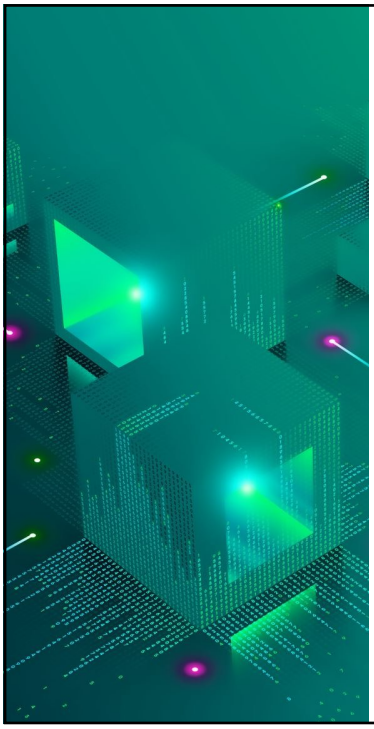


Sistemas de Computação Móvel e Ubíqua

2021/2022

FCT - UNIVERSIDADE NOVA DE LISBOA

1

Main Info

Lecturers
- Vitor Duarte (vad@fct.unl.pt)

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

2

Program

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

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

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

3

Bibliography

The bibliography will be composed of:

- Chapters from different text books, such as:
  - F. Adelstein, S. Gupta, G. Richard III, L. Schwiebert, *Fundamentals of Mobile and Pervasive Computing*, McGraw Hill Professional, 2005
  - G. Coulouris, J. Dollimore and T. Kindberg, *Distributed Systems - Concepts and Design*, Addison-Wesley, 5th Edition
- Articles published in journals and conferences in the Mobile and Ubiquitous Computing areas:
  - These articles are available from UNL's network

4

Evaluation

Two components:

- NT: two tests or final exam
  - Closed-book
- NP: laboratorial project in groups of 2
  - Frequency: NP > = 9.5
- Final Mark = NT * 60% + NP * 40%

5

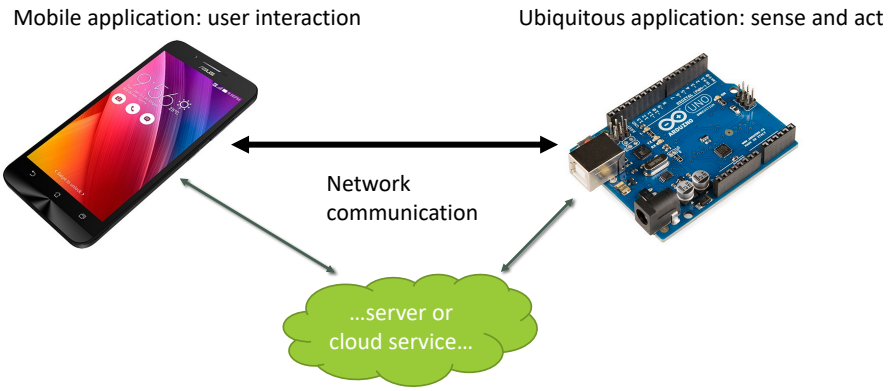
Laboratorial Project

Project: two main components:

- A mobile application
  - Java – Android (recommended)
  - Address challenges related to mobile computing
- An ubiquitous / pervasive application
  - Embedded prototype (Arduino or ESP32) with sensors/actuators
  - Interaction with mobile application and/or cloud service/server backend
  - Address challenges related to ubiquitous computing and IoT

6

Laboratorial Project



7

Laboratorial Project

The purpose of the application is of the group's choice
- But it has to follow a list of given requirements
- **Start looking for problems for you to solve**

Typical example: Smart Space
- 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 as weather forecast, time of the day, temperature, light conditions, etc …
  - and acts on several of the home's/office's devices.

8

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 (client/server, Web services)

9

Laboratorial Project

Tools and environments (sugestions):

- Mobile application
  - Android Studio or other IDE of your choice
  - You need to use your own smartphones to test your application
- Ubiquitous application
  - Arduino or ESP32 platforms and Arduino IDE or other of your choice:
  - It's better to use your devices, but some available:
    - Microcontroller (Arduino UNO) to control sensors, actuators and WiFi module
    - Sensors: potentiometer, pushbuttons, temperature, tilt, light, piezo, accelerometer, ultrasound, infrared sensor, hall effect, air humidity, water sensor, soil humidity, gas, sound, flame, etc ...
    - Physical actuators: DC motors, LEDs, buzzers, LCD module
- Server or cloud service
  - Any computer with your server, or
  - Cloud services like Arduino cloud, Firebase, IFTTT, etc...

10

Provisional Scheduling

- Next week: groups and project requirements (features, functionality and overall design)
- April 7th → Project draft and discussion
- April 28th→ Project proposal, design and architecture
- May 14th → 1st test
- May 19th → Project's checkpoint (report and code)
- June 5th → Project's delivery (report and code)
- June 18th → 2nd test
- Project demo and discussion