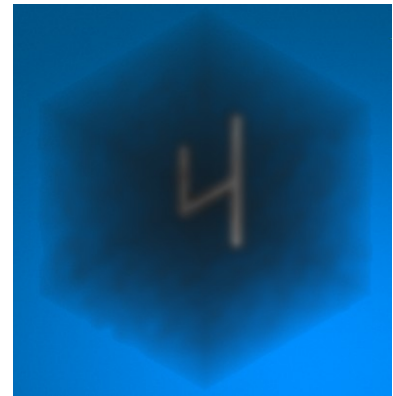


# Master-Thesis

## Custom Targets for Enhanced Terahertz Light Field Imaging: Design, Construction and Data Acquisition

Terahertz (THz) imaging has become a focal point in advanced imaging research due to its non-destructive capabilities and ability to penetrate opaque materials. This project advances THz imaging technology through two key initiatives. Firstly, we aim to design custom targets with normalized, sparse, and spectrally shaped features to serve as quantitative benchmarks for novel THz image reconstruction methods. Secondly, we employ these custom target in a data acquisition campaign, employing a UR5 robotic arm integrated with a THz source and camera to automate the imaging process for precise and repeatable measurements.



In this work, we design and use specialized targets, including USAF resolution test charts, to evaluate and calibrate the THz imaging system's spatial resolution, frequency response, and image reconstruction capabilities from sparse data. We also create targets with manipulated phase components to simulate realistic imaging scenarios. The project trains students to operate a robotic system for systematic image capture and develop analytical skills by testing and refining image processing algorithms for THz image quality assessment.

### Requirements:

- Good Knowledge in Python and MATLAB: Candidates should have a good understanding of Python and MATLAB, with the ability to undertake basic scripting for data processing tasks. Experience in MATLAB for simple signal processing and visualizing data is also desirable.
- Basic knowledge of one or several disciplines is a plus: time-frequency analysis, image processing, computer vision algorithms.
- Good command of English

### Upon completion of the work, career prospects are available in the following areas:

- Research in THz Imaging
- Image Processing and Computer Vision
- Imaging Algorithm Development

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