Exercise set: 1
Tommaso Carraro
student number: 015147592

Introduction to IoT: first set of exercises

First exercise

1. The application can not be IoT because:
    a. there aren't smart services for the final user: the data collected by the car's sensors aren't used in an intelligent way. In fact the car isn't able to know about problems until it will be presented at a maintainance point. This is a problem because the user could know about a problem only when it presents;
    b. there isn't a wireless integration between the components of the system: the car's computer needs to be connected by cables at the central server. This can not be considered IoT because the final user needs to present his car at a maintainance point to know informations about the state of the vehicle;
    c. the user isn't able to use the services by himself: there is the necessity of a technician to know something about car's conditions;
    d. there aren't advanced programs that run in the vehicle: the sensors just register records on the car's memory.

    The application could be IoT if:
    a. the car is able to connect itself directly to the server cloud: at the moment of the data collection the car should send these data to the server in such a way that is possible to know about a problem without the need of present the car at a maintainance point;
    b. the car is connected to a mobile platform: after receiving data from the server cloud, the system could send useful informations at the user's device, for example advices on what to do based on the car's conditions. This provides an integration between different wireless devices: car, server and user's device. Another useful information provided by the system could be a parking monitoring service in such a way that the user always knows where his car is. This can be obtained using the GPS coordinates provided by the car.

    Finally the unique IoT thing present in this car are the sensors, but they aren't enough to say that this car is an IoT device. In fact, I proposed different ways to transform this car in a better and complete IoT device.
2. The application can not be IoT because:
    a. the application could provide smarter services: the fridge should be able to order the milk by itself when it is expiring or finishing and not just send a notification to the user. In this way there isn't the necessity for the user to check which products has to buy and there isn't the necessity to go to buy something saving a lot of time. Moreover, the fridge should learn what the user usually buy to begin to order products by itself (usually during the week I eat always the same things);
    b. the fridge could integrate with other IoT components: for example there could be an integration between the fridge and the oven. In the fridge could be a camera that keeps track of the products. When the user takes something from

the fridge, the fridge knows what he takes and could send informations such as cooking time and cooking program to the oven, in such a way that when the user opens the oven, the oven can configure itself.

The application could be IoT because:

a. the fridge is connected to a mobile platform that provides more than one service: food tracking and camera checking.
b. the fridge contains computer vision algorithms that are able to understand if a product is expiring;
c. the platform is able to send alerts to the user's device.

Second exercise

Application 1: Healthcare using smartwatch

1. Function: the smartwatch is able to check irregolarities on the heartbeat through a sensor. These informations should be used to prevent heart problems or attacks. The device needs to be connected to a mobile device in such a way that in case of heart problems the smartphone will contact the hospital and will send messages to relatives;
2. Power source: in smartwatches are usually used Lithium Ion batteries. I think it is not possible to use a Lithium Ion Polymer in this case because this specific smartwatch requires a lot of power for the wireless connection, the sensor recording and also the algorithms to check the irregolarities on the heartbeat;
3. Control unit: this smartwatch needs a system-on-a-chip control unit because it is not only a sensor but it runs also algorithms to check irregolarities on the heartbeat, then it has a touch screen that has to be managed and finally it doesn't need the computational power of a microcomputer.

Application 2: smart parking with parking detector sensor

1. Function: the sensor needs to check if the parking is free or busy and it must change a led to show the parking state. The sensor needs to be connected to a system that connects all the sensors of the all parking. Finally the system is connected to a platform the provides services such as parking availability on specific parking sites;
2. Power source: the smart object is just a sensor, so it doesn't need a battery because it is directly connected to the power supply of the entire system;
3. Control unit: since the functionalities of the smart object are limited to a proximity sensor and the led management, a microcontroller control unit is enough for it.