

# Merve Begum TERZI, *Ph.D.*

## Contact Information

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### Postdoctoral Research Fellow

National Magnetic Resonance Research Center (UMRAM)  
Electrical & Electronics Engineering Department  
Bilkent University, Ankara, Turkey

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## Research Interests

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Signal Processing | Image Processing & Reconstruction | Machine Learning (Unsupervised / Self-Supervised / Few-Shot Learning) | Explainable AI (XAI) | Computer Vision | Pattern Recognition | Federated Learning | Medical Imaging & Instrumentation | Inverse Problems | Anomaly Detection | Magnetic Particle Imaging (MPI) | Magnetic Resonance Imaging (MRI)

## Education

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- **Bilkent University, Faculty of Engineering, Ankara, Turkey**

**Ph.D., Electrical & Electronics Engineering (100% Merit Scholarship)** [2015 – 2023]

Dissertation Title: Artificial Intelligence-based Hybrid Anomaly Detection and Clinical Decision Support Techniques for Automated Detection of Cardiovascular Diseases and COVID-19

**Advisor:** Prof. Orhan Arikan

- **Bilkent University, Faculty of Engineering, Ankara, Turkey**

**M.S., Electrical & Electronics Engineering (100% Merit Scholarship)** [2012 – 2015]

Thesis Title: Early Diagnosis of Acute Coronary Syndromes Automatically by using Features of ECG Recordings

**Advisor:** Prof. Orhan Arikan

## International Education Experience

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- **Athénée Royal d'Auderghem, Brussels, Belgium**

*Complete Secondary Education*

## Academic Experience

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- **Bilkent University, National Magnetic Resonance Research Center (UMRAM), Electrical & Electronics Engineering Department, Ankara, Turkey.**

**Postdoctoral Research Fellow, SARITAS Research Lab.** [2024 – Present]

**Supervisor:** Prof. Emine Ulku Saritas

- **Bilkent University, Electrical & Electronics Engineering Department, Ankara Turkey.**

**Graduate Research Assistant, ARIKAN Research Lab.** [2012 – 2023]

- **Bilkent University**, Electrical & Electronics Engineering Department, Ankara, Turkey.

#### **Graduate Teaching Assistant**

[2012 – 2023]

Assisted in a diverse range of undergraduate and graduate courses, including:

- \* EEE-525 Advanced Signal Processing
- \* EEE-520 Multirate Signal Processing & Wavelet Theory
- \* EEE-501 Linear System Theory
- \* EEE-443/543 Neural Networks
- \* EEE-442/542 Nonlinear Systems
- \* EEE-431 Digital Communications
- \* EEE-424 Digital Signal Processing
- \* EEE-351 Engineering Electromagnetics
- \* EEE-342 Feedback Control Systems
- \* EEE-321 Signals and Systems
- \* EEE-313 Electronic Circuit Design
- \* EEE-212 Microcontrollers & Embedded Systems
- \* EEE-211 Analog Electronics
- \* EEE-201/202 Circuit Theory

Formally evaluated as 'Exceptional' by course instructors five times for Teaching Assistant performance.

## **Courses Taught**

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- GE-304 Technology Society and Professional Development Seminar Course

## **Professional Experience**

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- **Siemens Healthineers**, Istanbul, Turkey

June 2012 - Sept. 2012

#### ***Research Internship***

- \* Contributed to the development and optimization of signal processing pipelines for MRI systems, focusing on image reconstruction algorithms and noise reduction techniques.
- \* Gained hands-on experience with medical image acquisition workflows and quality assessment of reconstructed images, supporting the integration of digital signal processing methods into clinical imaging protocols.

- **Toshiba Medical Systems** (Canon Medical Systems), Istanbul, Turkey

June 2011 - Sept. 2011

#### ***Research Internship***

- \* Developed and evaluated iterative reconstruction algorithms for computed tomography (CT) systems, focusing on artifact reduction and image quality enhancement.
- \* Conducted comparative performance analysis of image reconstruction techniques under varying clinical acquisition protocols.
- \* Assisted in image quality assessment studies using clinical datasets to validate diagnostic accuracy.

