

## Distributed Virtual Antenna Array for mmWave Hand Gesture Recognition

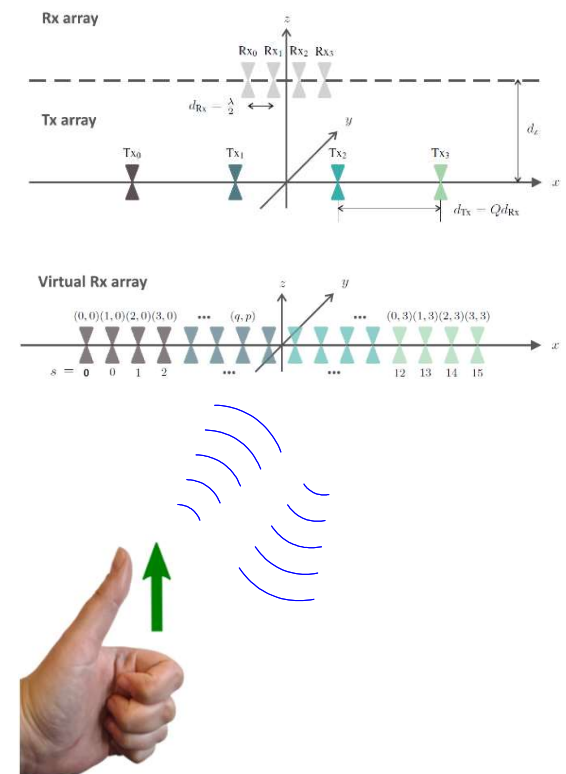
The focus of high resolution radar has fallen on range and velocity resolution. This is expected as radar has predominantly been used in the automotive industry. As radar is being investigated for hand gesture recognition applications, the angular resolution is becoming increasingly important. By maintaining orthogonality between multiple Tx antennas, a virtual antenna array can be obtained with many more virtual antenna elements than physical antenna elements. This can be used to obtain a large virtual aperture and a high angular resolution.

To date, virtual antenna array investigations have focused on arrays realized in the same package or on the same PCB. This work focuses on the design and performance assessment of a 2D MIMO antenna array with 4 Tx and 8 Rx antennas, but in different packages. Due to the large distances between packages, investigating different grating lobe mitigation approaches for virtual antenna arrays will form a key part of this thesis. The array design should be optimized such that over a maximum possible field of view in azimuth and elevation planes, the DoA (direction of arrival) of a target can be estimated with a low probability of generating ambiguities (low grating lobes). Additionally, the resolution in azimuth and elevation planes should also be optimized.

### Prerequisites

Knowledge of MIMO, antennas and antenna arrays, experience with CST Microwave Studio and MATLAB required.

The thesis can be written in English or German.



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