

# Frequency Modulated Ultrasonic Positioning System

## Background

Radar systems are used in a multitude of applications. Originally used for flight surveillance, they are today furthermore applied for the purpose of weather forecast or in the automotive sector. Nevertheless, conventional radar systems fail when not only target recognition, but also target identification is required. Therefore, active-target approaches exist, in which the target can be distinguished from the surrounding clutter. However, system complexity increases when a high resolution and high accuracy is required.

Besides radar-based technologies, ultrasonic is known to enable a high measurement resolution with comparable low system complexity and low costs. Therefore, ultrasonic-based measurement systems are commonly used in park-assist systems. Additionally, ultrasonic enables the simple implementation of target identification based on the active-target approach. Potential applications can be found in the filed of new mobility concepts such as the upBUS concept (<https://www.upbus.de/>), which was developed at the Chair of High Frequency Electronics .

## Tasks

The students' task is the design of a frequency modulated ultrasonic positioning system as it is presented in Fig. 1. In general, the work can be structured as follows:

- Investigation on suitable RX / TX topologies and required system specifications
- System design and verification
- PCB-Layout and assembling
- $\mu$ C- Programming
- Performance tests

The workload will be adapted correspondingly to the type of thesis (BA / MA).

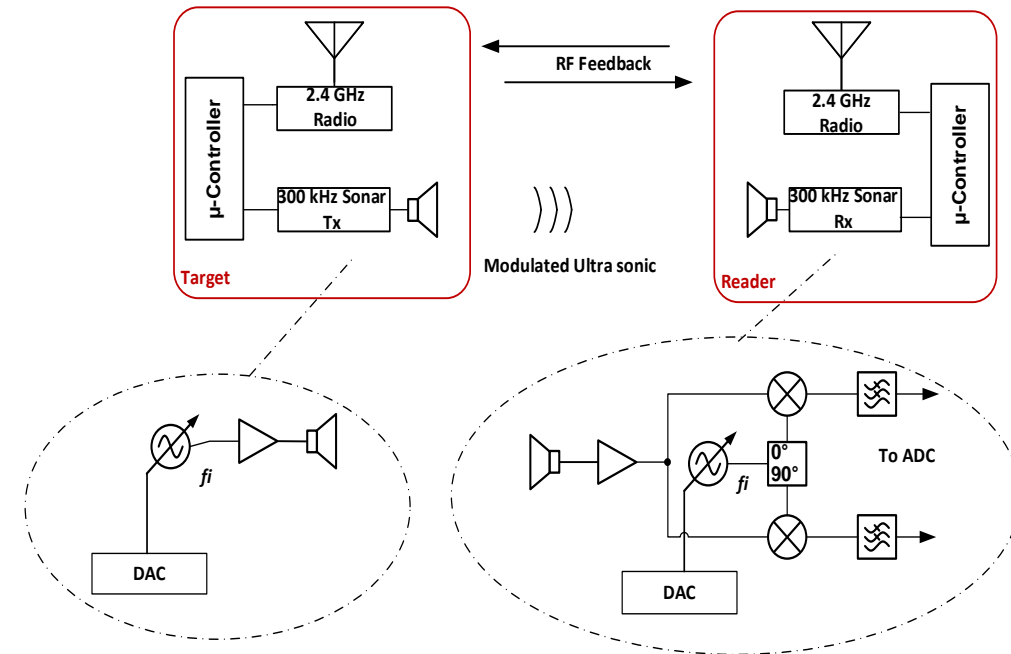


Fig.1 FM Ultrasonic Positioning System.

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