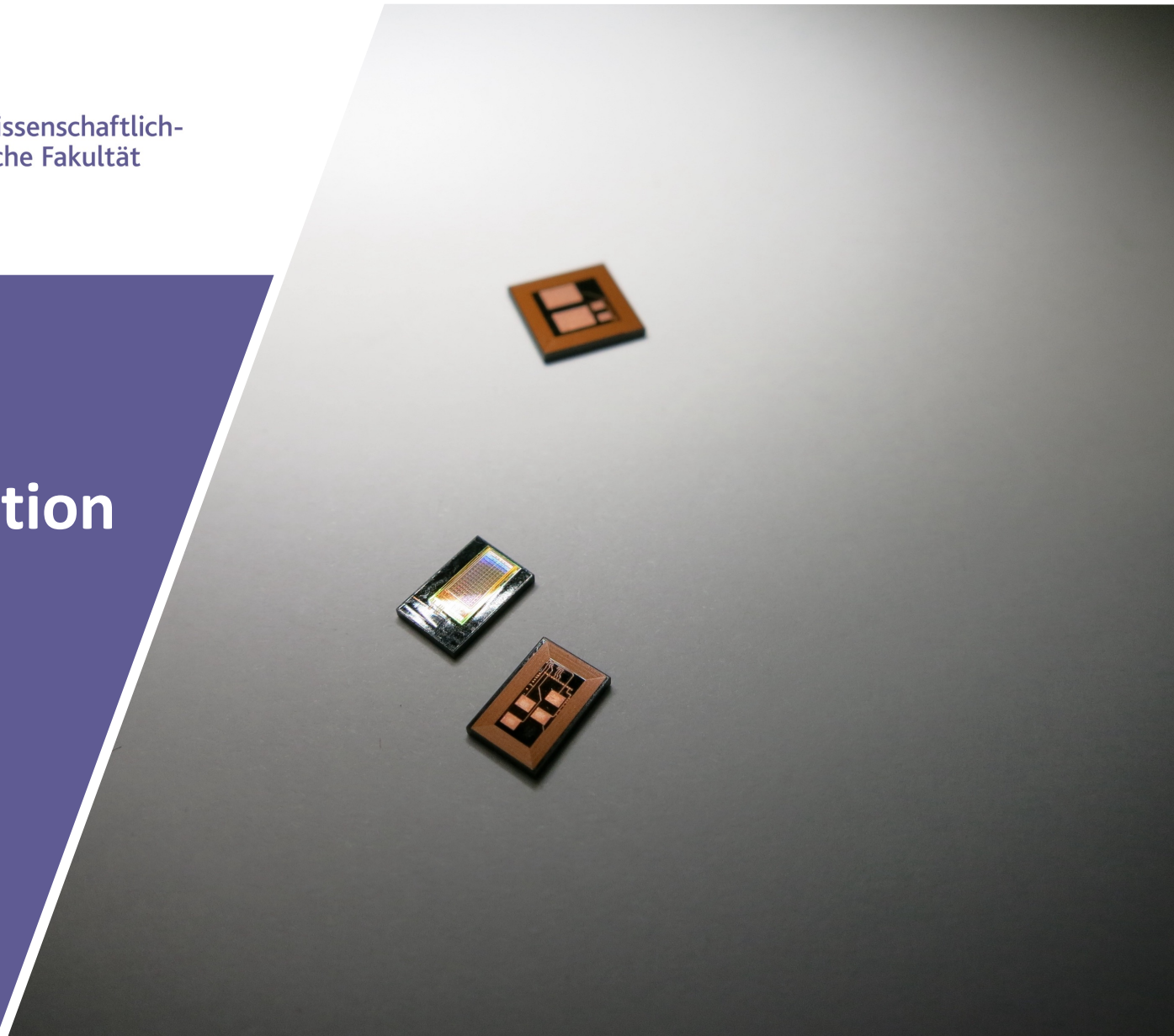


Chair of Communication Engineering

University of Siegen

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uni-siegen.de



Teaching portfolio

From communication fundamentals to sustainable and secure wireless systems

FOUNDATIONS

Grundlagen der Nachrichtentechnik

Information, modulation and coding

WIRELESS SYSTEMS

Data Communications Technology

Channels, transmission and networks

RF HARDWARE

Radio Frequency IC Design

Circuits and RF design trade-offs

ELECTROMAGNETICS

Antennas and Wave Propagation

Radiation, antennas and propagation

APPLICATIONS

Selected Topics in Wireless Technologies

Research-led wireless applications

SECURITY

Communications and Information Security

Cryptography and secure communication

Explore further: practical courses • PEP projects • Bachelor's and Master's theses

From fundamentals to wireless systems

UNDERSTAND THE PRINCIPLES

Grundlagen der Nachrichtentechnik

How does information become a signal?

- Channels, attenuation and noise
- Modulation and multiplexing
- Information theory and coding

Build the vocabulary and methods of communication engineering.

ANALYZE THE WIRELESS LINK

Data Communications Technology

How can a wireless link remain reliable?

- Link budgets, fading and channel models
- Detection, diversity, OFDM and MIMO
- Multiple access and cellular systems

Apply the concepts through calculation exercises.

Common thread: relate bandwidth, power, noise and interference to communication performance.

From RF circuits to antennas and propagation

DESIGN THE RF FRONT END

Radio Frequency IC Design

How do circuits shape RF performance?

- RF circuit principles and architectures
- Gain, noise, linearity and matching
- CAD-based low-noise amplifier design

Example design environment: Cadence AWR.

CONNECT CIRCUITS TO THE WORLD

Antennas and Wave Propagation

How is energy radiated and propagated?

- Antenna parameters, radiators and arrays
- Ionospheric and tropospheric propagation
- Analytical models and antenna simulation

Calculation exercises and Ansys HFSS simulations.

Common thread: connect physical models with design choices and interpret their limitations.

