The MEP project: Map for Easy Paths

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Abstract
The aim of MEP (Map for Easy Path) project is to provide a tool based on a mobile device to collect and deliver data concerning obstacles and accessible routes, in order to help physically impaired people to plan their journey. The mapping obstacles activities will be held with low-cost receiver and the main problem of the first project phase is the accuracy in GNSS positioning of obstacles and the estimation of the optimal placing of them on maps.

Introduction to the project
Get around the city for physically impaired people sometimes can be very easy: wide sidewalks and absence of any kind of obstacle, but sometimes is a problem: many kinds of obstacles are present and the path from one point to another can be very difficult and also can be dangerous. For physically impaired people it would be very important to know the obstacles before journey start.

The main goal of MEP project (Map for Easy Path) is to provide a tool to map obstacles and accessible routes and delivery it, in order to help physically impaired people to plan their journey and avoid any kind of contingencies. MEP solution is based on a mobile device with an app to collect and deliver data: this data would be collected in a implicit way, like position data from GNSS satellites and in a explicit way, when the user maps a particular point, gives a description, takes a photo and so on.

We not only collect data, but also the data will be processed and the result will be available, not only for end users, but also for for associations and public agencies that can use it to improve mobility: we want not only map obstacles, but also help to remove them.

MEP project won the "Polisocial Award 2014", the academic social responsibility programme launched by Politecnico di Milano; it is financed by this award and it started in October 2014.

Three departments of Politecnico di Milano are involved:
- DICA, environmental and civil engineering department to manage GNSS data,
- DEIB, the department of electronic, computer science and bioengineering, to manage the harvesting of explicit data
- Design department, to define how the end users can interact with this
The problem of correct positioning

When we are mapping obstacles, POI or any other kind of object, the problem is not only to find the correct point coordinates, but it is to find the correct coordinates respect to the map that is used as reference.

In the sample in figure 2 we suppose that the coordinates acquired from GPS (red point) contain an error and we can suppose that we are able to correct him (blue point); also the map can have an error, so may be that, when we put the point on the map, the right position of obstacle respect the map (green point) is different from that we calculated.

Therefore, two main goals can be identified:

- GNSS positioning of obstacles estimation;
- optimal placing of them on maps.

The goal of the first project phase is the accuracy assessment of the common GNSS receivers: to do this we identified a test path in a urban context (figure 3) in order to analyse different conditions of satellite visibility: urban canyons, in the old town, areas of intermediate visibility, outside the old town and open areas, mainly near the lake. We are surveying the test path with low-cost receivers and geodetic instrumentation, that gives us a reference to evaluate the results of low-cost receivers.

Up to now we have collected two different kind of results of our survey: the
point coordinates data obtained from receivers like smartphones and tablet and, using more complex receiver but always low-cost, the raw data, in order to elaborate them and try to obtain a better results. For this elaboration we are testing two open source software: rtkLIB\(^1\) (Takasu & Yasuda, 2009) and goGPS\(^2\) (Realini & Reguzzoni, 2013).

As reference map we will use OpenStreetMap\(^3\): a collaborative project to create a free editable map of the world. Using this map we can download the vector data and apply our algorithm to match the points survey with the corresponding segment. Moreover we can correct data, enhance with other information, upload them and make them available to all.

The project has just started and in the next few month we will have the first results of this activities.

Figure 2: difference between coordinate acquired (red), correct (blue) and the right position respect the map (green).

\(^1\) http://www.rtklib.com/
\(^2\) http://www.gogps-project.org/
\(^3\) http://www.openstreetmap.org/
Figure 3: Test path in a urban context.

References
