

STSM Scientific Report

COST STSM Reference Number: COST-STSM-IC0903-10712

Period: 2012-09-01 to 2012-11-01

COST Action: IC0903

STSM Type: Regular (from Belgium to Netherlands)

STSM Applicant: Nico Van de Weghe, Department of Geography, Ghent University, Belgium.

Email: nico.vandeweghe@ugent.be

Topic: on how to optimally combine Bluetooth-tracking and GPS-tracking

Host: Stefan van der Spek, Department of Urbanism, Urban Design, Delft University of Technology, Netherlands.

Email: s.c.vanderspek@tudelft.nl

1. Purpose of the STSM

Concrete issues that were defined for the ‘September-October stay’ are:

- cooperation with respect to the new minor-programme ‘Sensing the city – Delft van boven’ and in the master ‘Geomatics’ (Faculty of Architecture;

<http://home.tudelft.nl/en/study/master-of-science/master-programmes/geomatics/>) in the course ‘Positioning and Location Awareness’. In both, theoretical and practical issues of Location Aware Technologies (with specific focus on Bluetooth-research and the integration between the different technologies) will be given. Besides the teaching of theoretics and practical parts on how to set up a tracking experiment, terrain exercises will be given, which will partly form a basis for a core aspect of this STSM: on how to optimally combine Bluetooth-tracking and GPS-tracking. The idea is that the output of this research question will deliver a publication and/or a research proposal.

- Prof. Van de Weghe's research will fit into the new Minor project 'Sensing the City / Delft from Above' in which Van der Spek (Urban Design) and Verbree (Geomatics) are researching processes in the city of Delft, using GPS tracking technology. This research would highly benefit from the co-located application of Bluetooth tracking technology. The cooperation would provide the opportunity to compare both tracking technologies and could result into a joint scientific publication of Van de Weghe, Van der Spek and Verbree.

- This STSM might form the starting point of a nice cooperation between both research groups and more specifically between Van der Spek/Van de Weghe as well as research/teaching assistants and other scientific personnel, both during the STSM and in the longer term after the STSM.

2. STSM: work carried out, main results, future collaboration possibilities, foreseen publications

- With respect to the master 'Geomatics' (Faculty of Architecture), in the course 'Positioning and Location Awareness', several courses were given to the students, in both, theoretical and practical issues of Location Aware Technologies (with specific focus on Bluetooth-research and the integration between the different technologies).

- With respect to the new minor-programme 'Sensing the city – Delft van boven', there has been an interesting cooperation. Besides the teaching of theoretics and practical parts on how to set up a tracking experiment, terrain exercises were given as well. The students have been introduced in the Bluetooth-tracking approach and the GPS-tracking approach. Specifically, we presented and discussed:

- theoretical basis of Bluetooth-tracking;
- an overview of tracking projects (goals, methodology, results, SWOT) such as: Rock Werchter, Gentse Feesten, Student Kick-off, Lichtfestival, Pukkelpop, ...;
- methodology of acquiring Bluetooth-tracking data;
- fieldwork: locating the Bluetooth-scanners, ...;
- analyzing the data (demos of the software GISMO and support in the analysis);
- discussions about the research goal and the interpretation of the data.

The specific goal of the Bluetooth/GPS project is analyzing and interpreting differences in trajectories (and according behavior) of university students and young workers. To this end, 35 students were equipped with a GPS device and 35 young workers as well. During one week, their behavior through the central city of Delft was followed. Currently, these results are analysed by the students. They have to analyse, interpret, visualize the data and present a report in the near future. After this, Stefan and I will work on two papers based on these results:

- The first paper is more from the GIScientific perspective, where both approaches (Bluetooth-tracking and GPS-tracking) will be confronted with each other. Since the GPS-devices are Bluetooth-enabled, their Mac-adres could be logged throughout the 30 scanners, giving a valuable dataset being able to confront Bluetooth-data with GPS-data. An in depth study of quality and trajectory similarities will be done. This should result in a SWOT-analysis and some recommendations for future tracking-projects.
 - The second paper will be based on the tracking-results, but will be from the interpretation perspective. The central research question here is: “What can we do with the acquired data to give interesting support to typical urban problems like behaviour in the city, difference in pattern between the two groups, ...”.
- We are also thinking in combining the above results in an overall showcase which might be presented in the final meeting and in the showcase book.
- Also with respect to the above project and a previous tracking project, meetings were organised with the city of Delft and with the city of Rotterdam.
- Apart from the above, we also had interesting discussions with other members of Delft University, which might lead to interesting future collaborations:
- Research Institute OTB / Chair of GIS Technology : prof. P. Van Oosterom
 - Faculty of Civil Engineering, Transport Planning : prof. S. Hoogendoorn
- In addition, together with Stefan Van der Spek and Seraphim Alvanides, a workshop proposal for the AGILE conference was prepared.

As our idea was that this STSM might form the starting point of a nice cooperation between both research groups and more specifically between Van der Spek/Van de Weghe as well as research/teaching assistants and other scientific personnel, both during the STSM and in the longer term after the STSM, we hope to continue the cooperation in the future.

3. Confirmation by the host institution of the successful execution of the STSM

To whom it may concern

I hereby confirm the successful execution of the STSM of Prof. Nico Van de Weghe at the Department of Urbanism at Delft University of Technology, Faculty of Architecture, Delft, the Netherlands, from September 1 to November 1, 2012.

Prof. Van de Weghe highly contributed to our planned GPS-tracking research by adding theory and practice of Bluetooth-scanning technology to this exercise. The experiment not only marks the first time Bluetooth-scanning was used in the Netherlands, but also the first time both techniques were used simultaneously to improve the scope of both techniques.

During the project Prof. Van der Weghe was able to provide research equipment and additional colleagues to assist the project. Without MOVE this collaboration would not have existed at all. We were very glad with the provided human resources and research equipment for the project from another institution. The collaboration made the research much richer. We are looking forward to writing papers on the results of the research and to potential future research collaborations.

Kind regards,

Signage Date 12/11/2012

Corresponding Tutor

Stefan van der Spek MSc PhD

Associate Professor of Urban Design

Delft University of Technology

Faculty of Architecture, Department of Urbanism

Julianalaan 132-134, 2628BL DELFT

+31 15 278 4430 / +31 6 39250981 / s.c.vanderspek@tudelft.nl

