

Ege Ozkoc

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Summary

PhD student in Electrical and Computer Engineering at the University of Pittsburgh working on machine learning for biomedical time-series (ECG, EEG, IMU) and efficient, deployable AI. Industry research experience at Fraunhofer IIS building real-time Parkinson's tremor detection and compressing deep models for embedded inference (quantization, pruning). Experienced in Python, PyTorch, and C++, with a habit of building ML tools and algorithms from scratch.

Education

University of Pittsburgh

PhD in Electrical and Computer Engineering

Aug 2025 – Present
Pittsburgh, Pennsylvania

- Focus: Explainable AI, LLM-based interpretation, and signal processing for biomedical time-series.
- Cross-registered at Carnegie Mellon University.
- GPA: 3.80 / 4.00.

Friedrich-Alexander-University Erlangen-Nürnberg

MSc in Medical Engineering: Medical Image and Data Processing

Oct 2022 – Nov 2024
Erlangen, Bavaria

- Thesis: Evaluation of Traditional and Machine Learning Algorithms for Real-time Parkinson's Tremor Detection (conducted at Fraunhofer IIS).
- Overall grade: 1.4 (German scale; 1.0 = best).

Middle East Technical University

BSc in Electrical and Electronics Engineering

Sep 2016 – Aug 2022
Ankara, Türkiye

- Focus: Biomedical and Communications Engineering. Capstone: wearable system for real-time hand-to-face detection and hygiene reminders (COVID-era safety behaviors).

Relevant Coursework

Machine Learning & AI: AI for Embedded Systems, Introduction to Machine Learning (CMU), Optimization Methods, Deep Learning, Pattern Recognition, Pattern Analysis

Signal Processing: Digital Signal Processing, Statistical Signal Processing, Biomedical Signal Analysis, Signals and Systems I & II

Medical Imaging: Introduction to Medical Imaging, Magnetic Resonance Imaging I & II, Medical Imaging Systems, Image & Video Processing

Research & Work Experience

Signal Processing and Statistical Learning Lab (SPSL) at University of Pittsburgh

Swanson School of Engineering

Aug 2025 – Present
Pittsburgh, Pennsylvania

- Building an LLM-based framework that turns AI-ECG model outputs into faithful, human-readable clinical explanations for myocardial infarction and acute coronary syndrome prediction.
- Grounding open-source LLMs in model evidence — saliency maps and SHAP feature attributions — through a constrained, evidence-only prompting protocol that keeps explanations tied to the model and prevents independent diagnosis.
- First-named inventor on a U.S. provisional patent for the framework.

Fraunhofer Institute for Integrated Circuits IIS

Medical Sensors and Analytics Group

Mar 2024 – Nov 2024
Erlangen, Bavaria

- Designed a lightweight 1D CNN for real-time Parkinson's tremor detection from raw wrist-worn IMU data (tri-axial accelerometer, 50 Hz), targeting a wearable hand-stabilizer glove that reacts to tremor onset.
- Benchmarked the CNN against FFT-based, SVM, and Random Forest baselines under subject-independent leave-one-group-out cross-validation; the CNN generalized best to unseen patients (AUC > 0.90 vs. 0.68–0.75 for baselines).
- Compressed the model with 8-bit post-training quantization and structured pruning, reducing model size by ~75% with under 0.1% loss in accuracy, enabling deployment on resource-constrained microcontrollers.

FAU Erlangen-Nürnberg

Machine Learning and Data Analytics Lab

Jun 2023 – Apr 2024
Erlangen, Bavaria

- Research internship in biomechanics: predictive gait simulations of leg-length inequality (MATLAB).
- Prepared the Python exercises for FAU's Biomedical Signal Analysis course as a student assistant.

Universitätsklinikum Erlangen
Department of Radiology

Feb 2023 – Oct 2023
Erlangen, Bavaria

- Built neural-network pipelines for virtual contrast-enhanced breast MRI scans.
- Preprocessed MRI images with SimpleITK and filtered and organized patient data with Pandas for use as network input.

Middle East Technical University
Heart Research Laboratory

Jul 2020 – Jul 2022
Ankara, Türkiye

- Worked on the “ClinECGI” project, evaluating noninvasive electrocardiographic imaging for localizing premature ventricular contractions.
- Studied the inverse problem of electrocardiography via Bayesian MAP estimation, focusing on prior-model selection and noise reduction; work led to two IEEE publications.
- Applied registration and interpolation methods to transfer epicardial data between geometries in MATLAB.

ASELSAN
Defense Systems Technologies Division

Jul 2021 – Aug 2021
Ankara, Türkiye

- Built a MATLAB tool to visualize missile trajectory and orientation from experimental position and angle data.

Publications

Ege Ozkoc, Tobias Sebastian Zech, Norman Pfeiffer, Stephan Göbl, Jürgen Frickel. *Compressed and Lightweight CNN for Real-Time Parkinson's Tremor Detection from Wearable IMU Data*. In: *2025 IEEE International Workshop on Machine Learning for Signal Processing (MLSP)*, Istanbul, Türkiye, 2025. DOI: 10.1109/MLSP62443.2025.11204316

Ege Ozkoc, Yesim Serinagaoglu Dogrusoz. *Bayesian MAP Solution of the Inverse ECG Problem with Sinus Rhythm Data: Evaluation of Simulated Training Sets*. In: *30th IEEE Signal Processing and Communications Applications Conference (SIU)*, 2022. DOI: 10.1109/SIU55565.2022.9864708

Ege Ozkoc, Elifnur Sunger, Kutay Ugurlu, Yesim Serinagaoglu Dogrusoz. *Prior Model Selection in Bayesian MAP Estimation-Based ECG Reconstruction*. In: *13th International Conference on Measurement*, 2021. DOI: 10.23919/Measurement52780.2021.9446831

Honors & Awards

Turkish Education Foundation
Outstanding Merit Scholarship

Dec 2017 – Jun 2021

- Nationally competitive merit scholarship awarded to only ~60–70 Turkish university students per year.

TÜBİTAK (Scientific and Technological Research Council of Turkey)
2205 Undergraduate Researcher Scholarship

Oct 2020 – Jul 2022

- National merit-based undergraduate research scholarship from Turkey's Scientific and Technological Research Council (TÜBİTAK).

Selected Projects

- **mini-numpy**: A NumPy-like N-dimensional array library in modern C++ with Python bindings via pybind11, supporting broadcasting, slicing, and linear-algebra operations.
- **deep-learning-from-scratch**: A neural-network framework in pure NumPy with hand-derived forward/backward passes: fully connected, convolutional, and recurrent (RNN/LSTM) layers, batch normalization, and Adam (no autograd).
- **lora-from-scratch**: A minimal, readable LoRA implementation in PyTorch: the low-rank adapter, injection into existing layers, and weight merging.

Skills

- **Programming**: Python, C/C++, MATLAB, Linux Shell, Git
- **Scientific Computing**: NumPy, Pandas, scikit-learn, SimpleITK
- **Machine Learning**: PyTorch, TensorFlow, Hugging Face Transformers, ONNX, Edge AI
- **Hardware/Tools**: Simulink, Arduino, Raspberry Pi
- **Languages**: Turkish (native), English (fluent), German (intermediate)