nano-tera.ch

Swiss Competition 2015

iCAN

iCAN'15 Swiss Contest – Project Abstract

Project Title: BeMap-Bicycle environmental Mapping device

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PROJECT SUMMARY

Motivation:

People commute every day to work, mostly by car and public transportation. These vehicles get caught in traffic jams, are costly and not always flexible thus causing stress, but people could feel unconfident trying to cycle to work in non-cycle-friendly cities.

We would like to honour cycling commuters and encourage people to ride their bikes to work to reduce pollution and stress levels. Creating a community around these people and helping them with planning their commute by working together with municipalities in order to improve cycling facilities is our main goal.

Our device:

The device we want to develop is a portable tracker composed of a GPS and sensors, to be fixed on the user's bike. The GPS tracks the paths followed by the cyclist (commute or other) and combines the sensors' data to points on the map. We could include our device on a lamp, fixed on the handlebar of the bike.

Once at home, the user can connect his device to a computer in order to charge the battery and transfer collected data using provided software. The data can be set either as private, or added to a database to contribute to the cycling community.

The global data uploaded to our server will be analysed to detect pollution peaks and problems in cycling infrastructure. This information will be transmitted to municipalities and users could be alerted of problems on their regular paths.

A program on the user's computer will also show his data on a map and combine the information coming from his sensors. It will then be able to propose the best cyclist route for a specific destination: more secure, less pollution, less bumps and less cars.

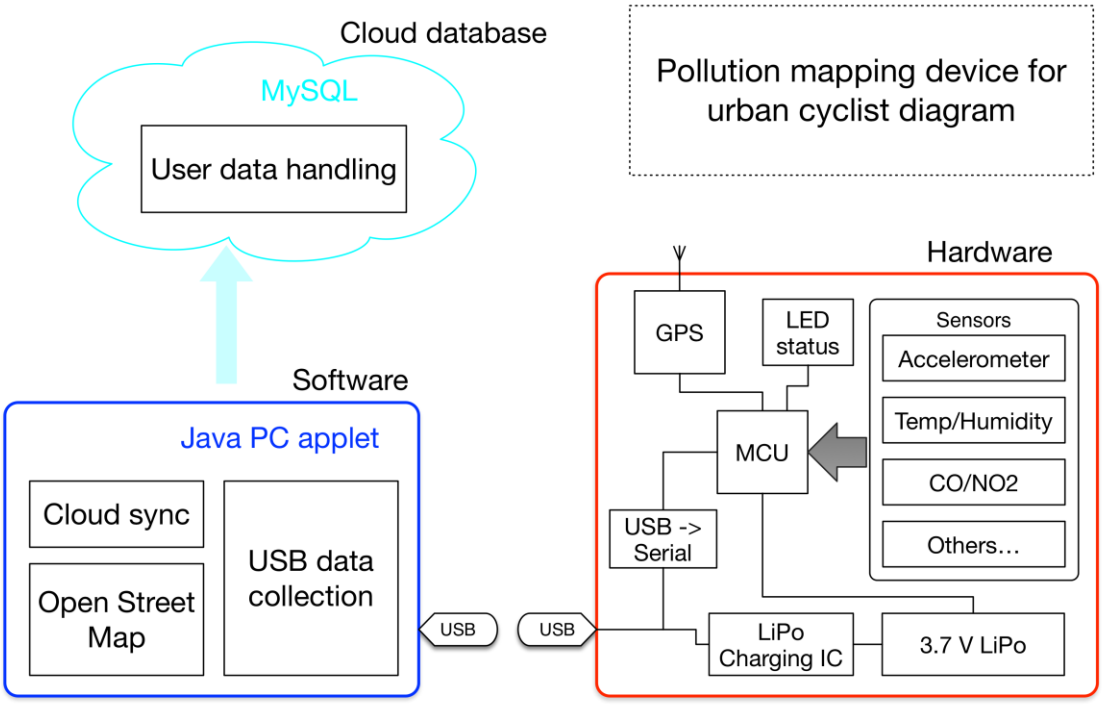
Market:

This device would aim at two specific markets:

-Municipalities who could provide the device to users in order to collect specific data about cycling infrastructures' quality and air pollution. These would be municipalities aiming to a more cycling-friendly city. Bike clubs or associations could also be interested to point out problems in a specific location.

-Cyclists, commuters, "data freaks" who would like to analyse their cycling paths and improve their security while cycling.