***Research Internship***

Advisor: Prof. Osman Erogul, Director of Biomedical Engineering Center

\*Performed clinical validation and performance benchmarking of medical imaging systems (MRI, CT, Ultrasound) through quantitative image analysis and protocol optimization methods.

\*Conducted system-level testing and quality assurance procedures, assessing imaging device performance against clinical diagnostic requirements and regulatory standards.

## **Other Academic Duties**

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- Treasurer, IEEE Signal Processing Society (SPS) Turkey Chapter, since 2024.

## **Honors and Awards**

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- Recipient of the “TUBITAK BIDEB 2250 Performance-based Scholarship Program for Ph.D. and Post-Doctoral Scholars”, awarded in recognition of research performance and active contribution to research projects, 2025/1.
- Recipient of the “TUBITAK BIDEB 2250 Performance-based Scholarship Program for Ph.D. and Post-Doctoral Scholars”, awarded in recognition of research performance and active contribution to research projects, 2024/2.
- Recipient of the “TUBITAK BIDEB 2250 Performance-based Scholarship Program for Ph.D. and Post-Doctoral Scholars”, awarded in recognition of research performance and active contribution to research projects, 2024/1.
- Recipient of the “TUBITAK BIDEB 2237-A Grant Program for Scientific Training”, awarded to support scientific training activities in science and technology and to promote advancement in these fields, 2022.
- Recipient of the “TUBITAK BIDEB 2224-A Grant Program for Participation in Scientific Meetings Abroad”, awarded to support participation in an international scientific conference, 2020.
- Recipient of the “TUBITAK BIDEB 2224-B Grant Program for Participation in Scientific Meetings within the Country”, awarded to support participation in a national scientific conference, 2018.
- Recipient of the “TUBITAK BIDEB 2211-C National Ph.D. Scholarship Program for Priority Research Areas in Science and Technology”, awarded to support my Ph.D. dissertation research, 2017 - 2018.
- During my Ph.D. studies, I was recognized five times for “Exceptional” Teaching Assistant Performance based on formal faculty evaluations. These recognitions were accompanied by departmental appreciation and partial financial support for academic conference and publication-related expenses.
- Received a full Merit Scholarship for graduate education (M.S. & Ph.D.) in the Top engineering school in Turkey, Bilkent University, Ankara, Turkey, 2012 - 2023.
- Ranked First in Class (Valedictorian) in the entire School of Engineering, Baskent University, Ankara, Turkey, 2012.
- Awarded funding and scholarship by TUBITAK BIDEB through the “2209-A Research Projects Support Program for Undergraduate Students”, for Undergraduate Senior Design Project, 2011 – 2012.

- Recipient of an Erasmus Scholarship for the Intensive Course “Biomedical Engineering in a European Perspective” at the University of Applied Sciences Oldenburg, Wilhelmshaven, Germany, June 2013 – Sept. 2013. The scholarship was awarded in recognition of maintaining continuous High-Honor academic performance during my undergraduate education.
- Awarded the “Outstanding Achievement Scholarship” for maintaining continuous High-Honor academic standing throughout my undergraduate education at Baskent University, Ankara, Turkey, 2008 - 2012.
- First Prize Winner at the Interactive Computer Competition of the NATO Science Exhibition “Bringing Scientists Together for the Advancement of Science”, organized by NATO in Brussels, Belgium.

