

Steffen Schieler

Signal Processing & Machine Learning Researcher | ISAC / Radar / Wireless Sensing

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Profile

Researcher with ten years of experience in signal processing and machine learning for Integrated Communication and Sensing (ISAC). Develops hybrid learned/model-based methods for joint detection, model-order selection and wireless propagation-parameter estimation, trained on synthetic data and validated on real-world radio/radar measurements. Combines algorithm development with GPU-based software engineering, real-time deployment, measurement campaigns and demonstrator development.

Research Experience

Researcher - EMS Group, Technische Universität Ilmenau

2018 - Present

Doctoral research since 2020; thesis in final writing phase, with submission expected by the end of 2026.

Thesis: *Deep Learning for Model-Based Parameter Estimation in Integrated Communication and Sensing*

- Develop neural-network methods that jointly perform signal detection, parameter estimation and model-order selection, trained on synthetic data and validated on real-world radio/radar measurements.
- Design and implement end-to-end training and deployment workflows using PyTorch, PyTorch Lightning, NumPy, SciPy and related scientific computing tools.
- Combine learned estimators with model-based optimisation and additional gradient-based refinement, delivering application-dependent gains in runtime, performance at low SNR and robustness to data mismatch compared with conventional baselines such as ESPRIT and RiMAX.
- Develop an internal software library for training and deploying learned signal-processing models, used by multiple colleagues and supporting demonstrators, project deliverables and research publications.
- Plan and execute radio-measurement campaigns as part of research teams, leading coordination and communication with internal and external partners during campaigns; post-process, synchronise, structure, and publish the resulting data, and write scientific publications based on it.
- Present research methods and demonstrators at scientific conferences, poster sessions, exhibitions and project reviews, including talks to audiences exceeding 100 people.

Research Assistant - EMS Group, Technische Universität Ilmenau

2016 - 2018

- Worked on Integrated Communication and Sensing during the KoSiMoLo project.
- Contributed to research on passive-radar sensing and radio-channel-based perception while completing the M.Sc. degree.

Wireless Research Intern - Huawei European Research Center, Munich

October 2015 - March 2016

- Measured and optimised latency performance of a USRP SDR frontend.
- Supported a V2X communication trial with Volkswagen and deployed and optimised the SDR software environment.
- Contributed to the development of a patented secure V2X communication-link establishment concept based on object-description information and supporting technical documentation.
- Supported team IT infrastructure, including hardware/software installation, network deployment, and GUI development for a prototype system.

Education

M.Sc. Electrical Engineering - Technische Universität Ilmenau

2016 - 2018

Thesis: *Modelling of an OFDM-based passive radar and study of respective key performance parameters*

B.Sc. Electrical Engineering - Technische Universität Ilmenau

2012 - 2016

Thesis: *Design of system-orientated cooperative radar concepts based on OFDM waveform*

Technical Skills

Signal processing and sensing: Integrated Communication and Sensing (ISAC), radar sensing, wireless propagation-parameter estimation, harmonic retrieval, target detection, model-order selection, radio-channel measurements

Machine learning and scientific computing: Deep learning, convolutional neural networks, PyTorch, PyTorch Lightning, CUDA/GPU training, NumPy, SciPy, synthetic-data generation, measurement-based evaluation, hybrid model-based and machine-learning estimation, experiment tracking with Weights & Biases, Neptune and MLflow

Software engineering: Python, MATLAB, shell scripting, software testing, Python packaging and deployment, API integration and prototyping, Git/GitHub, CI/CD

Infrastructure and reproducibility: Linux system administration, multi-user GPU-node administration, HPC and cluster computing, Docker, Podman, reproducible ML environments, container networking, service hosting and cryptographic security

Research Projects

D-TRaCe - Digital-Twin Representation of Radio Channels

2026 - 2028 · Funded by the EU and the TAB

Co-authored the proposal that secured project funding. Leads the development of neural material models that infer material properties from measurements.

KOMSENS-6G - Perceptive communication networks with integrated sensor technology for 6G

2022 - 2025 · Funded by the BMBF/BMFTR

- Designed and implemented the neural estimators and dataset post-processing pipeline. Integrated a hybrid neural-network/model-based estimator, trained on synthetic data, into a high-bandwidth RF-SoC SDR demonstrator with real-time inference and visualisation on low-power edge-computing hardware, demonstrating feasibility on real-world data under operational processing constraints.
- Published the resulting [isac-uav-dataset](#), accessed by more than 50 institutions worldwide; the dataset comprises approximately 200 GB compressed and around 4 TB uncompressed. Co-authored the proposal that secured project funding. Related publications include the papers on CNN-based propagation estimation, measurement-based CNN evaluation, and 6G AI/ML perspectives listed below.

Drone-Shield - UAV detection, localisation and jamming using distributed radio sensors

2019 - 2022 · Funded by the EU and the TAB

- Initiated the project's neural-estimator work for UAV detection and localisation, developing the initial deep-learning models and GPU-based training workflows, and planned and coordinated urban UAV measurement campaigns, including permits, flight planning, measurement coordination, and technical data collection.
- Acted as internal project lead under the project manager, organising workshops with external industrial partners, preparing presentations, monitoring work packages and success criteria, and writing project deliverables.

Contributed to the ideas, proposal writing, and technical development of several additional funded projects, including BiRaum, Open6GHub, 5G-CPP, and KoSiMoLo.

Selected Publications

- Shatov, V., **Schieler, S.**, et al. Integrated Radio Sensing Capabilities for 6G Networks: AI/ML Perspective. *IEEE Communications Surveys & Tutorials*, 2026.
- Thomä, R., Andrich, C., Döbereiner, M., Faramarzhangari, R., Gedschold, J., Miranda, M., Myint, S., **Schieler, S.**, et al. Distributed multisensor ISAC. *npj Wireless Technology*, 2026.
- **Schieler, S.**, Semper, S., and Thomä, R. Wireless Propagation Parameter Estimation with Convolutional Neural Networks. *International Journal of Microwave and Wireless Technologies*, 2025.
- **Schieler, S.**, Semper, S., Schneider, C., and Thomä, R. Measurement-Based Evaluation of CNN-Based Detection and Estimation for ISAC Systems. *IEEE International Radar Conference*, 2025.
- Tosi, P., **Schieler, S.**, Henninger, M., Semper, S., and Mandelli, S. Benchmarking CFAR and CNN-Based Peak Detection Algorithms in ISAC Under Hardware Impairments. *International Workshop on Smart Antennas (WSA)*, 2025.
- **Schieler, S.**, Semper, S., Faramarzhangari, R., Döbereiner, M., and Schneider, C. Grid-free Harmonic Retrieval and Model Order Selection using Deep Convolutional Neural Networks. *European Conference on Antennas and Propagation (EuCAP)*, 2024.
- **Schieler, S.**, Döbereiner, M., Semper, S., and Landmann, M. Estimating Multi-Modal Dense Multipath Components using Auto-Encoders. *European Signal Processing Conference (EUSIPCO)*, 2022.

Full publication list: <https://steffenschieler.xyz/en-gb/publications/>