

## REFLECTION AND PROCESS EVALUATION

An indoor localization method resulting in both coarse and fine location granularity using Bluetooth Low Energy tags for (semi) public places is proposed in this thesis. This research took place over the course of a year. The initial planning was that the research would take 8 months. Due to unforeseen circumstances I was unfortunately forced to deflect from the initial planning. However, this also positively influenced this research; it gave the time and possibility to think the research process over and to proceed in a sub zone localization granularity.

Initially, the goal of this research was to localize on zone level for a more specific case study: a congress setting. However, the possibilities of BLE gave the incentive to take the localization to the next level (a finer localization granularity) which made the method applicable for a larger group of applications. This is a research challenge in the domain of Geomatics. Specific features related to the initial case study, for example profile matching, were lost and replaced with a further technical development of the localization system. Indoor localization systems are underrepresented in practise, in contrast to outdoor positioning systems. Applications using outdoor positioning are well spread throughout day to day life. Localization systems and methods for indoor positioning do exist but indoor localization remains a research challenge. From a broader social perspective, this research adds to the development of an indoor localization method, which could become applicable in society, eventually equal to how outdoor localization nowadays plays a role in the daily life of many people. Services using indoor localization, positioning, tracking and tracing can all take their advantage of the methods proposed in this research. This research is innovative; the combination of BLE hardware and a range free localization technique are new. Moreover, a robust, adaptive and scalable indoor localization system (hardware and software) is proposed which both answers to a demand from society and is an remaining research challenge.

This research and the field of Geomatics are strongly related. The field of Geomatics is engaged with the analysis, acquisition, management, and visualisation of geographic data. This research includes these topics and applied the knowledge gained during the Geomatics courses. Applying spatial analysis and determining spatial relationships by using Voronoi and Delaunay diagrams, localization while processing of the data, modelling and visualizing spatial data are done in this research. These processes are made possible by the gained knowledge from the core Geomatics courses on SQL, programming, GIS and positioning and location awareness. This research combines knowledge from different fields and specializations like; Telecommunication, Mathematics and (Geo-) Computer Science, which relates seamlessly to the interdisciplinary nature of Geomatics.

According to the TU Delft website about the MSc Geomatics:

“Geomatics data management and analysis techniques allow us to turn these measurements into useful information and knowledge with which we can identify patterns, track feature behaviour over time and predict the future state.”

This is extremely illustrative for this research, it includes both the management and analysis concerning spatial information but also puts emphasis on the importance of adding value and using this information for a practical purpose: proposing the basis for LBS in (semi) public places.