

Hüseyin Karaca

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M.S. student in Electrical and Electronics Engineering at Bilkent University and principal Fulbright Ph.D. nominee for the 2027–28 cohort, seeking Fall 2027 Ph.D. positions. Author or co-author of 9 papers and preprints in machine learning and signal processing, focused on ensemble and feature-selection methods for sequential data and speech.

Education

Master of Science in Electrical and Electronics Engineering

Bilkent University

Jul 2024 – Present

Ankara, Türkiye

Grade: 3.87/4.00 Advisor: Prof. Dr. Süleyman Serdar Kozat

Thesis topic: Ensemble learning and feature selection methods for time-series forecasting

Bachelor of Science in Electrical and Electronics Engineering

Middle East Technical University

Sep 2019 – Jul 2024

Ankara, Türkiye

Grade: 3.60/4.00 Advisor: Assoc. Prof. Dr. Elif Vural

High School Diploma in Science

Ankara Science High School

Sep 2015 – Jun 2019

Ankara, Türkiye

Grade: 97.19/100

Publications

- J3 **Karaca, H.**, Tumay, A., Koc, A.T., Kozat, S.S. “Hierarchical Ensemble-Based Feature Selection for Time Series Prediction”. *Digital Signal Processing*, 2026. doi.org/hcb4pq
- J2 **Karaca, H.**, Kozat, S.S. “Soft Gradient Boosting with Learnable Feature Transforms for Sequential Regression”. *IEEE Signal Processing Letters*, 2025. doi.org/hbsppt
- J1 Işıl, Ç., Gan, T., Ardic, F.O., Montesoglu, K., Digani, J., **Karaca, H.**, Chen, H., Li, J., Mengü, D., Jarrahi, M., Akşit, K., Ozcan, A. “All-Optical Image Denoising Using a Diffractive Visual Processor”. *Light: Science & Applications*, 2024. doi.org/gtkjk6
- C1 **Karaca, H.**, Akgül, O., Arslan, O.F., Aydemir, A.C., Aydin, F.S., Unsal, E.A., Vural, E. “An Experimental Study of the Sample Complexity of Domain Adaptation”. *IEEE Signal Processing and Communications Applications (SIU)*, 2023. doi.org/hcjb7s
- P5 **Karaca, H.**, Kozat, S.S. “HiT-Forecast: Hierarchical Transformer Routing over Foundation Time-Series Models”. *Preprint*, 2026.
- P4 **Karaca, H.***, Namli, A.S.*, Kozat, S.S. “TAFS: Transformer-Attentive Feature Selection for Sequential Regression”. *Preprint*, 2026. Submitted to ACM Transactions on Intelligent Systems and Technology.
- P3 **Karaca, H.***, Namli, A.S.*, Kozat, S.S. “HiT-ASR: Hierarchical Transformer Routing for Adaptive ASR Expert Selection”. *Preprint*, 2026. Under review at IEEE Transactions on Audio, Speech and Language Processing.
- P2 **Karaca, H.***, Namli, A.S.*, Kozat, S.S. “FASTT: Feature-Adaptive Speech-to-Text Model Selection”. *Preprint*, 2026. Under review at Expert Systems with Applications.
- P1 Vural, E., **Karaca, H.** “A Unified Analysis of Generalization and Sample Complexity for Semi-Supervised Domain Adaptation”. *arXiv preprint*, 2025. doi.org/hcjb7r

*Equal contribution.

Research Experience

Research Engineer

Türk Telekom (6G R&D Laboratory)

Jan 2026 – Present

Ankara, Türkiye

Conduct machine learning research on traffic forecasting and resource management for 5G-and-beyond networks.

Develop transformer-based routing and selection methods: over expert models for speech-to-text (P2, P3), over input features for sequential regression (P4), and over foundation time-series models for forecasting (P5).

Summer Intern

UCLA (Ozcan Research Group, Prof. Dr. Aydogan Ozcan)

Jul 2023 – Sep 2023

Los Angeles, CA, USA

Investigated diffusion models for biomedical image restoration, running an extensive experimental comparison of denoising and reconstruction pipelines.

Contributed to the fabrication and testing of 3D-printed diffractive layers for an all-optical image denoiser, published in *Light: Science & Applications* (J1).

