

Sistemas de Computação Móvel e Ubíqua

2020/2021

First Test: 11/05/2021

Duration: 1:20h

Closed book test

1. Enumerate, justifying, the issues/challenges that distinguish Mobile Computing from Distributed Computing in general.
2. A sensor is a device that detects and responds to some type of input from the physical environment, is a type of transducer, that converts the physical parameter (for example: temperature, light, humidity, speed, etc.) into a signal which can be measured electrically or optically. What makes a sensor “smart”?
3. What are the main advantages that can be offered by a Wireless Sensor Network. Give at least three examples of WSN application domains.
4. Enumerate three different technologies that can be used in Indoor Position Systems, and explain how they can be used to get the position and/or track a person or object inside a building, also mention some of their limitations.
5. In wireless communications, in order to allow several devices to communicate without interference, it is necessary to multiplex the transmission medium. Enumerate and describe three main techniques used to deal with this problem.
6. Describe two main problems faced by wireless links.
7. In Bluetooth technology what is “frequency hopping” and why is it needed?
8. A bakery is interested in installing a system that allows the monitoring of its oven room. They want a system capable of detecting problems that can occur not only in the room, but also with each of the ovens.
Regarding the room the system should:
 - detect if the temperature is too high, in that case the cooling system should be automatically activated;
 - in the event of fire or significant degradation of air quality, an alarm should be triggered on site and an urgent notification should be sent to the manager.Regarding each oven the system should:
 - detect/signal that the oven is active and define/set its operating temperature. In case there is a significant change in the value initially defined, the situation should be signaled so that someone in the room can manage the problem;
 - detect if the oven’s door is closed correctly and, if it is not, it should be signaled so that whoever is in the room can manage the problem.

In addition, they want the system to keep a record of the different occurrences (ovens and room), to be later analyzed by the person in charge, with the aim of identifying problems with the ovens.

- a. Present an outline of a system proposal, describing its key elements, specifying the microcontrollers and sensors/actuators used. Regarding the sensors describe the main features which have to be considered. Also present a short but clear explanation of the infrastructure of your system and the interactions (communication) between the different system's elements. (note: a graphical image can help a better understanding of your proposal description).
- b. Identify the main problems and restrictions/limitations of your proposal and justify your options.