

Open Thesis / Project

Using the Next-Generation UWB Devices to Design Location-Aware IoT Applications

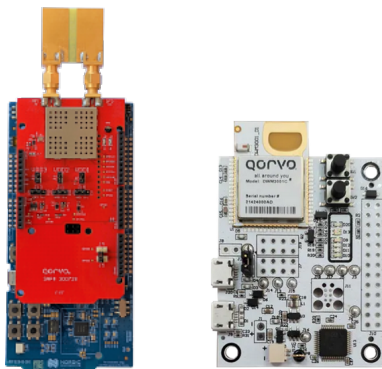
Thesis Type

Bachelor Thesis / Master Project / Master Thesis

Motivation

Ultra-wideband (UWB) is an emerging radio technology for building location-aware IoT applications. Its high bandwidth allows for a high timing resolution of the received signal, which leads to excellent ranging capabilities and enables distance measurements with sub-decimetre precision. This unmatched precision enables precise distance and position estimations crucial for applications such as drone-swarm localization, indoor navigation, social distance-tracking, and secure access systems.

The recently-released second generation UWB devices compliant to the IEEE 802.15.4z standard include improvements in terms of energy efficiency and secure-ranging capabilities. Furthermore, they bring new features such as the capability to measure – in addition to the distance between two devices – also the bearing between devices by estimating the angle-of-arrival (AoA) upon reception of a frame. The ability to obtain angular information using low-power UWB tags opens new possibilities and challenges for upcoming UWB-based systems.



Goals and Tasks

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

- Get familiar with UWB technology and explore the performance as well as capabilities of next-generation UWB radios;
- Enable or improve the support for UWB in modern embedded operating systems such as Contiki-NG or Zephyr;
- Study the accuracy and robustness of angular measurements returned by next-generation UWB radios;
- Benchmark and compare the performance of different next-generation UWB transceivers;
- Design location-aware application and protocols.

Target Group

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

Required Prior Knowledge

- Solid C programming skills;
- Experience with the programming of microcontrollers and embedded platforms;
- Basic knowledge in data analysis using python or Matlab as well as knowledge on wireless systems is of advantage.

Contact Person

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LENS