

# Development of a Radar Sensor (Amplitude Detector) in the E-Band Range

## Objective of the Master's Thesis:

The focus of this master's thesis is the development of a sensor for the detection of radar radiation in the E-band range. The sensor is designed to convert the amplitude of the received radar waves into a proportional voltage value. The core of the work is the design and realization of a frontend, which includes an antenna and a measurement circuit based on GaAs diodes. These components are to be integrated on a high-frequency printed circuit board, with the Vivaldi antenna being considered as a potential solution for the antenna design. After completion of the circuit board, comprehensive measurements are planned to determine key parameters and evaluate the performance of the sensor.

## Sections of the Master's Thesis:

- Identification of relevant parameters for the efficiency and accuracy of radar sensors.
- Investigation of various types of antennas and measurement circuits, especially the GaAs diode, for use in high-frequency environments.
- Design and Commissioning of the Sensor:
  - Design and simulation of the high-frequency printed circuit board with optimal signal integrity in mind.
  - Construction and physical setup of the Vivaldi antenna and the measurement circuit.
  - Implementation of the frontend on the printed circuit board.
- Measurement and Evaluation:
  - Conducting test series to determine the performance characteristics of the developed sensor.
  - Analysis of measurement data to determine frequency independence and voltage proportionality.
  - Validation of results in comparison to theoretical expectations and identification of optimization potentials.

## Organizational matters

- Requirements: Education in Electrical Engineering, Information and Computer Engineering or Physics
- Duration: 6 months
- Workplace: EMS, Inffeldgasse 33/I, 8010 Graz
- Payment: possible
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