

STRETCH Project

Socio-Technical Resilience for
Enhancing Targeted Community Healthcare
EPSRC-funded Project EP/P01013X/1



STRETCH News

March 2018

This is the newsletter for the Socio-Technical Resilience for Targeted Community Healthcare (STRETCH) project. The newsletter is sent bi-monthly to communicate with our research partners and collaborators.

Please also see our website <https://www.stretchproject.org/> which will be updated as the project progresses.

STRETCH Aims

The project will develop a patient-centred digital healthcare support infrastructure that is able to integrate and coordinate data and capabilities from both automated sensing and the human 'circles of support' ranging from medical professionals, care workers, community support and relatives. During the course of the project we will extend our understanding of how circles of support are created, coordinated and sustained.

A host of new smart devices now make it feasible for people to be monitored by doctors while recovering in their homes. Devices range from wearable technology which measures indicators such as heart rate and temperature, to home sensors recording patient activities, to automated carer management systems. The project's key challenge is integrating technology with these circles of support, comprising a wide range of people with very different relationships to the patient, levels of medical expertise and technological competence, who all need to share information with one another.

Recent Activities

Age UK Exeter Circles of Support Study



We spent the last couple of months talking to a variety of family, friends, and health professionals connected to our key pilot participants, about their support roles and how they could be supported by STRETCH. We will continue these conversations with as many people as we can to gain a diversity of perspectives.

We will also commence a testing phase of rolling out home sensor devices to some pilot participants homes, initially just to determine the acceptability and perceived usefulness of the technologies. We also aim to start testing communication focused apps that help circles of support to communicate and coordinate tasks with each other.

STRETCH Infrastructure and Activity Recognition

After evaluating various off the shelf and specially developed sensors, this month we created a short list of technologies that will form the basis of our pilot studies.

With the help of colleagues at Sensor Platform for Healthcare in a Residential Environment (SPHERE) project in Bristol, we were able to deploy their sensor technology in Blaine's home. This provides us with both environmental (temperature, humidity, luminosity) and presence sensing. We compared this technology to various off the shelf z-wave sensors, which we

ultimately found to be unreliable.

We hope to use these sensors to detect activities performed by our participants. For example, kitchen presence with an increase in temperature and humidity could be a sign that the participant is cooking a meal.

To aid in activity recognition we have experimented with off the shelf energy monitoring kits to investigate how different activities can be detected by analysing energy usage. For example, being able to detect that a participant has boiled a kettle can indicate that a tea is being made, an indirect measurement of hydration.

All of these sensors communicate with our central servers via "home hub", a raspberry pi computer that receives and processes the sensor data.

We have also been working on analyzing the SPHERE project's wrist worn sensor for recognising basic activities such as: walking, walking up and down the stairs, sitting, standing, and laying down. The developed algorithms recognized these activities with high accuracy. We will combine this data with some other sensors (such as motion sensors) to further enhance the activity recognition accuracy.

Then we will move towards recognising more complex activities, especially kitchen activities such as preparing drinks and meals. The recognition at the first stage will rely on the data streamed from the environmental and power sensors, but new sensors may be deployed if needed to enhance the activity recognition accuracy.

Participant User Interfaces

The Human-Computer Interaction team members have been focussing on developing a minimal viable interface that will allow an early pilot deployment for sharing and privacy control. The proposed solution is to have a tablet-based control mechanism for controlling the privacy of participants by allowing them choose which circles of support aggregated data is released to (Food, Medicine, Hygiene and Socialisation are currently being used as initial aggregates). For initial deployment we are envisioning email or SMS to be used to share information from the STRETCH system with the circles of support.

While this provides a solution which is deployable, we want to focus on the interfaces for the circles of support, particularly on how to prevent repeated exposure of messages dulling recipients' attention, not overloading them with information but still providing the information they need to act upon in a way that is a) understanding, b) going to grab attention and c) is engaging over long-term deployments. We are currently exploring a number of tangible technologies that can be embedded within household objects.

Additional attention is being spent on exploring how to collect participant data on their wellbeing. We have been exploring the use of bluetooth buttons and plan on looking at using Alexa to record and process voice input.

We have been advertising for a PhD student to work on the HCI aspects of the STRETCH project funded from School funds. We currently have at least one promising candidate.

Team News

Dr. Daniel Gooch joins the team!



Dr. Daniel Gooch is a Lecturer in Computing at the Open University, UK. He received his PhD in Computer Science from the University of Bath in 2014. His research interests are focussed around Human Computer Interaction (HCI), particularly in the design of communication systems. He was part of the iLearnRW project that explored the use of tablet educational software for primary school students with dyslexia. He also led the Citizen Innovation work stream of the MK:Smart project, exploring design methodologies for urban scale design. Dr Gooch will contribute to STRETCH by exploring the various human-facing interfaces involved. This will include the design of interfaces for the collection of health-related data from participants and the interfaces for the circles of support.

Planned Future Activities

- We will commence the first stages of implementing sensors in some pilot participants houses and showing them the sharing interfaces - asking them what information they would and wouldn't share with their family, support network, and healthcare professionals.
- The community survey we advertised in the last newsletter has now closed and the data will be analysed over the coming months. We are hoping this survey will help us understand the routes by which people come to be supporters of older people, and what motivations differ between people who provide different types of support.
- The overall architecture design of the STRETCH system will be iteratively improved
- Conduct discussions and requirements elicitation with GPs. We are contacting potential contributors from the GP communities in Milton Keynes and Exeter. Please contact us if you think you could help, or know a GP who can.
- Continue analysing the sensors test data, and develop the required algorithms to recognise more complex activities such as cooking.

Related News

In the news recently:

- [A report by Digital Health that Smart homes for ageing population could save NHS billions](#)
- [Just one hour a week of social interaction helps dementia patients](#)
- [A town that's found a potent cure for illness - community](#)



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