

# Hüseyin Karaca

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## Education

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<b>Master of Science</b> in Electrical and Electronics Engineering <i>Bilkent University</i> Grade: 3.87/4.00 Advisor: Prof. Dr. Süleyman Serdar Kozat Thesis topic: Ensemble learning and feature selection methods for time-series forecasting	2024-07 – present Ankara, Türkiye
<b>Bachelor of Science</b> in Electrical and Electronics Engineering <i>Middle East Technical University</i> Grade: 3.60/4.00 Advisor: Assoc. Prof. Dr. Elif Vural Capstone Project: A smart monitor to keep track of vitals and sleep patterns of the baby.	2019-09 – 2024-07 Ankara, Türkiye
<b>High School Diploma</b> in Science <i>Ankara Science High School</i> Grade: 97.19/100	2015-09 – 2019-06 Ankara, Türkiye

## Research Experience

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<b>Summer Intern</b> <i>UCLA (The Ozcan Research Group)</i> Studied diffusion models for biomedical images under the supervision of Prof. Dr. Aydogan Ozcan. Helped the preparation of 3D printed diffractive layers for an all-optical image denoiser network.	2023-07 – 2023-09 Los Angeles, CA, USA
<b>Undergraduate Researcher</b> <i>METU (Dr. Elif Vural's Research Group)</i> Studied sample complexity of domain adaptation of different deep learning architectures. Performed regular neural network trainings with PyTorch to test novel theoretical bounds.	2022-09 – 2024-07 Ankara, Türkiye
<b>Summer Intern</b> <i>TUBITAK SAGE (Image Processing Division)</i> Studied on bad pixel detection and wrote a MATLAB code that simplifies the examination of calibration images. Improved robustness analysis algorithms by performing stitching on real seeker images.	2022-08 – 2022-09 Ankara, Türkiye
<b>Undergraduate Researcher</b> <i>METU (Communication Networks Group)</i> Studied age-aware random access for LoRa - LoRaWAN protocols. Employed a LoRaWAN network at the METU campus.	2021-07 – 2022-09 Ankara, Türkiye

## Publications

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- 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: 10.1016/j.dsp.2025.105528
- J2 **Karaca, H.**, Kozat, S.S.. "Soft Gradient Boosting with Learnable Feature Transforms for Sequential Regression". *IEEE Signal Processing Letters*, 2024. DOI: 10.1109/LSP.2025.3639345
- J1 Isil, C., Gan, T., Ardic, F.O., Montesoglu, K., Digani, J., **Karaca, H.**, Chen, H., Li, J., Mengu, D., Jarrahi, M., Aksit, K., Ozcan, A.. "All-optical image denoising using a diffractive visual processor". *Light: Science & Applications*, 2024. DOI: 10.1038/s41377-024-01385-6
- C1 **Karaca, H.**, Akgul, 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: 10.1109/SIU59756.2023.10223790
- P1 Vural, E., **Karaca, H.**. "A Unified Analysis of Generalization and Sample Complexity for Semi-Supervised Domain Adaptation". *arXiv preprint*, 2025. DOI: 10.48550/arXiv.2507.22632

## Teaching Experience

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### Graduate Teaching Assistant

*Bilkent University*

Guided students during laboratory sessions, graded reports and quizzes, organized recitations.

- *EEE321 Signals and Systems (Fall 2024, Prof. Dr. Levent Onural).*
- *EEE321 Signals and Systems (Spring 2025, Prof. Dr. Billur Barshan).*
- *EEE321 Signals and Systems (Fall 2025, Spring 2026, Prof. Dr. Haldun Özaktas).*

2024-07 – present  
Ankara, Türkiye

### Undergraduate Teaching Assistant

*Middle East Technical University*

Assisted the preparation of lecture notes, organized monthly recitations.

- *EE201 Circuit Theory I (Fall 2023, Prof. Dr. Çağatay Candan).*
- *EE224 Electromagnetic Theory (Spring 2024, Prof. Dr. Gülbin Dural).*

2023-10 – 2024-06  
Ankara, Türkiye

## Skills

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<b>Languages:</b>	Turkish (Native), English (C1), Persian (A2)
<b>Programming:</b>	PyTorch, Python, MATLAB, LaTeX, Scikit-learn, Nixtla, Sktime
<b>Software:</b>	Siemens NX, LTspice, Wordpress, Quartus II, Modelsim, Simulink
<b>Hardware:</b>	Oscilloscope, FPGA, SDR

## Achievements and Honors

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### Research Awards

- \* ICT Authority of Türkiye 5G and Beyond Graduate Research Fellowship 10/25
- \* METU EEE STAR Departmental Undergraduate Research Program 3rd Place Award 06/22
- \* The Sci. Tech. Res. Council of Türkiye National Graduate Scholarship Program (2210-A) 09/24
- \* The Sci. Tech. Res. Council of Türkiye Scientific Activities Abroad Support Program (2224-D) 06/23

### National Examinations

- \* Placed 24th among 2.6M participants in National University Entrance Examination (YKS) 07/19
- \* Placed 1st among 1.4M participants in National High School Entrance Examination (TEOG) 08/15

### Physics Olympiads

- \* Bronze medalist in National Physics Olympiads 02/18
- \* Represented Turkey in Asian and European Physics Olympiads held in Russia and Estonia. 05/17
- \* The Sci. Tech. Res. Council of Türkiye Undergraduate Scholarship Program (2205) 09/19

## Extracurricular Activities

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### Trekking and Camping

Participated in two trekking tours (200km) on the Ancient Lycian Way.  
Organized midnight full moon walks and camps in Cappadocia.

### Cycling

*Board Member at METU Cycling Team*

Represented METU in intercollegiate mountain and road bike races.  
Organized weekly trainings and rides for the newcomers.

### Student Council Presidency

*Ankara Science High School*

Organized a spring festival and "Happy New Year!" party (three years in a row).  
Designed and sold printed hoodies for the Class of 2019.  
Founded a book society and organized weekly book review meetings.