

# Mustafa Semih Sadak

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## Research Profile

Assistant Professor researching trustworthy AI, machine learning, and safety-critical operational systems, with a current focus on aviation and air traffic management. My work brings together multimodal learning, human-in-the-loop decision support, and deployable AI for communication, training, and operational monitoring.

## Academic Appointments

**Assistant Professor (Dr. Öğr. Üyesi)** July 2025 – Present  
*Piri Reis University, Department of Electrical and Electronics Engineering, Istanbul, Türkiye*  
Teaching and research in machine learning, pattern recognition, signals and systems, human-computer interaction, and computing-related engineering topics.

**Lecturer** 2023 – 2025  
*Istanbul Okan University, Graduate School, Istanbul, Türkiye*  
Taught postgraduate and undergraduate courses in software, web programming, image processing, and computer engineering topics.

## Education

**Ph.D. in Electronics and Communication Engineering** 2013 – 2022  
*Yıldız Technical University, Istanbul, Türkiye*  
**Thesis:** Fusion of Dynamic and Static Features for Handwritten Signature Verification  
**Advisors:** Prof. Nihan Kahraman and Dr. Umut Uludağ

**M.S. in Mathematical Engineering** 2009 – 2011  
*Yıldız Technical University, Istanbul, Türkiye*  
**Thesis:** Performance Comparison of Numerical Algorithms Used in Solving Engineering Problems  
**Advisor:** Prof. Hülya Şahintürk

**B.S. in Mathematical Engineering** 2004 – 2009  
*Yıldız Technical University, Istanbul, Türkiye*

## Selected Publications

### Journal Articles

**Sadak, M. S.** A Multi-Agent LLM Framework with Bayesian Fusion and Safety Guardrails for ATC-Pilot Communication Error Detection. *Expert Systems with Applications*. 2026, Article 132241.

**Sadak, M. S., Kahraman, N., and Uludağ, U.** Dynamic and static feature fusion for increased accuracy in signature verification. *Signal Processing: Image Communication*. 2022, 108, 116823.

### Conference Proceedings

**Sadak, M. S., Kahraman, N., and Uludağ, U.** Handwritten signature verification system using sound as a feature. *43rd International Conference on Telecommunications and Signal Processing (IEEE TSP)*. 2020.

**Öncü, A., Arar, Ö. F., Akpınar, S., Yalçın, Ö., Mert, Ü., Sadak, M. S., Toker, G., Yıldırım, S., and Öztürk, U.** Developing an Electronic Examination System for Aptitude Measurement and Application to Air Traffic Controller Selection. *UYMS*. 2014.

**Arar, Ö. F., Öncü, A., Akpınar, S., Yalçın, Ö., Mert, Ü., Sadak, M. S., and Kosunalp, S.** A Flexible E-Exam Framework and Air Traffic Controller Selection System. *3rd World Conference on Information Technology, AWER-Procedia Information Technology & Computer Science*. 2013.

## Selected Research and ATC-Related R&D Projects

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- Developed a multi-agent LLM framework with Bayesian fusion and safety guardrails for detecting operationally relevant communication errors in ATC–pilot exchanges.
- Contributed to the development and deployment of domestic ATC simulator systems covering APP/ACC radar and TWR operations, including 3D tower visualisation and operational training support.
- Worked on ATC controller selection, assessment, remote training, examination, and personnel management systems for operational and recurrent evaluation.
- Contributed to ATC portal and ATM communication infrastructure modernisation projects, including planning, synchronisation, and software support for operational environments.

## Professional Experience

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### Project Manager

May 2017 – May 2025

*TÜBİTAK, Kocaeli, Türkiye*

Led software projects spanning parliamentary information systems and ATC-related platforms. Managed cross-functional teams and contributed to requirements analysis, software design, development, testing, reporting, deployment, and delivery in public-sector and safety-critical contexts.

### Senior Software Engineer

June 2014 – May 2017

*TÜBİTAK, Kocaeli, Türkiye*

Worked on distributed software architecture for air traffic controller simulation systems and developed performance evaluation tools for real-time trainee assessment and training support.

### Software Engineer

March 2011 – June 2014

*TÜBİTAK, Kocaeli, Türkiye*

Developed web-based applications for controller selection, aptitude assessment, personnel management, and online examination systems related to air traffic control operations.

### Software Engineer

May 2010 – March 2011

*CETECH-ADTECH, Istanbul, Türkiye*

Developed Java EE-based enterprise and web applications, including service-oriented infrastructure components and user-facing software modules.

## Teaching Experience

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### Piri Reis University

- **Fall 2025:** ISE436 Design Patterns; ISE439 Internet Technologies; COMP452 Human-Computer Interaction
- **Spring 2026:** ELK222 Signals and Systems; ELK459 Pattern Recognition; EEE518 Machine Learning Methods and Applications

### Istanbul Okan University

- **2023–2024 Fall:** BIL503 Advanced Programming Techniques
- **2023–2024 Spring:** BIL519 Special Topics in Computer Engineering
- **2024–2025 Fall:** BIL513 Web Programming
- **2024–2025 Spring:** BIL505 Image Processing

## Technical Skills

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<b>Programming</b>	Python, Java, C/C++, SQL, JavaScript, HTML/CSS
<b>Machine Learning</b>	scikit-learn, PyTorch, Keras, NumPy, pandas
<b>Tools &amp; Platforms</b>	Git, Bitbucket, Jira, Confluence, Jenkins, SonarQube, Linux, Bash, L <sup>A</sup> T <sub>E</sub> X
<b>Software Technologies</b>	Spring Boot, JSF, PrimeFaces, AngularJS, Vue.js, MySQL, RabbitMQ, nginx

## Certification

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**PMP® (Project Management Professional)**  
Project Management Institute (PMI)

Valid through February 6, 2028

## Languages

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**English:** YÖKDİL 2025 score: 96.25/100