2nd Workshop on Human Centred Design for Intelligent Environments (HCD4IE)

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The human centred design (HCD) processes for interactive systems provides requirements and recommendations for design principles and activities throughout the life cycle of interactive systems (ISO 2010). Driven by the advent of Internet of Things (IoT), the intelligent environments (IEs) such as smart devices, cities, homes, classrooms, offices, etc. are supported by interactions across sensing, ubiquitous and pervasive technologies (Gubbi et al. 2013; Miorandi et al. 2012; Darianian and Michael 2008). This brings further challenges to the concept of human centred design and hence user experience. Due to the lack of full involvement of the users during the design of IEs, there is a deficiency in acceptability of IEs, especially for certain classes of people, think about smart homes for elderly.

This workshop will address the recent advances in the both areas of HCD and IEs and particularly will discuss ways of applying HCD to develop user-centred and transparent IEs. Thus, the workshop will serve as a forum for bringing together researchers from both communities of HCD and IEs to overview the opportunities for bridging the two areas and to draw a roadmap for future avenues to enhance the serviceability and usability of IEs.

Human Centred Design, Intelligent Environments, Sensing, Ubiquitous Technologies, Internet of Things.

1. MOTIVATION

Intelligent environments (IEs) are smart spaces that are equipped with seamless computing technologies to empower the occupants/users of those spaces for completing the activities of daily living in an efficient way, while insuring security, safety and optimal usage of resources. Naturally, IEs cover a number of settings going from offices, hospitals, schools, factories to cities. While, IEs technology may be used for comfort, its relevance for a number of applications, such as medical and healthcare monitoring, energy management and education is prevailing. The impact of IEs for the quality of life for different categories of people is huge. Consider the case of healthcare for elderly and people with special needs. The technology of IEs has several types of impact, including the wellbeing of people, reducing costs (e.g., discharge of hospitals, energy saving), enhancing the social integration, etc.

IEs are not usually adopted, in particular for certain applications and by certain class of people mainly because of usability issues, acceptability issues as well as reliability, transparency and privacy issues. Numerous studies link this lack of acceptability to the users' mistrust in IEs. It becomes clear that HCD is the most appealing methodology to address these concerns.

HCD offers the tools for eliciting the requirements of the IEs users and for evaluating the IEs systems, once developed. However HCD is also challenged

because of the nature of people involved. For instance in the case of smart homes and telecare for elderly, especially for those with Dementia for instance, it is not easy to collect the requirements from them, although they are the primary users. Therefore, HCD methods and tools should be adapted for an effective exploitation in the domain of IEs and consequently for enhancing the acceptability of IEs.

The HCD process should also consider the current developments in multimodal interactions i.e. modes involved in five human senses to develop intuitive input modalities. These can include hand gesture, gaze, speech or a number of fused inputs. The challenges in multimodal interactions become more important and should be considered when developing intelligent environments. The user-centredness in the context of systems development as a multidimensional concept composed of four aspects: user focus, work-centredness, user involvement and system personalisation (Livari and Livari 2011) needs to provide input into the development of multimodal interactions for intelligent environments. The user-centred systems development methods such as goal directed interaction design, contextual design, scenario-based design and human centred systems development life cycle, as applied in the context of IEs, will help to bridge the gap between HCI and Intelligent Systems communities.

2. TOPICS

The present workshop aims at exploring the application of HCD techniques for IEs towards enhancing the quality of the system solutions and foremost contributing to the adoption of IEs by the targeted people. Thus the workshop will cover a set of rich topics at the intersection of HCD and IEs.

Relevant topics can include, but not limited to:

- Technologies
    - Wearable technologies
    - Sensing technologies
    - Assistive technologies
    - Internet of Things
    - Ubiquitous and Pervasive Computing
    - Networking and Communication
    - Visual and interactive analytics
- Interactions across ubiquitous and pervasive technologies
    - Mobile devices
    - Virtual reality
    - Augmented reality
- Human Centred Design approaches
    - Context of use and user requirements
    - Design solutions and evaluations
    - Participatory design
    - Inclusive design
    - Design for all
    - Universal design
    - Multimodal interactions
    - Acceptability studies
    - Reliability studies
    - Privacy and security studies
- Applications areas
    - Smart systems (homes, cities, rooms, materials, etc.)
    - Ambient Assisted Living
    - Telecare
    - Telehealth
    - Mobility
    - Social robotics
    - Industrial case studies

3. WORKSHOP FORMAT

This will be a full day workshop with Call for Papers. The full day schedule is as follows:

9:30 – 10:30	Invited Speaker 1
10:30 – 10:45	Break
10:45 – 11:45	Invite Speaker 2
11:45 – 12:30	Paper Presentations (Part 1)
12:30 – 13:30	Lunch
13:30 – 15:10	Paper Presentations (Part 2)
15:10 – 15:30	Break
15:30 – 16:30	Panel Discussion

Potential invited speakers

- Dr Hatice Gunes, Senior Lecturer, Computer Laboratory, University of Cambridge, UK (TBC).
- Prof Alan Dix, School of Computer Science, University of Birmingham, UK (TBC).
- Mr Barry Kirby, Managing Director - K Sharp Ltd, UK (TBC).