Hardware

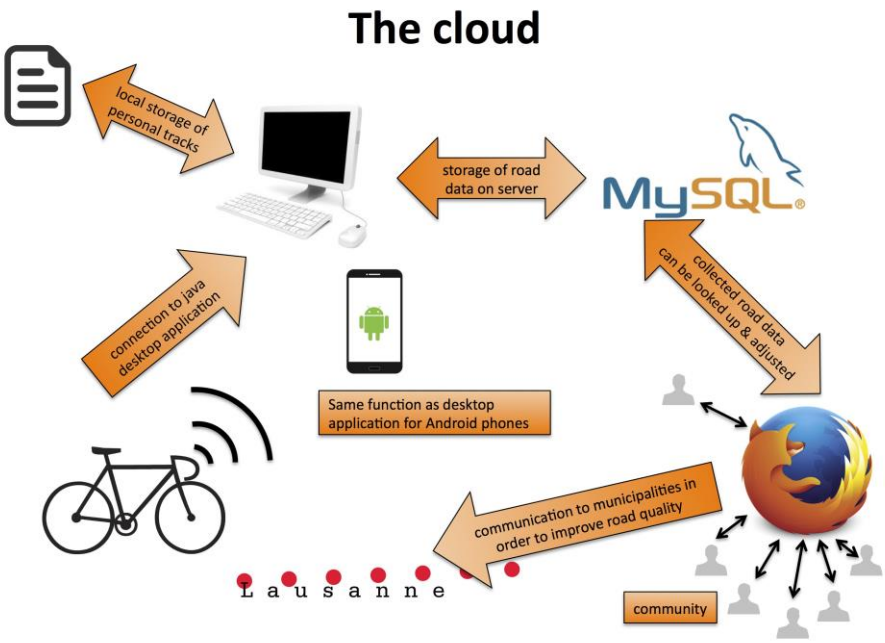


We would like to use some Swiss sensors:
-MiCS-4514 CO and NO2 sensor from SGX
-SHT21 temperature and humidity sensor from Sensirion
Those sensors will be used to measure all the environmental and pollution data, thus bringing Swiss engineering to the heart of our project.

We didn't find interesting Swiss components for the following and didn't make a supplier choice yet:
-**GPS** to record cyclist's position
-**Accelerometer** to detect bumps along the path
-**Microcontroller** to handle communication and data collection
-**USB to serial IC** to handle USB communication if not supported by MCU
-**LiPo charger IC** to properly charge the battery from the USB power line

Possible further hardware upgrades:
-**light sensor** to detect ambient light at night to list safer roads
-**microphone** to collect sounds: noisy roads most often means busy roads
-**Bluetooth** to communicate with smartphone/computer

Software

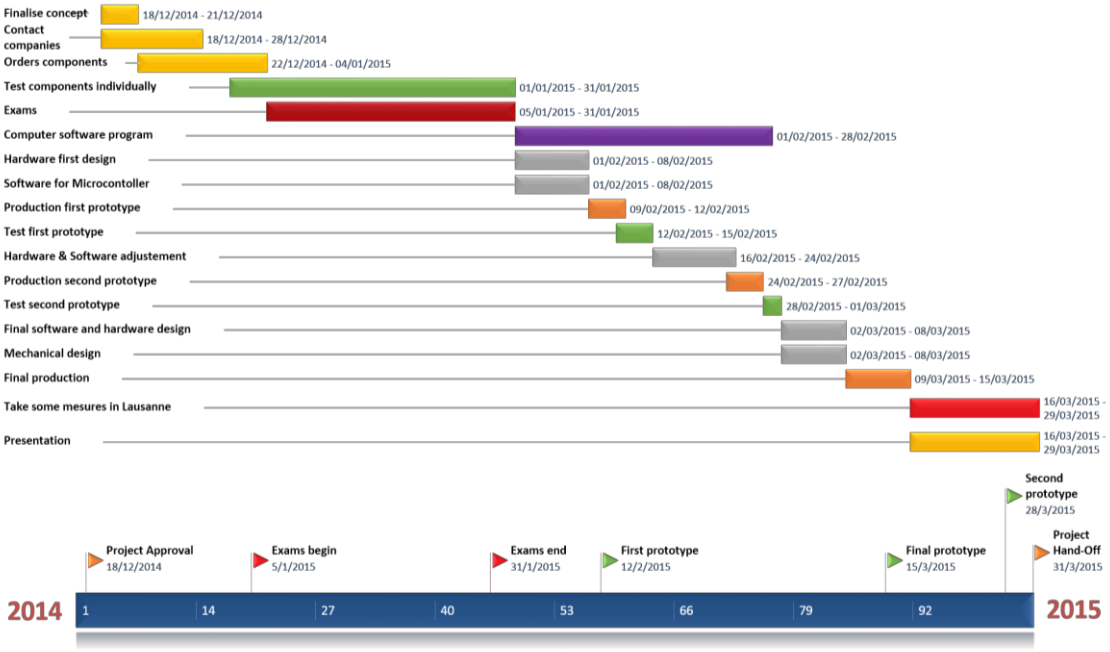


Data analysing and the cloud

Once the data has been collected on the bike, it has to be imported to any computer with our java desktop application. This software contains all the necessary algorithms in order to transform the data into the right format. The data will be stored both locally – as personal bike routes – and in an anonymised form on our server in order to collect the road data for entire cities. In order to guarantee the users' privacy, GPS data near to his home coordinates won't be uploaded. As soon as we have collected enough data, we will be able to propose cycle track improvements to municipalities and associations (pro-vélo…).

The locally stored data can help the user to compare his favourite tracks and chose the best one for his daily commute.

Project Timeline



Budget

Hardware components for 3 prototypes

1x Ardurino Leonardo	CHF 30.-
GPS modules	CHF 60.-
Sensor collection	CHF 100.-
other electronics (MCU, etc.)	CHF 100.-
Prototyping (PCB, etc.)	CHF 50.-
Unforeseen	CHF 60.-

TOTAL CHF 400.-