
IoT: Designing for Human Values

Organisers

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Abstract

This one-day, embedded workshop will explore the design intersections of human values and internet of things (IoT) applications. In a day-long session we will configure and build small IoT devices (using the Particle platform), then deploy them to collect, share and publish the data they harvest throughout the conference. During the conference program we will reconvene to debate how a world of connected devices intersects with human values (such as privacy and transparency) and to articulate the specific challenges for designing a value-conscious IoT.

Author Keywords

Internet of Things; Design; Prototyping; Human Values.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI).

Theme, goals, background and motivation

The appearance of the internet of things, where objects, environments, and even our clothes collect and share data through the internet has been both celebrated and reviled. Its potentials are debated in terms of human values. For proponents, IoT has the potential to improve health and wellbeing and the convenience of our lives by saving time, effort and the

Peter Worthy is a PhD Student at the University of Queensland. His research is focused on human concerns that arise when living with Internet of Things technology. He is currently also working with on a project that seeks to develop an application to support school children learning to code through the development of IoT technology.

Marie Boden is an Interaction Design researcher and outreach coordinator at the University of Queensland. Marie's research interests are with design of technology to support teaching and learning of complex concepts in the classroom. She is particularly interested in designs that incorporate collaboration between the students when learning. Marie is currently involved in the OPAL project, designing a social robot to support children's learning in the classroom.

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amount of conscious control we need to maintain over our lives. On the flip side, critics most frequently point to the real risks inherent in the constant collection of data about us and our lives. Data that can cumulatively piece together a very detailed picture of our private actions in ways—and for purposes—that are difficult to anticipate, sometimes called the “mosaic effect”. Privacy, transparency, consent, and awareness are human values that are clearly alive in such considerations; [see e.g. 1-13].

In this DIS one-day workshop we will take these issues as present design challenges for the Internet of Things. How can we challenge, preserve or promote human values in the design of connected and data-rich objects?

To address these as design issues, the workshop will provide materials and resources for multidisciplinary teams of 4-6 participants to design and prototype simple IoT technologies that use standard sensors (e.g. temperature, sound, light, motion). These devices will be deployed at the venue and/or with delegates during the conference. It is intended that the data from these devices will be collected and published on a website and via an open API accessible to conference attendees during the conference. Workshop attendees will also have the option of creating an “interesting” way of visualizing the collected data either in the website or through a physical representation. Workshop attendees will reconvene during the regular conference program in an “embedded” session to review the data and discuss the design themes that emerge from living with IoT-enabled devices.

Schedule and activities

The workshop plan reserves the bulk of the time for practical hands-on activities in teams, where participants will have the opportunity to work together to design and build a device (or family of devices) that can be deployed (see Table 1). Two hours of social time for informal interactions between participants has been built into the schedule as well.

TIME	ACTIVITY
9:00	Introduction and aims
9:15	Team formation
9:30	IoT device preliminary design (in teams)
10:00	Particle Photon introduction
10:30	<i>COFFEE</i>
11:00	Particle Photon prototyping (in teams)
12:30	<i>LUNCH</i>
1:30	Further design & prototyping (in teams)
2:15	Deployment planning (in teams)
3:00	<i>AFTERNOON TEA</i>
3:30	Pilot deployment & testing
4:15	Preliminary discussion (in plenum)
4:45	<i>END</i>

Table 1. Workshop timeline.

Required facilities and equipment

The workshop organisers will require:

- A flat-floor collaborative workspace (min. 30 places)
- network and (non-enterprise) wi-fi access, and possibly a single wi-fi access point for the workshop.
- Power boards, data projector

Queensland. His research is focused on supporting collaboration around physical artefacts using Augmented Reality. He is currently also working on a project to develop a social robot to support children's learning in the classroom.

Geraldine Fitzpatrick is a Professor of Technology Design and Assessment, Head of Institute and Head of HCI Group, at the Vienna University of Technology. She is particularly interested in the potential of mobile, wireless and sensor-based technologies to support social and community engagement, motivation and behaviour change, health and wellbeing. She is coinvestigator on the AAL-funded Give&Take project and co-author on publications about sharing services. She has been subcommittee co-chair at CHI 2009, and papers co-chair at CHI 2010 and CHI 2011 and coorganiser of numerous CHI workshops.

However, we will provide our own:

- Particle photon kits
- Sensors
- Online site for publishing the data during the conference

Participants will be required to bring their own laptop computers and, optionally, a mobile device. Tablets and other mobile devices by themselves will not be suitable. Prior to the workshop, participants will be advised of the software they will need to pre-install install via email and links on the workshop website.



Figure 1: Conducting an Internet of Things workshop for High School teachers during CS4HS 2016. Teachers undertook a 3 hour workshop introducing them to the Particle Photon, how to code for the Photon, how connect sensors to the Photon, and how to Post data to a web based database.

Outcomes and dissemination plans

Concrete outcomes from the workshop will include a number of simple IoT prototypes, the data they have generated in deployment and the design themes that have been identified in discussion. The organisers will draft a journal special issue proposal for publication in 2017 that responds to the themes generated in discussion. Current publication targets being evaluated for the special issue include CoDesign, Design Studies, and Personal & Ubiquitous Computing.

Tom Rodden is a Professor of Computing at the University of Nottingham and co-director of the Mixed Reality Laboratory, an interdisciplinary research facility that is home to a team of over fifty researchers. His research focuses on the challenges that emerge as computers move beyond the desktop with its traditional arrangement of screen and keyboard to impact all aspects of our lives through a diverse set of mobile and computational devices either embedded into the world we inhabit or carried with us. He has published widely in the areas of Computer Supported Cooperative Work, HCI and Ubiquitous Computing. He is currently a member of the Technical Advisory Board for Microsoft Research in Cambridge and a member of the scientific advisory board for Mobile Life in Sweden.

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