## **Research Projects**

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- “A Neurotechnological Solutions Platform for Challenges Threatening Human Function”, Postdoctoral Researcher, TUBITAK ARDEB 1004 Project, 23AG005, 2024 - 2027. (Principal Investigator: Prof. Ergin Atalar, Bilkent University).
- “Focused Hyperthermia and Simultaneous Temperature Monitoring with Magnetic Particle Imaging”, Postdoctoral Researcher, TUBITAK ARDEB 1001 Project, 122E162, 2024 - 2025. (Principal Investigator: Prof. Emine Ulku Saritas, Bilkent University).
- “Nanoparticle Fingerprinting for Cancer Imaging with Magnetic Particle Imaging”, Postdoctoral Researcher, TUBITAK ARDEB 1001 Project, 120E208, 2023 - 2024. (Principal Investigator: Prof. Emine Ulku Saritas, Bilkent University).
- “Ensemble Learning-based Hybrid Clinical Decision Support Technique for Automated Detection of COVID-19 using RT-PCR Curves, Thorax Computed Tomography Images and Clinical-Laboratory Data”, Ph.D. Thesis Project, Health Institutes of Turkiye (TUSEB) Strategic Research and Development Project Support Program – COVID-19 Strategic R&D Project Call, 2020-CV01-9081, 2020 - 2022. (Principal Investigator: Prof. Ozlem Ozdemir Kumbasar, Ankara University).
- “Deep Learning-based Automated Early Detection of Cardiac Diseases from Sympathetic Nerve Activity Signals”, Ph.D. Thesis Project, TUBITAK ARDEB 1001 Project, 2018-2020. (Principal Investigator: Prof. Adnan Abaci, Gazi University).
- “Weakly-Supervised Multiple Instance Learning for Tumor Detection in Histopathology Images”, CS-550 Machine Learning Course Project. (Course Instructor: Prof. Cigdem Gunduz Demir).
- “Explainable Artificial Intelligence (XAI) for Computer Vision Failure Mode Analysis”, EEE-543 Neural Networks Course Project. (Course Instructor: Prof. Tolga Cukur).
- “Numerical Simulation and Comparative Analysis of Magnetic Resonance Imaging (MRI) Sequences”, EEE-574 Foundations of Magnetic Resonance Imaging Course Project. (Course Instructor: Prof. Ergin Atalar).
- “Modeling the Structural Characteristics of Anomalies and Irregularities in the Turkish Ionosphere using Machine Learning Techniques”, Ph.D. Thesis Project, TUBITAK ARDEB 1001 Project, 114E541, 2015-2017. (Principal Investigator: Prof. Feza Arikan, Hacettepe University).
- “Machine Learning- and Signal Processing-based Automated ECG Analysis for Early and Robust Detection of Cardiovascular Diseases”, M.S. Thesis Project, TUBITAK ARDEB 1001 Project, 113E174, 2013 - 2015. (Principal Investigator: Prof. Adnan Abaci, Gazi University).
- “Magnetic Resonance Electrical Properties Tomography (MREPT)”, TUBITAK ARDEB 1001 Project, 11E090, 2012 - 2013. (Principal Investigator: Prof. Yusuf Ziya Ider, Bilkent University).

- “Ora-Nasal Airflow Measurement System Design and Ora-Nasal Respiratory Index Measurement”, Undergraduate Senior Design Project, TUBITAK BIDEB 2209-A Project, 2011 - 2012. (Advisor: Prof. Osman Erogul, Baskent University).

