

Master's thesis description

2008 - 2009

Title master's thesis

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1 Master's thesis description

Researchgroup: AMBIT

Masterthesis title: WSN localization for SCALA //TODO: aanpassen aan nieuwe

Promotor: Jeroen Doggen, Maarten Weyn and Jerry Bracke

Students: Tim Van Overtveldt and Peter De Cauwer

1.1 Goal of this master's thesis

The goal of this thesis is to use a Wireless Sensor Network (WSN) to locate a mote with limited mobility. This system, application will be interfaced to SCALA, another master's thesis. SCALA is an application which combines information from several localization platforms such as GPS, RFID and Ekahau. This thesis will evaluate existing WSN localization algorithms and try to implement the best of them. We will also evaluate the effects of varying battery voltage levels and mote orientation on the accuracy of the localization. The algorithms will be developed in incremental steps, starting with the most simple algorithm. The goal of the algorithms will not solely be the accuracy. Other factors, mostly specific to WSN, will be accounted for as well. Our work should result in a fully functional system with a working interface to SCALA.

The thesis can be divided into four phases.

- Research: this phase will mainly happen in the first semester. It includes research about existing localization algorithms, RSS models, TOA, AOA etc.
- The Senseless framework: this phase will build on the software project developed in the thematic week of the ICT 7 course. We will adapt this system to support localization data.
- Algorithms: this phase forms the core of the thesis, here we will determine the position of a blind node with several algorithms. To be more concrete: the algorithms researched in the first phase will be implemented in the system which we expanded in the second phase.
- Interfacing with SCALA: building the software interface with the SCALA middleware.

Throughout the thesis we will work on the paper. Doing so, we can deliver a better paper.

2 Contacts

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3 Tasks, planning and timepath

3.1 Tasks

1. Research: RSS-based algorithms in a major scientific databases but also via Google Scholar.
2. Survey-paper & Paper
3. Reviewing the possibility of TOA on TelosB
4. Reviewing RSS propagation theory
5. Senseless framework:
 - a. Comparing both frameworks
 - b. Reviewing most of the source of the chosen framework
 - c. Adapting the framework for localization: adding new data fields
 - i. Telosb XML parser
 - ii. Controller
 - iii. Database design
 - iv. GUI
 - v. Interface definitions
 - d. Building a WSN control/status tool
 - i. Telosb XML parser
 - ii. Controller
 - iii. Database design
 - iv. GUI
 - v. Interface definitions
 - e. New TelosB application supporting
 - i. Localization
 - ii. Control via the TinyOS dissemination protocol
6. SCALA interface
 - a. Location data
 - b. Sensor data
 - c. Map data
7. Testing the influence of mote orientation & battery variability
 - a. Equip the motes with external antennas

3.2 Timepath

