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FAKULTÄT FÜR INFORMATIK UND ELEKTROTECHNIK

Universität Rostock
Fakultät für Informatik
und Elektrotechnik
Institut für Angewandte
Mikroelektronik und Datentechnik

Postadresse:
18051 Rostock

Besucher
R.- Wagner Str. 31
18119 Rostock

Fon +49(0)381 498-7290

Fabian.hoelzke2@uni-rostock.de
http://www.imd.uni-rostock.de

Implementation of anchor-free distributed localization system in wireless-mesh networks

Modern logistics and production planning rely on the just-in-time delivery of material for further processing and the timely availability of (semi-)autonomous mobile machines like trucks, forklifts, or cranes. The reliable detection of a machine's or a product's current location not only enables tracking and adaptive logistics in material transport, but also the provisioning of context aware functions for the autonomous processing of the delivered material. Satellite-supported global navigation systems such as GPS enable sufficiently precise localisation in the open air, paving the way for intelligent applications for long-range material transport or (semi-) autonomous vehicles for cargo handling in harbours. Indoors, however, GPS is unsuitable for accurate positioning. Still, many location-based functions are conceivable within buildings like production halls or storage facilities, using mobile machines that are aware of their own location and the location of nearby machines. As these mobile machines are supposed to be connected wirelessly in a scalable and failure-resilient way, WLAN mesh networks according to the standard IEEE 802.11s are focused as a candidate technology. In this work, the applicability of distributed anchor-free localization (AFL) methods in 802.11s networks shall be investigated.

The following tasks should be completed:

- Acquisition of basic knowledge in the topic of IEEE 802.11s WLAN mesh networks
- Research and documentation of existing distributed anchor-free localization (AFL) methods
- Research of the applicability of status information, provided by the wireless mesh network standard IEEE 802.11s, as input data for AFL
- Design and implementation of real-time localization using AFL in an 802.11s mesh network
- Analysis of localization accuracy and computational performance
- Documentation of the results

Project type	Thesis/Project
Requirements	Experience in programming (C/C++) or equivalent
Contact	M.Sc. Fabian Hölzke – fabian.hoelzke2@uni-rostock.de
Telephone	0381 / 498 - 7290
Office	Institute MD, Building 1, Room 1339