## Publications

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1. **MB Terzi**, O Arikан. “Machine learning based hybrid anomaly detection technique for automatic diagnosis of cardiovascular diseases using cardiac sympathetic nerve activity and electrocardiogram”. *Biomedical Engineering / Biomedizinische Technik*, vol. 69, no. 1, 2024, pp. 79-109. <https://doi.org/10.1515/bmt-2022-0406>
2. EB Verdi, M Gok, DD Mülazimoglu, **MB Terzi**, AG Kaya, S Erol, O İsik, OU Guvendik, C Uzun, AH Elhan, ZC Karahan, A Azap, A Kaya, O Arikан, OO Kumbasar. “Deep Learning-based Hybrid Clinical Decision Support System Algorithm for COVID-19 Diagnosis via PCR Graphics and Thorax CT Images, Preliminary Data”. *European Respiratory Journal*, vol. 60, suppl 66, September 2022. DOI:10.1183/13993003.congress-2022.1357 (ISSN: 0903-1936).
3. EB Verdi, DD Mulazimoglu, **MB Terzi**, M Gok, AG Kaya, S Erol, O Isik, OU Guvendik, C Uzun, AH Elhan, ZC Karahan, A Azap, A Kaya, O Arikан, OO Kumbasar. “Deep Learning-based Hybrid Clinical Decision Support System Algorithm for COVID-19 Diagnosis via PCR Curves and Thorax CT Images, Preliminary Data”. *25th Annual National Congress of Turkish Thoracic Society*, Antalya, Turkey, May 2022, p. 211-212.
4. **MB Terzi**, O Arikан. “Detection of Cardiac Arrhythmia using Sympathetic Nerve Activity, Gaussian Mixture Model and Artificial Neural Network”. *19th National Neuroscience Congress (USK)*, Ankara, Turkey, November 2021.
5. **MB Terzi**, O Arikан. “Detection of Cardiac Arrhythmia using Sympathetic Nerve Activity, Gaussian Mixture Model, and Artificial Neural Network”. *Anatomy: International Journal of Experimental and Clinical Anatomy*, November 2021.
6. **MB Terzi**, O Arikан. “Deep Learning with Gated Recurrent Neural Networks for Anomaly Detection”. *International Congress on Multidisciplinary Natural Sciences and Engineering (ICOMNAS)*, Ankara, Turkey, December 2021, p. 300-308. (ISBN: 978-605-71156-0-7).
7. **MB Terzi**, O Arikан. “Deep Gated Recurrent Unit and Long Short Term Memory-based Anomaly Detection Technique”. *International Congress on Multidisciplinary Natural Sciences and Engineering (ICOMNAS)*, Ankara, Turkey, December 2021, p. 149-157. (ISBN: 978-605-71156-0-7).
8. **MB Terzi**. “Anomaly Detection with Deep Long Short Term Memory Networks”. *2021 6th International Conference on Computer Science and Engineering (UBMK)*, Ankara, Turkey, 2021, pp. 129-132. DOI: 10.1109/UBMK52708.2021.9559034
9. **MB Terzi**, A Abaci, O Arikан, M Candemir, M Dedeoglu. “The GU-ECG Database: ECG Datasets for Detection and Classification of Acute Myocardial Ischaemia Through Machine Learning”. *Mendeley Data*, V1. 2021. DOI:10.17632/zhr5zsngtg.1
10. **MB Terzi**, O Arikан. “Detection of Ischaemia using Nerve Activity, Artificial Neural Network, and Gaussian Mixture Model”. *18th National Neuroscience Congress (USK)*, Ankara, Turkey, 2020, p. 200.
11. **MB Terzi**, O Arikан. “Detection of Cardiac Arrhythmia using Autonomic Nervous System, Gaussian Mixture Model, and Artificial Neural Network”. *2020 Medical Technologies Congress (TIPTEKNO)*, Antalya, Turkey, 2020, pp. 1-4. DOI:10.1109/TIPTEKNO50054.2020.9299274

