

BACHELOR PROJECT THESIS

in the course ISE

For: **Assigned**
Set by: **Prof. Dr.-Ing. A. Czulwik**
Topic: **Design and manufacturing of an
optimised quasi-optical component
for the control of THz radiation**

Terahertz (THz) radiation is approximately defined in the range of 0.1 to 10 THz. In the last decades some interesting applications for THz technology has been found. THz radiation penetrates through matter through which optical light can not. Its absorption properties regarding water can be used in measurement systems. Also more precise distance measurements compared to microwave radiation become possible.

One further application is to measure the position of human skin by a THz system. The beam, which is created by the THz source, is divergent. Lenses are needed to collimate and focus the beam in the frequency range from 100 GHz to 1 THz.

The beam is collimated and afterwards deflected by a galvanometer. The galvanometer contains a mirror which can be swiveled by an electric drive. A further quasi-optical component (e.g. a lens) shall convert a rotating beam into a beam scanning the skin at a forearm.

Therefore, this bachelor thesis aims to develop a quasi-optical component which allows to scan the cross-section of a human forearm.

This bachelor thesis can be divided into the following sub-tasks:

- Creation of a work plan and a time schedule
- Literature research on the used THz systems and on lens functionalities and designs
- Development of at least one quasi-optical component converting a rotating THz beam in a beam scanning a forearm
- Measurement of the beam pattern in different positions and distances
- Implementation of a suitable orientation and positioning of the beam
- Ranging measurements and evaluation
- Documentation of the achieved work
- Finalisation of the work in the form of an oral presentation

Second reviewer: Prof. Dr.-Ing. Jan C. Balzer

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