
UbiMI'17: Ubiquitous Mobile Instrumentation

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Abstract

Mobile devices (smartphones, smartwatches, *etc.*) allow us to reach people anywhere, anytime. Collectively, these devices form a ubiquitous computer that offers valuable insights on the user. In addition to the benefits for researchers and developers, explored in previous UbiMI workshops, devices can also help individuals understand their own health, activities, and behaviour. The Ubiquitous Mobile Instrumentation (UbiMI) workshop focuses on using mobile devices as instruments to collect sensing data, to understand human-behaviour and routines, and to gather users' context using sensor instrumentation.

Author Keywords

Mobile; Ubiquitous; Computing; Instrumentation; Frameworks; Middleware; Experiments; Context-aware; User studies.

ACM Classification Keywords

H.m. Information systems: Miscellaneous.

Motivation

Mobile devices are inherently personal and contain the potential to sense the user's environment, or in other words the user's context. Mobile and wearable devices can collect an uninterrupted stream of health-related information, user's activities, location, and other highly

personal information. This information can be beneficial to both end-users and researchers. Mobile devices have several built-in sensors (*e.g.*, accelerometer, proximity sensor, gyroscope). These mobile sensors are primarily used by the mobile operating system to enhance the user experience, such as app functionality or mobile device user interaction (*e.g.*, vibration feedback, screen orientation detection), but they are increasingly being leveraged by applications to obtain and offer valuable information about the user's activities. The field of quantified-self, especially, is interested in obtaining and investigating this type of information harvested from end-users' devices.

The convenience and availability of mobile devices and app stores make it easier for a researcher to reach thousands of study participants whether they wish to investigate information, information collection methods, or simply collect data from study participants.

In this workshop, we bring together researchers who take advantage of the proliferation of mobile devices, use them as instruments for research on ubiquitous computing, or study how end-users interact with their devices. We also investigate new and existing methods for collecting instrumented data. We are especially interested in the mobile devices, systems, applications, methods and tools that were built to collect and explore such rich datasets. More so, we want researchers to share their experiences, successes and frustrations on conducting research and analysing information from such power and processing constrained devices in order to capture state-of-the-art on theories, models, methodologies, and tools that cope with these challenges.

Previous contributions to UbiMI

In this section, we summarise the contributions of the most previous workshop, UbiMI'16. The workshop has also been previously organised as UbiMI'12 and UbiMI'13.

Focusing on understanding human mobility, Asadzadeh *et al.* [2] studied differences in usage characteristics and statistics of a pedometer application. They present a cluster based approach to understanding different application usage styles. For indoor measurements, Van Berkel *et al.* [8] investigated group dynamics in a school setting, and the feasibility of using Bluetooth beacons in tandem with tablets.

To advance the methods and tools for ubiquitous mobile computing, De Masi *et al.* [3] presented their Smart Lab designed to enable interdisciplinary research experiments. The goal of the Living Lab is to give researchers from fields outside computer science the possibility to leverage mobile devices in their data collection. Andone *et al.* [1] present their large-scale deployment of Mental, a framework for collecting and analysis of mobile data, including location and mood information. Klakegg *et al.* [5] propose the use of near-infrared spectroscopy (NIRS) in mobile devices. Implementations can be used by health care services to *e.g.* detect compounds and identify counterfeit medicines.

In the scope of improvements in usability of mobile devices using sensors, Sarker *et al.* [7] investigate responses to incoming calls according to the user's context and the caller. Their approach can reduce interruptions to mobile users in situations where they are not available. Manzoor *et al.* [6] present Contact

Lingo, an approach to intelligently switch keyboard layouts and text-prediction languages according to the recipient. The motivation for this work is clear as mobile users increasingly communicate in multiple languages. Escobar *et al.* [4] evaluate information visualisation methods and designs for an application measuring quality of service of internet providers. Clarity in information presentation is key to end-user understanding of collected data.

UbiMI Topics & Outcomes

Instrumenting mobile devices needs to be addressed as a research community effort. In this workshop, we expect to harvest experiences, challenges and recommendations on:

- Devices and techniques: design, architecture, usage and evaluation of mobile devices and techniques that create valuable new capabilities for ubiquitous computing;
- Systems and infrastructures: design, architecture, usage and evaluation of mobile systems and infrastructures that support ubiquitous computing;
- Applications: design and/or study of how mobile applications can leverage other ubiquitous devices, systems and applications;
- Methodologies and tools: new methods and tools that are applied on studies or building novel mobile ubiquitous systems and applications;
- Theories and models: critical analysis or organizing theory with relevance to the design or study of mobile ubiquitous systems;
- Experiences: empirical investigations of the use of new or existing mobile technologies that can potentially motivate future mobile ubiquitous systems.

The end result is a better understanding of the current state-of-the-art in mobile devices instrumentation and how it affects future mobile ubiquitous systems and applications. A future journal article depicting the workshops' findings and rules of thumb will further highlight the importance of mobile devices instrumentation. After all, mobile devices are the widest distributed sensor-enabled devices.

Schedule

Sep. 11th or 12th: Workshop papers presentations & brainstorming workshop on collecting and understanding raw data – what data would such a study setting or an application include if no technical limitations existed, discussion on how these limitations could be overcome, and how would the data be presented in order for it to be understandable by a researcher or an end-user.

Important dates

Submissions: June 9th, 2017

Acceptance: June 30th, 2017

Camera-ready: July 14th, 2017

Participants

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, mobile user studies, and quantified-self.

Publications

All accepted (4/5-page + 1 references maximum length is 6 pages) workshop papers will be archived in the ACM Digital Library.

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