

Open Thesis / Project

UWB-based Indoor Localization using Angle-of-Arrival (AoA) Measurements

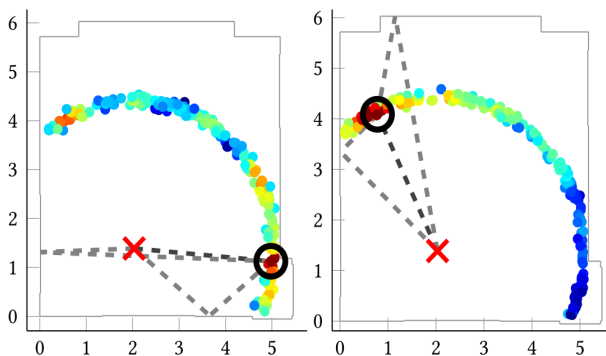
Thesis Type

Master Project / Master Thesis

Motivation

Ultra-wideband (UWB) is an emerging radio technology for building location-aware IoT applications. Its high bandwidth, indeed, allows for a high timing resolution of the received signal, which leads to excellent ranging capabilities and enables distance measurements with sub-decimetre precision. The upcoming second generation of UWB-transceivers will also embed the ability to retrieve angular information, namely the angle-of-arrival (AoA), of received signals. This feature enables the creation of new localization systems and allows to increase the robustness of existing location-aware IoT-applications.

In this project, you will be investigating the AoA capabilities of the next-generation UWB-transceivers and their localization performance in terms of accuracy and precision. You will also exploit the angular information of UWB transceivers supporting AoA measurements to build a single-anchor localization system: this is important to reduce the amount of required infrastructure in indoor real-time location systems (RTLS).



Goals and Tasks

Within this context, you will explore several directions and perform different tasks, such as:

- Explore the angle-of-arrival capabilities of the next-generation ultra-wideband platforms;
- Build a single-anchor localization system leveraging angle-of-arrival, ranging measurements, and multipath information, building upon the joint SALMA work between ITI and SPSC;
- Evaluate the accuracy, precision, and robustness of your solution.

Target Group

- Students of Electrical Engineering (EE), Information and Computer Engineering (ICE), and Computer Science (CS).

Required Prior Knowledge

- Excellent C programming skills;
- Good Python and Matlab skills;
- Basic background on signal processing;
- Experience with embedded platforms/microprocessors is of advantage.

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