Undergraduate Researcher

METU (Assoc. Prof. Dr. Elif Vural's Research Group)

Sep 2022 – Jul 2024

Ankara, Türkiye

Co-authored a unified covering-number analysis of generalization and sample complexity for semi-supervised domain adaptation (C1, P1), and built the experimental program confirming its central prediction — quadratic growth in network depth and width — for both MMD-based and adversarial models.

Summer Intern

TÜBİTAK SAGE (Image Processing Division)

Built a MATLAB tool for bad-pixel detection in infrared seeker calibration images, streamlining the division's manual inspection workflow.

Explored image-stitching approaches for extending the division's robustness-analysis pipeline.

Aug 2022 – Sep 2022

Ankara, Türkiye

Undergraduate Researcher

METU (Communication Networks Group, Prof. Dr. Elif Uysal)

Surveyed age-aware random access schemes for LoRa/LoRaWAN, and won 3rd place at METU EEE STAR undergraduate research program.

Assisted in deploying a campus-wide LoRaWAN testbed at METU.

Jul 2021 – Sep 2022

Ankara, Türkiye

Teaching Experience

Graduate Teaching Assistant

Bilkent University

Lead laboratory sessions and recitations; grade reports and quizzes; review lab manuals.

- EEE321 Signals and Systems: Fall 2024 (Prof. Dr. L. Onural); Spring 2025 (Prof. Dr. B. Barshan);
Fall 2025, Spring 2026, Fall 2026 (Prof. Dr. H. Özaktaş).

Jul 2024 – Present

Ankara, Türkiye

Undergraduate Teaching Assistant

Middle East Technical University

Assisted in preparing lecture notes and organized monthly recitation sessions.

- EE201 Circuit Theory I: Fall 2023 (Prof. Dr. Ç. Candan).
- EE224 Electromagnetic Theory: Spring 2024 (Prof. Dr. G. Dural).

Oct 2023 – Jun 2024

Ankara, Türkiye

Skills

Programming: Python, MATLAB, LaTeX
ML & Data: PyTorch, scikit-learn, LightGBM, Nixtla, sktime, Hydra, Weights & Biases
Software: Siemens NX, LTspice, WordPress, Quartus II, ModelSim, Simulink
Hardware: Oscilloscope, FPGA, SDR
Spoken Languages: Turkish (Native), English (C1), Persian (A2)

Achievements and Honors

Fellowships and Scholarships

- Fulbright Scholarship (selected as principal Ph.D. nominee for the 2027–28 cohort) Sep 2026
- ICT Authority of Türkiye (BTK) 5G and Beyond Graduate Research Fellowship Oct 2025
- Turkish National Science Foundation Graduate Scholarship (2210-A) Sep 2024
- Turkish National Science Foundation Grant for Scientific Activities Abroad (2224-D) Jun 2023
- Turkish National Science Foundation Undergraduate Scholarship for Science Olympiad medalists (2205) Sep 2019
- Presidential Merit Scholarship and İş Bank Golden Youth Award (for the top 100 and 30 in the YKS) Sep 2019

Research Awards

- 3rd Place, METU EEE STAR Undergraduate Research Competition, for “Towards Age-Aware LoRa” Jun 2022

National Examinations

- Ranked 24th of 2.6 million candidates (top 0.001%) in the National University Entrance Examination (YKS) Jul 2019
- Ranked 1st of 1.4 million candidates (perfect score) in the National High School Entrance Examination (TEOG) Aug 2015

Physics Olympiads

- Bronze Medal (16th nationwide), TÜBİTAK National Physics Olympiad Feb 2018
- Turkish national team, Asian Physics Olympiad 2017 (Russia) and European Physics Olympiad 2017 (Estonia) May 2017

Activities and Interests

Cycling — Board Member, METU Cycling Team

Represented METU in intercollegiate road and mountain bike races.

Organized weekly training rides and introductory sessions for newcomers.

Trekking and Camping

Completed two long-distance treks (200 km in total) on the Ancient Lycian Way.

Organized full-moon night hikes and camping trips in Cappadocia.

Student Council President — Ankara Science High School

Organized the annual spring festival and school-wide year-end events for three consecutive years.

Founded a book society and led its weekly book review meetings.

Hobbies

Reading and pour-over coffee brewing.