12. **MB Terzi**, O Arikan. "Anomaly Detection Technique based on Sympathetic Nerve Activity for Detection of Cardiac Arrhythmia". *2020 28th Signal Processing and Communications Applications Conference (SIU)*, Gaziantep, Turkey, 2020, pp.1-4. DOI: 10.1109/SIU49456.2020.9302485
13. **MB Terzi**, O Arikan. "Detection of Myocardial Ischaemia by using Sympathetic Nerve Activity, Artificial Neural Network and Gaussian Mixture Model". *Anatomy: An International Journal of Experimental and Clinical Anatomy*, vol. 14, 2020, p.S151. (ISSN: 1307-8798).
14. **MB Terzi**, O Arikan. "Detection of Myocardial Infarction using Autonomic Nervous System, Gaussian Mixture Model, and Artificial Neural Network". *2020 Medical Technologies Congress (TIPTEKNO)*, Antalya, Turkey, 2020, pp. 1-4. DOI: 10.1109/TIPTEKNO50054.2020.9299275
15. **MB Terzi**, O Arikan. "Detection of Myocardial Ischaemia by using ECG, Artificial Neural Network and Gaussian Mixture Model". *2020 28th Signal Processing and Communications Applications Conference (SIU)*, Gaziantep, Turkey, 2020, pp. 1-4. DOI: 10.1109/SIU49456.2020.9302389
16. **MB Terzi**, O Arikan. "Detection of Acute Coronary Syndrome based on Support Vector Machines and ECG". *2019 27th Signal Processing and Communications Applications Conference (SIU)*, Sivas, Turkey, 2019, pp. 1-4. DOI:10.1109/SIU.2019.8806272
17. **MB Terzi**, MK Korkmaz, O Arikan, S Topal, A Abaci. "Detection of Acute Myocardial Ischemia based on Artificial Neural Networks and Skin Sympathetic Nerve Activity". *II. International Conference and Exhibition on Digital Transformation and Smart Systems (DTSS)*, Ankara, Turkey, 2019, p. 69-72.
18. **MB Terzi**, O Arikan. "Coronary Artery Disease Detection by using Support Vector Machines and Gaussian Mixture Model". *2019 Medical Technologies Congress (TIPTEKNO)*, Izmir, Turkey, 2019, pp. 1-4. DOI:10.1109/TIPTEKNO.2019.8894953
19. **MB Terzi**, MK Korkmaz, O Arikan, S Topal, A Abaci. "Detection of myocardial ischaemia based on artificial neural networks and skin sympathetic nerve activity". *EasyChair*, 2019, (2165).
20. **MB Terzi**, O Arikan. "Detection of Acute Myocardial Ischemia based on Support Vector Machines". *2018 26th Signal Processing and Communications Applications Conference (SIU)*, Izmir, Turkey, 2018, pp. 1-4. DOI: 10.1109/SIU.2018.8404733
21. **MB Terzi**, O Arikan, S. Karatay, F. Arikan. "Classification of Regional Ionospheric Disturbances based on Support Vector Machines". *2017 25th Signal Processing and Communications Applications Conference (SIU)*, Antalya, Turkey, 2017, pp. 1-4.
22. **MB Terzi**, O Arikan, S Karatay, F Arikan. "Classification of Regional Ionospheric Disturbances based on Machine Learning Techniques". *The Third Committee on Space Research (COSPAR) Symposium*, Jeju, South Korea, 2017, p. 1-4.
23. **MB Terzi**, F Arikan, O Arikan, S Karatay. "Classification of Regional Ionospheric Disturbances based on Support Vector Machines". *41st Committee on Space Research (COSPAR) Scientific Assembly*, Istanbul, Turkey, 2016, vol. 41, pp. C1-4.
24. **MB Terzi**, O Arikan, F Arikan, S Karatay, T Gulyaeva. "Classification of Regional Ionospheric Disturbance based on Machine Learning Techniques". *Living Planet Symposium (LPS), European Space Agency (ESA) Special Publication*, Prague, Czech Republic, vol. SP-740, 2016, p. 1-6. (ISSN: 0379-6566) (ISBN: 978-929221305-3).
25. **MB Terzi**, O Arikan, F Arikan, S Karatay, T Gulyaeva. "Classification of Regional Ionospheric Disturbances based on Support Vector Machines". *VIII. International Union of Radio Science (URSI) Scientific Congress*, Ankara, Turkey, September 2016, p. 1-4.

26. **MB Terzi**, O Arıkan, S Karatay, F Arıkan, T Gulyaeva. "Classification of Regional Ionospheric Irregularities using Support Vector Machines". *Summer School on New Techniques in Machine Learning and Information Processing*, Ankara, 2016. <https://yazokulu.bilimakademisi.org/yapayogrenme/2016/poster-oturumlari.html>
27. **MB Terzi**, O Arıkan, A Abaci, M Candemir, M Dedoglu. "Early Diagnosis of Acute Coronary Syndromes with Automatic ST/T Classifier". *2014 18th National Biomedical Engineering Meeting*, İstanbul, Turkey, October 2014, pp. 1-4. DOI:10.1109/BIYOMUT.2014.7026388.
28. **MB Terzi**, T Celik, O Erogul. "Ora-Nasal Airflow Measurement System Design and Ora-Nasal Respiratory Index Measurement". *2011 16th National Biomedical Engineering Meeting (BIYOMUT)*, Antalya, Turkey, October 2011, pp. 1-4.

