UbiMI’12 Workshop appendix

UbiMI’12: Ubiquitous Mobile Instrumentation

Summary
Thanks to the rapid development of mobile technologies, smartphones allow people to be reachable anywhere and anytime. In addition to the benefits for end users, researchers and developers can also benefit from the powerful devices that participants potentially carry on a daily basis. This workshop brings together researchers with an interest on using mobile devices as instruments to collect data and conduct mobile user studies, with a focus on understanding human-behavior, routines and gathering context.

Format
The workshop will be conducted as a mini-track. Each participant will present his workshop papers (up to 10 minutes), followed by a short (5 minutes) discussion. Furthermore, the workshop will be wrapped up with a state-of-art and future work Q&A.

Topics of Interest
Relevant topic areas for workshop papers include, but are not limited to:
- **Devices & techniques**: descriptions of the design, architecture, usage and evaluation of mobile devices and techniques that create valuable new capabilities for ubiquitous computing;
- **Systems & infrastructures**: descriptions of the design, architecture, deployment and evaluation of mobile systems and infrastructures that support ubiquitous computing;
- **Applications**: descriptions of the design and/or study of mobile applications that leverage Ubicomp devices and systems.
- **Methodologies & tools**: new methods and tools applied to studying or building mobile Ubicomp systems and applications;
- **Theories & models**: critical analysis or organizing theory with clear relevance to the design or study of mobile Ubicomp systems;
- **Experiences**: empirical investigations of the use of new or existing mobile Ubicomp technologies with clear relevance to the design and deployment of future mobile Ubicomp systems;

Workshop Organizers

**Denzil Ferreira (University of Oulu, Finland) <denzil.ferreira@ee.oulu.fi>** is currently a Ph.D. candidate at University of Oulu in Ubiquitous and Mobile Computing. He is a member of Prof. Anind K.Dey’s UbicompLab group at HCII at Carnegie Mellon University. He recently graduated from the M.Sc. in Human-Computer Interaction at Carnegie Mellon University, with a background in Software Engineering (M.Sc.) and Computer Science (B.Sc.) from University of Madeira. His research interests include ubiquitous, pervasive, distributed and mobile computing, in an emphasis in context-awareness and human-behavior.

**Vassilis Kostakos (University of Oulu, Finland) <vassilis@ee.oulu.fi>** is Professor of Computer Engineering in Ubiquitous Computing at the Department of Computer Science and Engineering at the University of Oulu.
He previously held appointments at the University of Madeira and Carnegie Mellon University. He holds a Ph.D. in Computer Science from the University of Bath. He has been a Fellow of the Academy of Finland Distinguished Professor Programme. He conducts research on ubiquitous and pervasive computing, human-computer interaction, social and dynamic networks, usable security and trust.

Jonna Hakkila (University of Oulu, Finland) <jonna.hakkila@soul4design.fi> is an adjunct professor (in the area of Human Computer Interaction, HCI) at the University of Oulu, Finland, and works as a Director, Concepting & Research at User Experience design house Soul4Design. Prior to this, she worked as a research leader at Nokia Research Center, where she led user experience, conception and prototyping research teams in 2007-2011. She obtained her PhD in 2007 at University of Oulu, Finland, and has done extended research visits to University of Stuttgart, Germany (2011), Carnegie Mellon University, USA (2006), and Griffith University, Australia (2003). She is an active member of international HCI research community and has published over 50 peer reviewed scientific papers on HCI with mobile and ubiquitous computing.

Tom Lovett (University of Bath/Vodafone Group R&D, UK) <tom.lovett@vodafone.com> is an Eng.D. candidate in the Department of Computer Science at the University of Bath, UK and Vodafone Group R&D, UK. His research concentrates on context-aware computing, with particular focus on practical application in the mobile environment.

Emiliano Miluzzo (AT&T Research, USA) <miluzzo@research.att.com> is a Senior Member of the Technical Staff at AT&T Research working at the intersection of mobile systems and applied machine learning. His research interests include mobile, pervasive, distributed computing, mobile sensing systems, and big data analysis. He holds a PhD. in Computer Science from Dartmouth College, and an MS and BS in Electrical Engineering from University of Rome La Sapienza, Italy.

