Open Thesis / Project
Exploring the Next Generation Ultra-Wideband Transceivers

Thesis Type
Master Project / Master Thesis

Due to their excellent ranging performance, Ultra-Wideband (UWB) radios have rapidly gained attention in the recent years within the IoT domain. For example, end-user applications such as key fobs (Apple Air Tag/Samsung SmartTag), secure access systems, or real-time location systems (RTLS) are leading to a greater awareness of this technology. The upcoming second generation of UWB devices aims to improve the performance as well as to introduce new security features.

This project aims to investigate the capabilities of the new generation of UWB transceivers. To this end, a radio driver needs to be implemented, that integrates the new radios, such as the recently released Qorvo DW3000, into Contiki-NG, an open source operating system for resource-constraint devices. This implementation can be done as part of a master project. Afterwards, the work can be extended to a master thesis in different directions. Potential topics might be (but are not limited to) the benchmarking of the second generation of UWB devices against its predecessor, the design and implementation of a real-time location system (e.g. for drone localization) or analysing the impact of inter-technology interference. Own proposals for location-aware IoT applications (e.g. in the field of smart home systems) are welcome.

Goals and Tasks
Within this context, the student can explore several directions and perform different tasks, such as:

- Integration of next generation UWB radio transceivers into an embedded operating system (Contiki-NG);
- Benchmarking 1st against 2nd generation of UWB devices;
- Design and implementation of a real-time location system for drone localization;
- Design of location-aware IoT applications.

Target Group

- Students of ICE/Telematics;
- Students of Computer Science.

Recommended Prior Knowledge

- Experience in C programming;
- Experience in microcontroller programming;
- Knowledge of networked embedded systems and experience with embedded operating systems is a plus.

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