

# Analysis of NN-based Beamforming with Angle-of-Arrival Tracking

## Master's Thesis

### Project

Beamforming is mainly done with fixed beam alphabets, where a specific direction is illuminated with a beam of fixed width. Joint Communication and Sensing enables the detection and tracking of passive objects. By estimating the angle of arrival, we can select suitable beams in a classic system that are best suited for communication and illuminating the object. Previous work shows that no dominant beams are formed for sensing for NN-based beamforming and angle of arrival estimation when both functionalities are trained together. This thesis aims to investigate the reasons for this and to propose and implement system adaptations.

### Tasks

1. Literature review and implementation of classical AoA estimation
2. Analysis of the JCaS system
3. Adaption of NN-based beamforming
4. (Extension to blockage prediction)

### Requirements

- ✓ Nachrichtentechnik 2 / Communication Engineering 2
- ✓ Base knowledge of signal processing
- ✓ Interest for machine learning

### Institute

Communications  
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