Proceedings
All accepted workshop papers will be archived in the ACM Digital Library. Furthermore, a journal article with a state-of-art and future work in the domain of Ubiquitous Mobile Instrumentation will be submitted to Springer’s journal of Personal And Ubiquitous Computing.

Papers accepted for UbiMI 2012
Ubiquitous Inference of Mobility State of Human Custodian in People-Centric Context Sensing
Authors: Mattia Gustarini; Katarzyna Wac
Abstract: People-centric sensing using people’s smartphones offers new research opportunities for large case studies. It presents many challenges, e.g., efficient capture of person’s mobility, understanding of context changes and preservation of user privacy. We propose an accurate and energy-efficient method able to capture user’s mobility, thus the context changes, while preserving his/her privacy. Our solution can be applied to systems that
aim to efficiently sense context on smartphones to study large scale phenomena or perform location management.

**Multimodal Annotation Tool for Challenging Behaviors in People with Autism Spectrum Disorders**

*Authors: Akane Sano; Javier Hernandez; Jean Deprey; Micah Eckhardt; Matthew S. Goodwin; Rosalind W. Picard*

*Abstract:* Individuals diagnosed with Autism Spectrum Disorders (ASD) often have challenging behaviors (CB’s), such as self-injury or emotional outbursts, which can negatively impact the quality of life of themselves and those around them. Recent advances in mobile and ubiquitous technologies provide an opportunity to efficiently and accurately capture important information preceding and associated with these CB’s. The ability to obtain this type of data will help with both intervention and behavioral phenotyping efforts. Through collaboration with behavioral scientists and therapists, we identified relevant design requirements and created an easy-to-use mobile application for collecting, labeling, and sharing in-situ behavior data in individuals diagnosed with ASD. Furthermore, we have released the application to the community as an open-source project so it can be validated and extended by other researchers.

**A Preliminary Study of Sensing Appliance Usage for Human Activity Recognition Using Mobile Magnetometer**

*Authors: Mi Zhang; Alexander A. Sawchuk*

*Abstract:* Human activity recognition and human behavior understanding play a central role in the field of ubiquitous computing. In this paper, we propose a novel method using magnetometer embedded in the mobile phone to recognize activities by detecting household appliance usage. The key idea of our approach is that when the mobile phone user performs a certain activity at home, the embedded magnetometer is capable of capturing the changes of the magnetic field strength around the mobile phone caused by the household appliance in operation. Our mobile application uses these changes as magnetic signatures for each of these appliances such that the daily household activities associated with these appliances such as cooking can be recognized.

**Context-Aware Mobile Crowdsourcing**

*Authors: Andrei Tamilin; Iacopo Carreras; Emmanuel Ssebaggala; Alfonse Opira; Nicola Conci*

*Abstract:* Ubiquity of internet-connected media- and sensor-equipped portable devices has emerged a range of opportunities for direct involvement of citizens into public decision making, leading to a new participatory format of public administration functioning. Intersecting the power of the crowdsourcing problem-solving paradigm by directly relying on human intelligence, with instantaneity and situation-awareness of mobile technologies, one gets a context-aware crowdsourcing approach for problem-solving in the right circumstances with the right people. In this paper, we present a prototype implementation of a context-aware mobile crowdsourcing system that enables the deployment and execution of crowd-sourcing campaigns with users carrying mobile devices. The system is designed to maximize conditions for
user participation, while minimizing the usage of energy. The paper describes the system architecture, defines an optimized sampling algorithm, and outlines a preliminary experimentation study carried out.

**On the Challenges of Building a Web-based Ubiquitous Application Platform**
Authors: Heiko Desruelle; John Lyle; Simon Isenberg; Frank Gielen
Abstract: People use an increasing number of consumer electronic devices to access their mobile apps. To enhance the applications' immersive user experience, these devices often expose APIs for accessing a wide array of sensors and domain-specific capabilities. Existing mobile application environments, however, only provide limited support for cross-device access of such APIs. To address this limitation, the Webinos platform was designed. Webinos is a virtualized Web-based application platform, aiming to support the collaboration of multiple devices within a single mobile application. In this paper we elaborate on the Webinos platform design. We discuss the encountered design challenges regarding portability, scalability, and privacy, and how these were mitigated.