Wireless applications and secure communication

EXPLORE A RESEARCH TOPIC

Selected Topics in Wireless Technologies

How can research inform a wireless design?

- Example focus: UHF RFID and RF harvesting
- Backscatter, sensing and batteryless tags
- Analyze a paper and reproduce its results

Individual project work, simulation and technical communication.

PROTECT INFORMATION

Communications and Information Security

How do we make communication trustworthy?

- Threats and cryptographic principles
- Authentication and key management
- Security protocols and applications

Understand protection mechanisms and their assumptions.

Complementary goals: useful wireless functionality, efficient resource use and protected information.

Learn through calculation, simulation and projects

Use different methods to explain, predict and evaluate an engineering solution.

01

CALCULATE

Translate physical assumptions into quantitative predictions.

Data Communications: link budgets and fading

02

SIMULATE

Build a model and compare it with analytical expectations.

Antennas: HFSS | RFIC Design: Cadence AWR

03

INVESTIGATE

Study a research paper and reproduce selected results.

Selected Topics: an individual research-based project

04

DESIGN & EVALUATE

Develop a solution, assess the evidence and explain the results.

PEP, practical courses and thesis work

Across the portfolio: state assumptions, check plausibility and communicate your reasoning.

Take the next step: projects and theses

Apply what you learn to a focused engineering question.

OUR PRACTICAL CONTRIBUTIONS

Practical Course Communications Technology

Explore components and systems through experiments and measurement.

PEP PROJECTS

Professional Design Experience Project

Develop and evaluate a solution to an application-inspired engineering task.

THESIS WORK

Bachelor's and Master's theses

Investigate a research question through modeling, simulation, design or experiments.

EXAMPLE TOPIC AREAS AT OUR CHAIR

RFID / NFC

Antennas & coils

RF circuits

Batteryless sensing

Interested? Talk to the teaching team about your interests and available topics.

