Introduction

Objective: develop a platform for ubiquitous mobile applications development. This poster describes a prototype application - Social Computing Cloud and a study of a potential Mobile Bio-loggers application. The foundation of this work comes from observations of the mobile ecosystem which features:

- over a billion activated devices based on Android platform,
- considerable and growing computing power of smartphones,
- a rich set of sensors,
- noticeable patterns of users behaviour that can empower mobile applications,
- ubiquity in all sorts of human activity environments.

Architecture

In this platform mobile devices are modelled as software components that provide well-defined functionality e.g. script execution in Social Computing Cloud application.

To address the key consideration in the mobile system design: inherent variability and the dynamics of these software components, the platform follows an Event Driven Architecture with the application of Complex Event Processing (Fig.1).

This duo has proved to be effective in:

- adaptive systems with dynamic components,
- scalable processing of a variable stream of monitoring data,
- enabling the platform to aptly respond to changes in the monitored devices.

Platform maintains an event-driven state of the mobile ecosystem atop of which mobile applications can be build.

Google Cloud Messaging system is used to communicate with the devices under platform supervision and to trigger those devices to respond with the events describing their state.

Social Computing Cloud Application

The Social Computing Cloud (SCC) application was developed to illustrate platform features. It is a voluntary computing application that uses mobile devices as computing task executors. It takes advantage of the following features and observations of Android platform:

- install & forget approach - application can work as background services without user supervision
- scheduler handles the background task execution to minimize its impact on user experience
- user tend to connect to Wi-Fi whenever it is possible
- patterns in battery consumption and charging can be observed

Server communicates with SCC Android client on the mobile device. Client application receives computation tasks; executes them and responds with the results to the server (Fig. 3).

Mobile Bio-loggers

Biological tracking systems such as UvA BITS often suffer from limitations of the wireless (ZigBee) communication. Certain specimens frequently escape from a range of base stations and cannot be effectively monitored.

We propose to use the Event-driven Mobile Application Platform to build a human-assisted distributed sensor network that can extend BITS tracking systems capabilities and leverage platforms features: monitoring, management and coordinating of mobile device pools.

When bird watchers come close to an interesting specimen:

- a mobile application on the device with Zigbee transceiver can detect the vicinity of a bird,
- analyse its coordinate and movements,
- notify another human tracker that his area,
- assist in the transmission of the data from bird tracking devices to the central BITS server.

Future Work

Future work:

- analysis of performance and impact on user experience in SCC
- investigation of network handover patterns and the possibility of peer-to-peer device communication
- adapting frequency of the events to the application needs
- implementation of prototype Mobile Bio-loggers application

References