Sistemas de Computação Móvel e Ubíqua

2018/2019

Main Info

Lecturers

- Carmen Morgado (cpm@fct.unl.pt)

Web page

- CLIP (http://clip.unl.pt)

Program

Mobile Computing: Mobile devices and the Internet
- Overview
- A Wireless World
- Data Management

Ubiquitous Computing: Mobile devices and the environment
- Location Systems
- Sensors and Networks
- Context-awareness computing
- Internet of Things
- Fog Computing

Networks of Mobile Devices
- Ad Hoc Networking
- Routing
- Mobile Edge Computing

Bibliography

There is no text book.

The bibliography will be composed of:
- Chapters from different text books, such as
  - G. Coulouris, J. Dollimore and T. Kindberg, *Distributed Systems - Concepts and Design*, Addison-Wesley, 5th Edition
  - F. Adelstein, S. Gupta, G. Richard III, L. Schwiebert, *Fundamentals of Mobile and Pervasive Computing*, McGraw Hill Professional
- Articles published in top ranked journals and conferences in the Mobile and Ubiquitous Computing areas:
  - These articles are available from UNL's network

Evaluation

Two components

- CTE: two tests or final exam
  - Closed-book
  - CTE = (Test1 + Test2) / 2 or CTE = Final exam
- CL: laboratorial project in groups of 3
  - Frequency: CL > =8
- Final Mark = CTE * 66% + CL * 34%

Tests

Two closed-book tests

Schedule

- 1st test → 15th April (Monday 16:00)
- 2nd test → 3th June (Monday 16:00)

Laboratorial Project

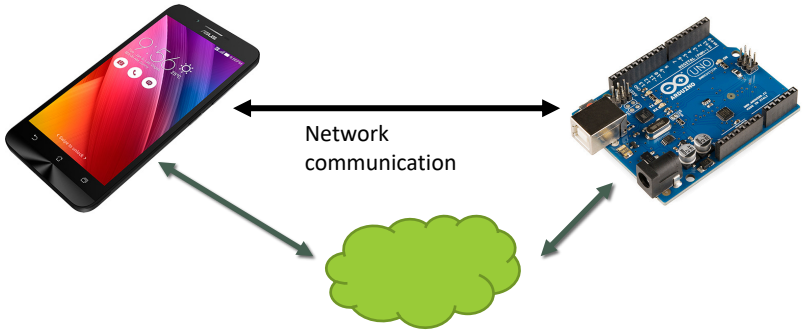
The project comprises two main components:

- A mobile application
  - Java - Android
  - Address challenges related to mobile computing
- An ubiquitous application
  - C - Arduino
  - Address challenges related to ubiquitous computing

Laboratorial Project

Mobile application: user interaction

Ubiquitous application: sense and act



Laboratorial Project

The purpose of the application is of the group's choice
- But it has to follow a list of given requirements

Paradigmatic example: Smart Home/Office
- Mobile application for home/office management that:
  - displays information about the house/office (and others), and allows for the configuration of several of each's appliances
  - keeps track of the smartphone's location and conveys this information to the buildings, so that the latter may prepare themselves for the reception
- Ubiquitous application that
  - senses the house's/office's enviroment,
    - integrates this data with context information, such weather forecast, time of the day, time of arrival
  - and programs/acts on several of the home's/office's devices.

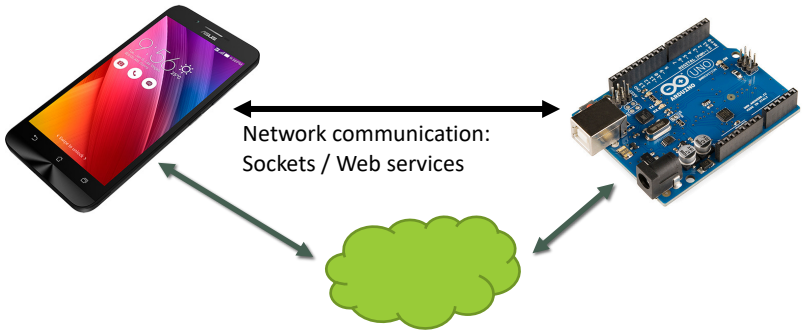
Laboratorial Project

Tools and environments:
- Mobile application
  - Android Studio or other IDE of your choice
  - You may use your own smartphones to test your application
- Ubiquitous application
  - Arduino platform:
    - Some sensors available: potentiometer, pushbuttons, temperature, tilt, light, piezo (detects vibration), accelerometer, ultrasound, infrared sensor, hall effect, air humidity, water sensor, soil humidity, gas, sound, flame, etc ...
    - physical actuators: DC motors, LEDs, buzzers, LCD module
    - WiFi microcontroller
    - Microcontroller (Arduino UNO) to control sensors and physical actuactors

Laboratorial Project

Mobile application: Android

Ubiquitous application: Arduino



Laboratorial Project

Expected background:

- Computer Networks course
- Distributed Systems course (preferable)

- Programming skills of a 4th year MIEI student
  - Java and C programming languages
  - Network programming (sockets and/or Web services)

Laboratorial Project

Schedule

- April 5th → Project's presentation: features, functionality and overall design
- May 10th → Project's system architecture
- May 30th → Project's delivery
- Week of June 7th → Project final presentation