

# Master's Thesis

## « Indoor Navigation on an Embedded System »

### Background

In the project Airport 2030 the Institute of Telematics investigates how passenger processes in airport terminals can be optimized using information technology. As an approach the Institute of Telematics develops and assesses a device for digital boarding assistance, which integrates passengers and luggage into the IT automation chain in the terminals.



The hardware developed in the Institute of Telematics is based on a wireless sensor node called *IRIS* by Crossbow Technology. Wireless sensor networks consist of small, battery powered sensor nodes. Developing wireless sensor network protocols is a challenging task. These networks are inherently distributed, wireless transmission is unreliable, and resource limitations prohibit storage and transmission of large amounts of data.

The sensor node has been equipped with a small monochrome liquid crystal display, a beeper and a joystick for interaction with the user.

### Work Description



In order to enable indoor navigation, the topology of a building has to be captured and modeled. Building properties as for example room / floor shapes, doors, elevators and staircases, height of rooms, access restrictions and many others have to be considered as well. These properties are stored in the backend system.

The task of this thesis is the design, implementation and evaluation of an indoor navigation system for the mobile device as well as the backend system. The sensor node is programmed using *TinyOS*, a commonly utilized operating system for different hardware platforms for wireless sensor nodes. The presentation

on the display, data storage and (incremental) data transmission to the device have to be evaluated in the thesis.

The backend system will be written in Java.

Since the device itself is not capable of obtaining positioning information of the necessary degree, the positioning has to be simulated. In order to do so, a third system will be used. It sends position information to the mobile node. These values are assumed to be accurate, valid and trustworthy.

### Requirements

Knowledge in programming C and Java, interest in wireless sensor networks.

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