Internet of Homes (IoH)

Ambient Displays and Wearable Devices for Eco-feedback in Smart Homes

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OBJECTIVES

The increase of home energy consumption levels is a major concern associated with designing smart cities. The use of innovative technology is meant to make our life easier but if not properly designed and utilised, can double our electricity bills. Lack of awareness and the inability to sense the energy being used in homes by tenants, is considered as the main contributor to this matter. Taking a hands-on experience approach, this workshop aims at increasing collaboration and engaging architects, designers, researchers and professionals with the Internet of Things (IoT) at a level where they can design and create prototypes. These prototypes can help them to understand, monitor and better utilise innovative technologies.

SCOPE

In order to improve design solutions in future cities, deploying participatory design approach is a way to raise awareness and engage the public. This one day workshop aims at running “A Maker Workshop” where the participants will gain hands-on experience designing, creating and installing a simple ambient display or a wearable device to give eco-feedback on their smart home appliances and clean technologies. The workshop works as a Hackathon, to explore new and innovative ideas for implementation.

SCHEDULE

The workshop starts with a set of short presentations and introductions followed by dividing the participants into groups. Two proposed applications where the participants get to choose which case study they want to work on: Solar Battery System or EV shared residential charging bay. Groups are divided into the following categories: Group A: Light Ambient Display. Group B: Wearable Device. Group C: Sound Device. The following part of the workshop includes thinking about the possible use of the Arduino kit to create a first working prototype. The closing segment of the workshop includes presentations and discussions about the wider context of using wearable devices with some closing remarks and network creation.

CONTRIBUTION TO THE CONFERENCE

The proposed IoH workshop is in line with the eCAADe theme this year. We are deploying IoT, ambient displays, and wearable devices in the context of smart homes and green mobility.

EXPECTED OUTCOMES/SKILLS ACQUIRED BY PARTICIPANTS

(1) Be exposed to Human Computer Interaction (HCI) knowledge in smart cities domain; (2) Understand simple Arduino principles (through presentations and making), see figures; (3) Explore various applications of wearables and ambient displays.
**PREREQUISITE SKILLS OF PARTICIPANTS**

No particular skills are required; however, this workshop is for those who are interested in physical prototyping. The workshop evolves around IoT and it needs participants to utilize their creativity, work towards solving a given problem, and come up with possible applications. It will involve programming (aided by the organisers) and some electronic connections to make the prototype. Participants will be asked to submit a position paper (500 - 800 words), where they will: Briefly describe their background and why they are interested to participate in this workshop. Mention any particular challenges they might have faced, if they already have experience in designing, developing or using any relevant approaches to engage in smart homes and cities. They will also be asked to indicate if they are interested in giving a short presentation. Papers will be reviewed and the organizing committee will select up to 12 participants according to relevance, diversity of opinions, and the probability of creating dynamic discussion. In addition, we are actively exploring a book or journal special issue based on the outcomes of this workshop.

**LOGISTICS AND TECHNICAL REQUIREMENTS**

The workshop mainly includes group-based activities, so we will need a space with three tables, with enough space for each group to work on their ideas and prototypes.

We will provide the necessary technical background and guidance before the activity starts, along with 2 presentations (in addition to a 3rd presentation post the activity), a short demo (using a small table in front of the presenter). Members of the organizing committee will be available during the activity to provide technical support and help to answer any questions that may arise during prototyping.

We are also going to need stationary to assist participants during their team presentations at the end of the activity. This stationary will include marker pens and large, poster size paper. We recommend having a printing facility to print posters A1 size so the groups can present their projects. In addition, we will need four flip chart boards (one for the organizers, and one for each group) for group discussions.

**BIOGRAPHIES**

**Eiman Elbanhawy**

Eiman Elbanhawy, is currently working as a Research Associate in Smart Cities’ Technologies and Social Practice at the Open University. Within the remit of the research project (MK: Smart), Elbanhawy focuses on the social practice of the use of innovative technologies and renewable energies in smart homes and green mobility. In Northumbria University, Elbanhawy organized and conducted various symposiums and internal workshops for Ph.D. researchers. The participants were giving presentations and their work was assessed by the organiser, invited speakers, and subject specialist. She participated in organizing one international conference as a part of her role in E-mobility research project in Northumbria University. Elbanhawy continued her success in organizing hands-on experience workshops covering Human Computer Interaction (HCI), visualisation, and IOT in smart cities context.

**Daniel Gooch**

Daniel Gooch is a Lecturer at the Open University. For the last 2 years, Gooch was principally HCI researcher in MK: Smart project. His research interests are motivated by wanting to understand how we can best design technology to fit within, and where necessary change, peoples practices and behaviour. The work Gooch does is interdisciplinary cutting across computer science, psychology, information science, design and education. As a continuous role, Gooch has been leading the Citizen Innovation strand of the MK Smart project, investigating how to facilitate citizen-led innovation within Smart City projects. Gooch has been involved in organizing community workshops and events with other stakeholders.
The needed surface for each group to work on their prototypes.

The wired prototypes have to be connected to the participants laptops.

**Theodoros Georgiou**

Theodoros Georgiou holds a BSc (Hons) and an MSc in Computer Science, an MSc in Human Centred Interactive Technologies and is currently working towards a PhD in Human Computer Interaction. Theodoros current research focuses on the design, development, testing and evaluation of wearable devices capable of monitoring gait and provide a tactile rhythmic cue to the person wearing it. The ultimate goal of this research is to assist with the gait rehabilitation and training of people who suffer from neurological conditions affecting their gait. He was on the organizing committee of a PhD student symposium at the University of York, and helped to organize the annual departmental conference at the Open University, where he currently works, for the
past three years. Theodoros also helped organise numerous hackathon events, including one on prototyping using human-centered design techniques.

**Aikaterini Chatzivasileiadi**

Aikaterini Chatzivasileiadi is currently working as a Research Associate at the Welsh School of Architecture on a Leverhulme Trust funded project. The project aims at using a technique called non-manifold topology to significantly influence architectural computing and architectural practice and to ultimately improve the experience of people who use buildings. Her previous research was on the integration of renewable energy and battery technologies in buildings. She fully organized a symposium regarding energy use in buildings, as well as a workshop on user-centred design at the Welsh School of Architecture. She also was in the organizing committee of two inter-disciplinary conferences in Cardiff; one on energy and human interactions in the built environment and another one within the broad context of science.