Karlsruhe Institute of Technology

Department of Informatics
Institute for Anthropomatics und Robotics (IAR)
Chair for Intelligent Sensor-Actuator-Systems (ISAS)
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Intelligent ISAS Sensor-Actuator-Systems

Bachelor/Master Thesis

Towards Map-Enhanced Localization in Wireless Sensor Networks

Ultra-wideband (UWB) sensors can provide very accurate range measurements and have been widely deployed in many industrial application scenarios. However, the localization accuracy of UWB sensor networks is heavily dependent on the characteristics of the surroundings, such as complexity of scene geometries, existence of ferromagnetic material as well as anchor positions, etc.

In this project, a novel map-adaptive localization solution is to be developed for UWB sensor networks. 3D indoor environments are to be mapped in an efficient manner, based on which the UWB signal propagations are modeled with considerations of reflections and interferences of ferromagnetic objects, etc. A learning-based approach is further to be proposed to optimally position the anchors for enhanced tracking performance. More specifically, the project is divided into the following work packages:

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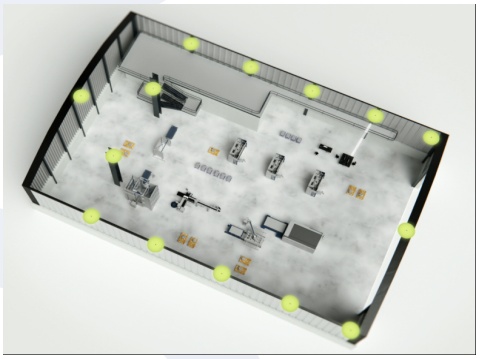
- Implementing an available algorithmic framework for high-performance modeling of indoor UWB-signal propagation based on an efficient 3D mapping approach.
- Developing a learning-based approach for optimal positioning of anchors.
- Evaluation on experimental data sets w.r.t. tracking accuracy and robustness.



Source: TRUMPF GmbH + Co. KG.

Requirements:
Students with background of computer science, mathematics or other engineering majors are welcome to apply. Solid coding skill in C++ is required. Preknowledges about computer graphics, probabilistic machine learning and ROS are a plus. The thesis can also be tailored to HiWi-jobs.

Emphasis:

Theoretical Study	
Software Implementation	
Hardware Implementation	

We offer:
- intensive supervision
- highend infrastructure
- contact to industry and research partners

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