infer whether someone has gone out, come in or just answered the door.
2. In the kitchen, recognising activities such as making a cup of coffee, making toast and opening the fridge door or cutlery drawer can provide very good indications that an older person is managing well at home.

Energy Efficiency

We will measure the temperature both outdoors and in a few rooms, and the occupancy of those rooms. If appropriate in your home, we may also look at when certain appliances are used.

How does it work?

All the sensors communicate with a small bridge which is placed somewhere in the home. The bridge makes sense of the information it receives from the sensors and sends this via the internet to the ContinuumBridge server. From here, using a secure login, selected people from UWE, Designability and ContinuumBridge will be able to view and download the data.

The Bridge

What do I need and what will be installed?

All that's required is a mains socket for the bridge to plug into and a broadband connection. The bridge can use either your WiFi network or plug straight into your router (in which case it will have to be nearby).

All the sensors are small, battery powered and use wireless connections. They are fixed using "sticky" pads so there is no drilling or wiring involved. For the technically minded and energy conscious, the bridge will use an average of about 4 Watts, 24 hours a day, and will send between 10 and 20 bytes per second on your internet connection (which will be capable many thousands of times this amount).

The sensors are pictured below. The full set is:-

- An open/closed switch on the front door.
- PIR movement detectors just inside and just outside the front door, in the kitchen and at least one other room of your choice. These also measure the temperature.
- Two open/closed switches in the kitchen. Maybe on the "coffee cupboard" door, fridge door or cutlery drawer. Wherever is appropriate and convenient for you.
- Appliance usage monitor - on the kettle or toaster for example. We may also monitor an electric heater if there is one.

You can of course opt out of any of the above.
We will do all the installing and will be happy to discuss with you where you want the sensors to go.

How secure is the system?

As this monitoring is slightly intrusive we will take the following measures:-

- No names or addresses are stored anywhere in the system - so all the data is anonymous. Only the project managers from Energy Efficient Widcombe and from ContinuumBridge will know who has which bridge.
- All logins to the system are password protected.
- Your bridge will be within your home firewall which is built into your router. This means that it is as secure as any other connected device in your home such as a PC, tablet or phone. We can check your firewall for you.
- Communications between the bridges and our data store are carried over the internet. This means that it is as secure as web browsing but not as secure as online banking (we'll have that level of security during the trial but not at the start.

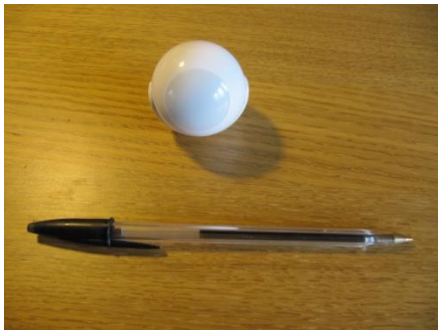
Who will see the data?

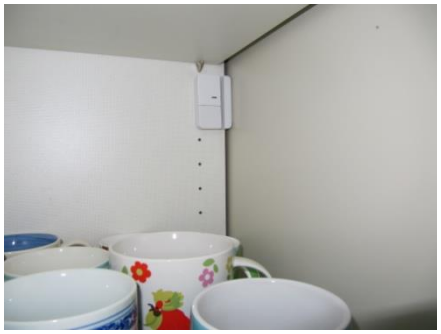
ContinuumBridge, UWE, Designability and Energy Efficient Widcombe will have access to the anonymous data. ContinuumBridge will also produce a "daily digest" email (which is much easier to read than the data). You can opt in and out of receiving this mail at any time.

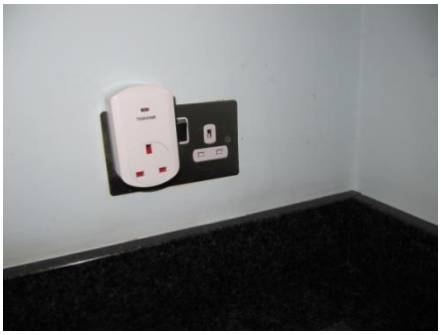
What will the data from my sensors be used for?

Energy Efficient Widcombe (EEW).
The aims of EEW are to reduce energy use and carbon emissions, locate and assist older people who are at risk from cold or in fuel poverty, and to work with others to tackle these issues.
The data will be collected by ContinuumBridge, processed into an easy to read form and passed to EEW. With this information, they will be able to follow-up with more detailed analysis (for example with an infra-red camera) and advise on energy saving measures and appropriate insulation. The momentum and publicity from this trial will help EEW to engage more vulnerable people who are at risk from winter cold.
UWE is at the forefront of research into assisted living for the ageing population. They will use the data to develop more intelligent and reliable algorithms for recognising daily patterns of activity and learning how to track these as they change over time. The aim of this collaboration is to achieve this with a very flexible and cost effective system. Ultimately the result will be assisted living packages that are affordable, very easy to use and that adapt to the changes in the cared-for person.
Designability (formerly the Bath Institute of Medical Engineering) is a national charity. They are engineering and design experts with a passion for creating life-changing assistive technologies. They conduct original research and develop commercial products to meet real needs. Their main interest in this collaboration is to develop their Kitchen Minder product (which is not part of this trial in Widcombe). At the end of this trial, they will assess the use and usability of the system the results of which will be put into the Kitchen Minder design.
ContinuumBridge is the organisation leading the project and the provider and installer of the technology. Their interest is less in the data and more in achieving a successful outcome for all the partners and for the technology.

The Sensors


Motion and Temperature Sensor


Door switch fitted in coffee cupboard


Appliance monitor (on kettle)