4. AUDIENCE

The workshop is intended for academia and industry. Researchers, practitioners and professionals in both areas of IEs and HCI are targeted.

5. PUBLICATION STRATEGY

Accepted workshop papers will be included in conference proceedings and published in the BCS e-WIC repository and in the ACM Digital Library. In addition, a special issue in an international journal (either at the Journal of Ambient Intelligence and Humanized Computing, Journal of Ambient Intelligence and Smart Environments, TBC) is also planned.

6. CHAIRS

Dr Huseyin Dogan is a Senior Lecturer in Systems Engineering and Human Factors at Bournemouth University. His research interests include Human Computer Interaction, Usability Engineering, Ubiquitous Computing, Assistive Technologies, Soft Systems, Systems Design and Systems of Systems. He has been a reviewer for BCS HCI, IEHF, IEEE SMC, IEEE SoSE, IEEE Systems Journal and INCOSE. He was also the general co-chair for the 30th International British Computer Society Human Computer Interaction Conference (BCS HCI 2016).

Dr Nan Jiang is a Senior Lecturer in Software Quality and Testing at Bournemouth University and specialised in usability evaluation. His research interests include multimodality in mobile interfaces and interaction design in gamification, crowdsourcing and augmented reality. He has been an active reviewer for top research conferences including BCS HCI, ACM CHI, MobileHCI and DIS as well as leading industrial conferences like UXPA since 2008. He is also often invited to review journal paper submissions in related domains (e.g., Software Quality Journal, International Journal of Human-Computer Studies). He was part of the organising committee of PRO-VE 2012. He was the general co-chair for the 30th International British Computer Society Human Computer Interaction Conference (BCS HCI 2016), which is held in Bournemouth.

Prof Hamid Bouchachia is currently a Professor in Data Science and Intelligent Systems at Bournemouth University, Department of Computing and Informatics, leading the group Machine Intelligence. His major research interests include Machine Learning and Soft Computing with a particular focus on online/incremental learning, semi-supervised and active learning, prediction systems, and uncertainty modelling. He has (co-) authored more than 110 publications in international journals and conferences and served as guest editor for a dozen of special issues of international journals and books. He has organised more than 20 conferences, workshops, special sessions and he the founder of the biennial International Conference on Adaptive and Intelligent Systems (ICAIS). He has been serving as a program committee member for many conferences in his area of expertise. He currently serves as Associate Editor of Evolving Systems and acts as a member of Evolving Intelligent Systems (EIS) Technical Committee of the IEEE Systems, Man and Cybernetics Society, the IEEE Task-Force for Adaptive and Evolving Fuzzy Systems and the IEEE Computational Intelligence Society.

Mr Stephen Giff has over 15 years of experience in the UX discipline, which includes leadership roles in Microsoft Band, Dynamics, Developer Division, Microsoft Advertising, and in his current role as User Experience (UX) Researcher at Google. He has focused on the building experiences for wearables and fitness devices. He is passionate about user research – its role, evolution, and its future. He lives in Seattle, WA but hails from the United Kingdom, where he earned both a bachelor's degree in psychology and a master's degree in Human Computer Interaction from the University of London.

Dr Raymond Bond has research interests within the broad area of biomedical and health informatics, which is the application of digital technology in healthcare. This has involved the modelling, processing and visualisation of medical data to enhance clinical decision-making (mainly involving cardiology data such as the ECG). He also has research interests in simulation-based training for medicine, usability engineering methods to improve medical devices (which include eye tracking and other psychophysiology metrics) and also Internet-based models for healthcare monitoring and interventions. Raymond also

coordinates a UX-Lab which is an outlet for transferring usability engineering knowledge to the medical device industry and other industries. Raymond has been a grant holder on research projects funded by FP7 and H2020 programmes, InvestNI, Innovate UK, InterTrade Ireland and the Royal Irish Academy.

HCD4IE, Workshop Website at British HCI 2016

http://dec.bournemouth.ac.uk/hci/workshop/

REFERENCES

ISO 9241-210 (2010) Ergonomics of human-system interaction - Part 210: Human-centred design for interactive systems. Geneva, Switzerland: International Organization for Standardization.

J. Gubbi, R. Buyya, S. Marusic, M. Palaniswami (2013) Internet of Things (IoT): A vision, architectural elements, and future directions, Future Generation Computer Systems, Volume 29, Issue 7, September 2013, pp. 1645-1660.

M. Darianian and M. P. Michael (2008) Smart Home Mobile RFID-Based Internet-of-Things Systems and Services, 2008 International Conference on Advanced Computer Theory and Engineering, Phuket, 2008, pp. 116-120.

A. Dohr, R. Modre-Opsrian, M. Drobics, D. Hayn and G. Schreier (2010) The Internet of Things for Ambient Assisted Living, Information Technology: New Generations (ITNG), 2010 Seventh International Conference on Las Vegas, NV, 2010, pp. 804-809.

D. Miorandi, S. Sicari, F. De Pellegrini, I. Chlamtac (2012) Internet of things: Vision, applications and research challenges, Ad Hoc Networks, Volume 10, Issue 7, September 2012, pp. 1497-1516.

J. Iivari, N. Iivari (2011) Varieties of user-centredness: An analysis of four systems development methods. Information Systems Journal, 21(2), 125-153.