

T-110.5130 Mobile Systems Programming sign-up information, Spring 2015

January 2, 2015

1 Introduction

Signing up for the Mobile Systems Programming course during Spring 2015 involves sending a sign-up “letter” to the course assistant Olli Mäkinen (`firstname.lastname@aalto.fi`) by 12th January 2015 at 23:59.

The letter should contain the following items:

- Your name and student ID number
- Your preferred topics in order (include all of them, *e.g.*: 1. Mobile control of LED lighting systems, 2. Traffic safety, 3. Other (also specify if you have an idea already), 4. Local caching, 5. Mobile P2P communication, 6. HSL, 7. Video orchestration, 8. Drones for data collection, 9. Personal fitness, 10. Signal strength mapping)
- Your preferred development platforms in order (*e.g.*: 1. iOS, 2. Android, 3. Windows Phone 8)¹. This will apply for the “Other” topic only.
- Your programming experience and background (“mini-CV”) in general and with which languages and platforms
- Possible aspiration to become a group leader

2 Topics

There are ten topics available during Spring 2015. Unfortunately some topics have a limited amount of places available, so we cannot guarantee that you will get the first topic preference.

2.1 MEC

MEC, standing for Mobile Edge Computing (https://portal.etsi.org/Portals/0/TBpages/MEC/Docs/Mobile-edge_Computing_-_Introductory_Technical_White_Paper_V1%2018-09-14.pdf), is a concept where a relatively standard server (in this case, RACS - Radio Applications Cloud Server: <http://networks.nokia.com/portfolio/liquid-net/intelligent-broadband-management/liquid-applications>) is installed into a mobile base station, allowing a wide range of services to run very near the end user. This Spring we have four sub-topics in this area, focusing on different areas that MEC enables. These topics require open sourcing the projects.

¹Note that we only provide technical support for Android development. Additionally, developing for iOS requires OS X computers and for Windows Phone 8 requires Windows 8 computers, neither of which we can provide for you.

2.1.1 Video orchestration

RACS video orchestration is a concept where multiple video streams are broadcast inside the LTE network directly from the base station to the end user's mobile phone. For example, this can be utilized in a sports event to broadcast multiple video feeds from multiple camera angles in real-time, without delays caused by the Internet.

The task in this topic is to create an application that can receive these streams and allows the user to view their preferred one. Additionally, features such as interaction between other users can be designed to immerse the audience even further.

2.1.2 Mobile P2P communication

This topic involves creating a Peer-to-Peer application for communication through RACS utilizing WebRTC. The task is to enable communication in different ways, for example through text, voice messages or voice/video calls. WebRTC is a framework of technologies released into open source by Google who bought a suite of patents, allowing developers to create a variety of communication services very easily, incorporating video, audio and messaging.

2.1.3 Traffic safety

Traffic safety is one of the most promising applications for Internet connected vehicles. Currently most pedestrians and drivers do carry a smartphone that has a GPS receiver suitable for collecting probe data: location, speed, direction, from which prospective collisions can be detected. In the future, similar probe data can also be collected directly by the base station / RACS, which can be used to complement GPS. Integrating pedestrians and cyclists into the vehicular networks by means of their smartphones would enable development of innovative applications like vehicle to pedestrian (V2P) collision avoidance.

2.1.4 Local caching

Mobile Edge Computing allows to take the idea of a content delivery network (CDN) a step closer to the end users. The task for this group is to implement a digital newspaper viewing application utilizing RACS as a local CDN, including a content pre-fetcher and a distribution system - allowing a great user experience in commuting, for example.

2.2 Mobile control of LED lighting systems

The task of this group is to develop a mobile application for controlling LED lighting systems. Third-party software developers can now more easily design products that integrate mobile systems with LED lamps using open tools and APIs. New kind of innovative services can be created by combining lighting control with other information like wake up time, calendar, movement sensors or weather forecasts.

Some examples are Philips HUE (<http://www.developers.meethue.com/> and LIFX (<https://github.com/lifx>).

2.3 Drones for data collection

The task in this topic is to implement a solution where a drone flies autonomously based on different sensors, for example recognizing a ball moving on a field. This topic will still be refined before the sign-up deadline. <https://projects.ardrone.org/>

2.4 Personal fitness

The task is to implement personal fitness application that can show a personal fitness level. The application passively monitors heart rate using a Bluetooth sensor device without requiring the user to do any special exercises. All gathered sensor data is uploaded to the cloud for storage along with other available data. Another part of the application can be used to browse trend of personal fitness level during previous weeks/months.

2.5 HSL

Region Transport HSL has continuously opened up new data sources and interfaces since 2009. HSL governs the popular journey planner reittiopas.fi but is even prouder of their thriving developer community. In early 2013, HSL kickstarted the public transport Navigator. The data, interfaces, standards, source code and collaboration are 100% open. This snowball has already rolled into several cities in Finland and abroad. The HSL topic involves implementing a novel application based on the interfaces, which you are free to choose.

Find out more from HSLdevcom, <http://dev.hsl.fi/>.

2.6 Signal strength mapping

This topic involves creating an application where mobile signal strengths are recorded along with the GPS positional data into a database running in a cloud server. This application would then be able to show the strength in a visually interesting way on a map, to for example make choosing the user's mobile network operator easier.

<http://developer.android.com/reference/android/telephony/SignalStrength.html>

2.7 Other applications and platforms

Do you have an idea that you would like to implement which doesn't fit to the other topics? Or if neither of the other topics sound interesting, you can choose this topic.

Additionally, if you wish to develop for other platforms (Windows Phone 8/Apple iOS), choose this topic. If there are enough other participants, a group can be created for you.

Please indicate if you have an idea already in this topic selection, and also if you already have other course participants that you would like to do the project with.