Sistemas de Computação Móvel e Ubíqua

2016/2017

Second test: 12/06/2017
Duration: 2:00h
Closed book

1. Triangulation is a process for determining a location.
    a. Explain in what consists this method.
    b. Indicate and describe some known techniques to measure distances.

2. Suggest (describe) a possible method/system to track user location inside a building.

3. An ultrasound system can be used to determine distance, explain how and indicate possible problems.

4. What is the offset of a sensor? How can this factor influence application behavior? suggest possible ways to deal with it.

5. Sensors can be classified into two different physical categories: passive and active, name and explain each one of them, giving some examples of use.

6. Explain what is meant by “smart sensor”.

7. Describe and comment the main factors that influence a sensor network design.

8. A very simplified definition of Internet of Things: “IoT is the interconnection via the Internet of computing devices embedded in everyday objects, enabling them to send and receive data, even without human intervention”.
   What are the main characteristics of an IoT system?

9. What are the main requirements of an IoT architecture? Describe each layer of a typical IoT architecture (three layer architecture).

10. Fog Computing is a rather recent architectural model for the Internet of Things. Describe the architecture and discuss when it his advantageous to resort to the Fog Computing model.

11. Describe the concept of *Cyber Foraging* and the current approaches for offloading computations in the Mobile Cloud Computing field.

12. Routing protocols for mobile ad hoc networks (MANETs) may be classified according to two dimensions:
    1. how they forward packets (source-driven or hop-by-hop), and
    2. how they obtain the routing information (reactive or proactive)

Explain what is source-driven and hop-by-hop routing, and what are reactive and proactive algorithms is the MANET context. Lastly, give an example of a hop-by-hop proactive algorithm.

13. Suppose that you have to develop a system to manage several aquariums at a pet store. Each aquarium has a predefined number of fishes, being that each kind of fish requires specific habit conditions. The system must guarantee the quality (with a PH sensor) and level of the water, as well as the temperature and light conditions of each aquarium. Each aquarium also has an automatic feeding mechanism that should be controlled by the system.

    The system must be configured, monitored and controlled from a mobile device by the store managers. It must also feature an emergency notification system that notifies the mobile devices when an aquarium's conditions change in a way that could endanger the fishes' health.

    Present an outline of your system, describing its key software and hardware elements. Clearly define the sensors/actuators used and their control system and the communication infrastructure; also present a short but clear explanation of the software infrastructure of your solution and the interactions (communication) between the system's elements. Justify all your options.