

Mohammadmahdi Maharebi

M.Sc. Student / Electrical Communication Engineering

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Profile

M.Sc. student in Electrical Communication Engineering with a **solid analytical and computational background** in electromagnetics, RF/antenna design, and signal processing. Silver medalist in Iran's National Physics Olympiad. Experienced with numerical modelling (FDTD, FEM) and reproducible research workflows. Looking for research-oriented positions or a funded master's thesis in 5G/6G systems, antenna arrays, or computational photonics.

Education

- 2024–Present **M.Sc. Electrical Communication Engineering**, University of Kassel, Kassel, Germany, GPA: 1.53/1.0 (*sehr gut*)
Key topics: microwaves, optoelectronics, engineering mathematics, digital communications and lab.
Focus on computational EM, photonics, and optimization methods.
- 2017–2023 **B.Sc. Electrical Engineering**, Sharif University of Technology, Tehran, Iran
Emphasis on electromagnetics, microwave engineering, and signal processing.
Teaching Assistant (2021–2023): Circuit Analysis I (Head TA), Circuit Analysis II, Object-Oriented Programming in Java; responsible for labs, grading, and mentoring.

Selected Research Projects

- 2025 **2D FDTD PEC Cavity Solver**, Python / NumPy, Computational Electromagnetics
○ Implemented TMz FDTD solver on Yee lattice; validated five cavity modes with mean error **0.43%**.
○ Used FFT-based peak detection with windowing and multi-probe averaging for robust eigenfrequency extraction.
○ Produced convergence plots and animations in a fully reproducible repository.
○ *Code:* github.com/mmaharebi/fdtd-pec-cavity
- 2025 **Fiber Mode Perturbation Analysis**, Python / SciPy, Operator Theory & Tolerance Study
○ Derived first-order sensitivities of β and n_{eff} for refractive-index and radius variations.
○ Implemented eigenmode solvers with Brent root-finding and normalized integrals; numerical error < 0.1%.
○ Generated sensitivity maps and tolerance curves for realistic fabrication ranges.
○ *Code:* github.com/mmaharebi/fiber-perturbation
- 2021–2023 **RF / Microwave Design Portfolio**, HFSS / ADS / MATLAB, Antenna & Circuit Design
○ Designed 16 dBi horn antenna (10–12 GHz) with optimized matching and far-field validation.
○ Modelled phased dipole array (15 dBi) including mutual coupling and beam steering.
○ Designed 3 dB branch-line coupler (10 GHz) with > 20 dB isolation and low insertion loss.

Technical Skills

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|-------------------|---|
| EM / RF | HFSS, ADS, CST Studio; S-parameters, Smith chart, array factor analysis |
| Numerical Methods | FDTD and FEM post-processing, eigenmode solvers, perturbation / operator methods |
| Programming | Python (NumPy, SciPy, Matplotlib, Jupyter), MATLAB, C++, Java, TypeScript/React, Git/GitHub |
| Tools | LaTeX, VS Code, Jupyter notebooks, Linux/Bash |
| Domains | EM simulation, antennas, microwave circuits, photonics, signal processing, 5G/6G concepts |

Professional Experience

- 2024–Present **R&D Engineer — Communication Systems & Software**, Kassel, Germany
Develop simulation tools and web applications; integrate EM-related numerical models with modern software engineering practices. Maintain public repositories with validation code and documentation.
- 2019 **Intern — 5G Demo Platform**, *Hamrah-e Avval (MCI Iran)*, Tehran, Iran
Built gesture-controlled 5G demonstration using Arduino and Leap Motion sensor. Presented low-latency communication concepts in a robotics setup for visitors and internal stakeholders.

Awards

- 2017 Silver Medal — Iran's National Physics Olympiad
- 2017 National Elites Foundation Recognition (Iran)

Languages

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|---------|---------------------------|---|
| English | Professional proficiency | <i>Comfortable with technical communication and documentation</i> |
| German | A2.1 (actively improving) | <i>Learning; familiar with technical coursework</i> |
| Persian | Native | <i>Mother tongue</i> |

Links

- GitHub github.com/mmaharebi
- Portfolio mahdymahareb.de
- Key Repos FDTD cavity solver, fiber perturbation, RF designs, FEM visualization tool