

# Monitoring the status of the garbage containers

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## Project description

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## 2. Project context

This project will be developed during the semester of fall 2016, for the ITIPRJ course at Aarhus university. Our group is a team of international exchange students.

We came up pretty fast with the idea of garbage monitoring, as we wanted to develop a something like a practical solution. This project is actually more about optimization than problem solving.

## 3. Goals

In this project we have a good panel of options to include. The concept is more about data gathering and distribution, and we have respectively a software and a hardware part to work on.

For the software part:

- Do a GPS tracking of garbage containers
- Do TCP connections to store information about each garbage bin (on a private server)
- Create an Android application to visualize the data
- Get information about state of garbage containers on the app (JSON)

For the electronic part:

- Use an Arduino with internet – the garbage bin will essentially be an IoT
- 3G/GPRS Shield for Arduino
- Monitor the current state of the bin through a sensor (empty/full/almost full)

## 4. Potential difficulties and remarks

Since our project is about long range data communication, we are considering using GPRS tracking, which will be likely more complex to design than a Wi-Fi or Bluetooth communication system.

As a result of the GPRS choice, the communication protocol could be more convoluted.

If we went for a realistic solution, the price of a bin should be reasonably low to be considered seriously. However, this project is more focused on feasibility than commercialization. As such, we are trying to achieve a working prototype by the end of the project.

## 5. Blueprint

The project presented below is based on the design and implementation of a prototype system that detects the status of garbage containers. It also covers the creation of a mobile phone application that serves to know what garbage containers are full and therefore have to be emptied. The garbage collectors will be able to optimize its route to collect the garbage. This project has been made based on the need to reduce CO2 emissions into the atmosphere and the fact that optimize waste collection routes can contribute appreciably also represents a significant fuel savings.

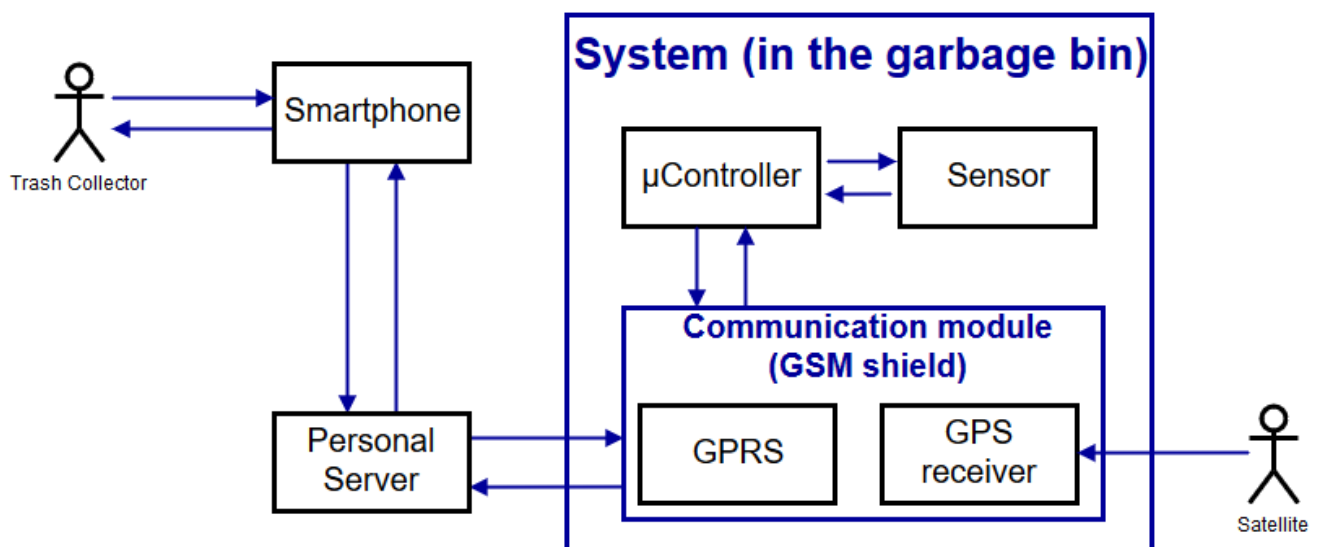


Figure 1: System Description

This image illustrates how the project works. There is the system where you can find the  $\mu$ controller, the sensor and the communication module with the GPRS and the GPS receiver. All of this components are located in the garbage bin. The trash collectors use his smartphone to check how full are the garbage bins thanks

to the sensor which gives the information to the  $\mu$ controller. They can also know where to go thanks to the GPS receiver which gives them the position of the bins that they have to collect. The communication module transmits this information to a personal server and the smartphone read data on the server thanks to JSON parse method. Therefore, trash collector has all the information to do its job simply and quickly.