A bottom up sensor testbed

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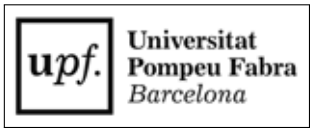

To my family.

Acknowledgments

Acknowledgments

Abstract

A bottom up sensor testbed is a sensor platform which collect sensory data. In this thesis we will develop a sensor platform that can be attached to guifi nodes to gather and share sensory data throught the guifi network and opencities. Guifi is an open network built to everyone can join it providing his own connection and opencities is a platform develop in UPF which allows any user to upload and download sensory data.
For the guifi nodes we will use an Arduino YUN (Arduino is an open-source electronics prototyping platform) which will gathered the sensory data and send it to opencities, then an Android application will get and visualize this data.
This solution will show how to create a sensor platform and see the result very quickly which could help to other developers build their own platform to share sensory data.

Resum

Un banc de proves de sensors de baix a dalt és una plataforma de sensors que recull dades de sensors. En aquesta tesi es desenvoluparà una plataforma de sensors que es pot conectar a nodes guifi per recopilar i compartir dades de sensors a través de la xarxa guifi i opencities. Guifi és una xarxa oberta construïda per a tothom pot unir-se a ella proporcionant la seva pròpia connexió i OPENCities és una plataforma de desenvolupament a la UPF, que permet a qualsevol usuari per carregar i descarregar les dades sensorials.
Per als nodes guifi utilitzarem un Arduino YUN (Arduino és una plataforma de creació de prototips electrònics de codi obert) per reunir les dades de sensors i enviar-les a openities, i a continuació, una aplicació per Android descarregarà i visualitzarà aquestes dades.
Aquesta solució mostrarà com crear una plataforma de sensors i veure el resultat molt ràpid, el que podria ajudar a altres desenvolupadors a construir la seva pròpia plataforma per compartir dades de sensors.

Contents

List of Figures

Chapter 1

PLANNING REPORT

The following sections explain the tasks that I will do in the course of this project.

1.1 Familiarization with the Arduino Yun

In this project I will be working with an arduino Yun, but I never worked before with any type of arduino, so the first task is to start coding different kind of programs. Then I will have to learn how to interact with the linux in the arduino Yun.

1.2 Preliminary testbed

I want to do an easy example to how to connect an arduino with a server running in my computer, what I want to do is establish a bridge between an arduino program and the linux within the arduino to be able to communicate with a server in my laptop, and send a string with the value returned by a sensor. This is a reduce problem of the real "bottom-up sensor testbed" because, at the end, in every arduino will be a program that will have to send a message to a server with the data of the sensors attached to it.

1.3 Collect Data from sensors

First I will connect a temperature sensor to the arduino YUN, then, I will develop a program to collect the information from it, and send it to a server. When the temperature sensor works, I will do the same process with a humidity, light, and noise sensor.

1.4 Install Sentilo

Sentilo (www.sentilo.io) is an open source sensor and actuator platform that I will install in my laptop to act as the server between the sensor network and the interface for the users to visualize the data.

1.5 Communication with Sentilo

I will adapt the messages that the arduino send to fit with the Sentilo.

1.6 Real deployment

At this moment, the part of the arduino and the server will be done, so I will test the server installing the arduino in real nodes of the guifi network, for example, the node in the Universitat Pompeu Fabra, and any other node that allow me to install it. The arduino will have a temperature, humidity, light, and noise sensor.

1.7 Interface

I want to do an interface for any user to understand the meaning of the temperature, humidity, light, and noise values. This interface will be develop for an android mobile application.

1.8 Sentilo module

I will contribute to Sentilo and other sensor data brokerage platforms accommodating the sensor testbed deployed in the previous tasks.

1.9 Final report

This task have to be done in parallel with all the other ones, and its purpose is document all the work that I will do.

1.10 Gantt chart

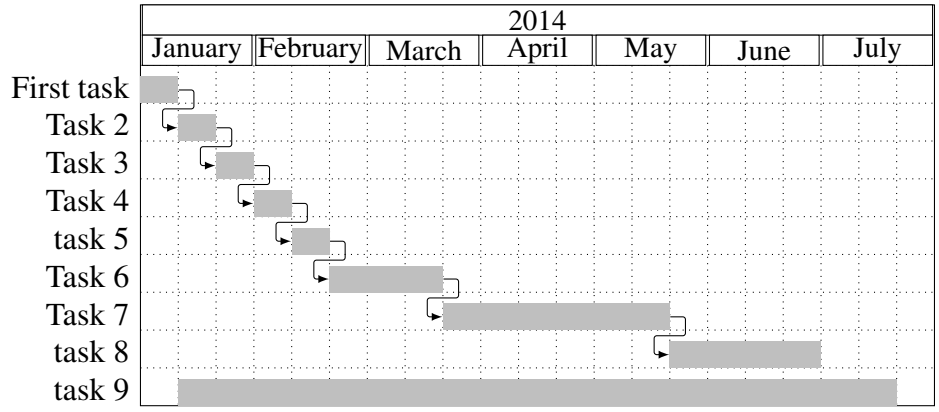

Figure 1.1: Gantt Chart