**Using Ontologies to Reduce User Intervention to Deploy Sensing Campaigns with the InCense Toolkit**
Authors: Marcela D. Rodríguez; Roberto Martínez; Moisés Pérez; Luis A. Castro; Jesus Favela
Abstract: This paper presents the InCense research toolkit to facilitate researchers with little or no technical background to implement a sensing application for mobile phones. To reach this end, InCense provides a GUI and an interactive ontology to enable users to define the configuration of the sensing application, i.e. what sensing components to add, and the flow of the sensing session. We illustrate the ease of use of the InCense platform through a scenario in which both opportunistic and participatory sensing paradigms are used.

**Engaging participants for collaborative sensing of human mobility**
Authors: Helena Rodrigues; Maria João Nicolau; Rui João José; Adriano Moreira
Abstract: Human mobility has been widely studied for a variety of purposes, from urban planning to the study of spread of diseases. These studies depend heavily on large datasets, and recent advances in collaborative sensing and WiFi infrastructures have created new opportunities for generating that data. However, these methods and procedures require the participation of a significant community of users through extended periods of time. In this paper, we address the problem of how to engage people to participate in the data collection process. We have conducted a user study on the utilisation of a mobile collaborative sensing application. We have found that users react positively to campaigns, but it is difficult to keep them participating for long periods of time. We also hypothesize that one must close the loop, rewarding the participants with services based on the collected data, eventually showing that there is added value obtainable from crowd sourcing.
A Comparison of Alternative Client/Server Architectures for Ubiquitous Mobile Sensor-Based Applications

Authors: Gary M. Weiss; Jeffrey W. Lockhart

Abstract: Mobile devices such as smart phones, tablet computers, and music players are ubiquitous. These devices typically contain many sensors, such as vision sensors (cameras), audio sensors (microphones), acceleration sensors (accelerometers) and location sensors (e.g., GPS), and also have some capability to send and receive data wirelessly. Sensor arrays on these mobile devices make innovative applications possible, especially when data mining is applied to the sensor data. But a key design decision is how best to distribute the responsibilities between the client (e.g., smartphone) and any servers. In this paper we investigate alternative architectures, ranging from a “dumb” client, where virtually all processing takes place on the server, to a “smart” client, where no server is needed. We describe the advantages and disadvantages of these alternative architectures and describe under what circumstances each is most appropriate. We use our own WISDM (Wireless Sensor Data Mining) architecture to provide concrete examples of the various alternatives.

Attendees
We expect between 15-25 attendees. Their research interests and areas of expertise are in, but not restricted to, ubiquitous technologies, mobile computation, mobile interaction, mobile prototyping and mobile user studies.

Workshop marketing
A website for the call-for-papers and workshop details will be available here: http://ubimi.blogspot.com. The workshop will be advertised in various mailing lists (CHI, MobileHCI, Ubicomp, HCI), as well as social network groups (Facebook, Twitter, LinkedIn, Google+ and Groups).

Timeline
Call for papers: April 13th, 2012
Deadline for submissions: June 1st, 2012
Response to authors: June 10th, 2012
Camera-ready workshop papers deadline: July 1st, 2012

Workshop timetable
9:45 - 10:00am - Tamilin, A. et al.: Context-Aware Mobile Crowdsourcing.
10 - 11am - COFFEE BREAK
11:15 - 11:30am - Rodríguez, M. et al.: Using Ontologies to Reduce User Intervention to Deploy Sensing Campaigns with the InCense Toolkit.
12 - 1:30pm - LUNCH
1:30 - 2pm - Organizers' presentation and discussion panel kick-off
2 - 2:55pm - Discussion panel
2:55 - 3pm - Workshop wrap-up
3 - 3:30pm - WRAP-UP COFFEE