## **Conference Organization**

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1. Organizing Committee Vice Chair, *33rd Graduate Research Conference*, Department of Electrical & Electronics Engineering, Bilkent University, Ankara, Turkey, 27 January 2023.  
(website: <https://ieee.bilkent.edu.tr/grc/grc2023/index.html>)
2. Organizing Committee Vice Chair, *32nd Graduate Research Conference*, Department of Electrical & Electronics Engineering, Bilkent University, Ankara, Turkey, 27 January 2022.  
(website: <https://ieee.bilkent.edu.tr/grc/grc2022/index.html>)
3. Organizing Committee Vice Chair, *31st Graduate Research Conference*, Department of Electrical & Electronics Engineering, Bilkent University, Ankara, Turkey, 20 January 2021.  
(website: <https://ieee.bilkent.edu.tr/grc/grc2021/index.html>)
4. Organizing Committee Vice Chair, *31st Graduate Research Conference*, Department of Electrical & Electronics Engineering, Bilkent University, Ankara, Turkey, 8 May 2020.  
(website: <https://ieee.bilkent.edu.tr/grc/grc2020/index.html>)
5. Organizing Committee Vice Chair, *30th Graduate Research Conference*, Department of Electrical & Electronics Engineering, Bilkent University, Ankara, Turkey, 22 March 2019.  
(website: <https://ieee.bilkent.edu.tr/grc/grc2019/index.html>)
6. Organizing Committee Vice Chair, *29th Graduate Research Conference*, Department of Electrical & Electronics Engineering, Bilkent University, Ankara, Turkey, 6 April 2018.  
(website: <https://ieee.bilkent.edu.tr/grc/grc2018/index.html>)

## **Academic Journal Reviewership**

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- The Lancet
- IEEE Transactions on Medical Imaging
- IEEE Transactions on Computational Imaging
- IEEE Transactions on Biomedical Engineering
- IEEE/ACM Transactions on Audio, Speech and Language Processing
- IEEE Transactions on Artificial Intelligence
- IEEE Journal of Biomedical and Health Informatics
- IEEE Internet of Things Journal
- American Journal of Physiology-Renal Physiology

- Medical Physics
- Physics in Medicine and Biology
- Signal, Image, and Video Processing (SIVP)
- European Journal of Medical Physics
- Biomedical Signal Processing and Control
- Digital Signal Processing
- Expert Systems with Applications
- Physical and Engineering Sciences in Medicine
- European Radiology
- Medical Hypotheses
- Computers in Biology and Medicine
- The British Journal of Radiology
- Canadian Journal of Electrical and Computer Engineering
- Australasian Physical and Engineering Sciences in Medicine
- Journal of Thoracic Imaging
- IEEE International Symposium on Biomedical Imaging (ISBI)
- European Journal of Clinical Microbiology & Infectious Diseases
- European Journal of Preventive Cardiology
- Frontiers in Cardiovascular Medicine
- CJC Pediatric and Congenital Heart Disease
- Journal of Medical Microbiology
- Access Microbiology
- Applied Intelligence
- Radiologia Medica
- Behavioral Neuroscience
- Data in Brief
- TUBITAK - Turkish Journal of Electrical Engineering and Computer Sciences

## **Professional Memberships**

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- COST (European Cooperation in Science and Technology) Association - COST Action Working Group, since 2025.
- Federation of European Neuroscience Societies (FENS), since 2024.
- International Society of Magnetic Resonance in Medicine (ISMRM), since 2023.
- IEEE Engineering in Medicine and Biology Society (EMBS), since 2012.
- IEEE Robotics and Automation Society (RAS), since 2014.
- IEEE Machine Learning for Automation (MLA) Technical Committee, since 2014.
- IEEE Robot Control (RCTRL) Technical Committee, since 2014.

- IEEE Women in Engineering (WIE), since 2012.
- IEEE Young Professionals, since 2012.
- Institute of Electrical & Electronics Engineering (IEEE), since 2012.
- Turkish Magnetic Resonance Society (Turk Manyetik Rezonans Dernegi), since 2023.
- Turkish Society for Brain Research and Neuroscience (TUBAS), since 2023.
- Bilkent University Cognitive Science Society & Consciousness Collective Club, since 2025.
- UCTEA The Chamber of Electrical Engineers (EMO), since 2012.

## Technical Skills

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- **Programming Languages:** Python, MATLAB, Julia, C, C++, CUDA
- **Machine & Deep Learning Frameworks:** PyTorch, TensorFlow, Keras, scikit-learn, MONAI
- **Scientific Computing & Simulation:** Simulink, COMSOL, LTSpice, Proteus (Ares & Isis), Multisim, Electronic Workbench
- **Technical & Research Tools:** IBM SPSS Statistics, LaTeX, Overleaf, Linux, Git

## Language Skills

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- **English:** Professional working proficiency
- **French:** Professional working proficiency
- **German:** Elementary proficiency
- **Turkish:** Native proficiency

Last Updated: January 10, 2026