Muhammet Furkan ILASLAN

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*A researcher passionate about embedded systems and computer science, specializing in human-centered AI for improving human learning experience. Submitted his PhD Thesis at NUS-ECE under the supervision of **Dr. Mike Zheng Shou** in collaboration at the I2R-A*STAR with **Dr. Qianli Xu**. His research interests include developing assistive AI models empowered by LLMs and multimodal feature modeling to improve human-in-the-loop applications in AI. With experience, he bridges embedded intelligence with human-AI interaction.*

WORK & RESEARCH EXPERIENCE

PhD Candidate, **Show Lab-NUS & I2R-A*STAR**, (Dr. Mike Zheng Shou & Dr. Qianli Xu) | Singapore ***Aug 2021 - Aug 2025***

- Developed **PLUFFIN**, a holistic computational framework structuring multimodal procedural plans (MPPs), human-AI collaborative modeling, and retrieval-augmented mistake detection to support real-time human-centered learning from instructional videos (IVs).
- Invented **VG-TVP** and **VG-MPP** models, which process both curated and raw IVs into structured, visually-grounded procedural plans, significantly improving scalability and generalizability in MPP *(up to* 86% *human preference rate)*.
- Collected **GazeVQA** industrial-based, and gaze-enhanced Video Question Answering (VQA) dataset & Developed **AssistGaze** multimodal AI-Assistant model: Pioneering the integration of eye-gaze and multimodal features (text, image, video) to advance collaborative interaction modeling and answer prediction in procedural tasks. ($\approx 40\%$ increase)
- Created **RAMMP**, a Retrieval-Augmented Multimodal Mistake Predictor for real-time semantic mistake detection and context-aware feedback generation, substantially advancing online human-centered procedural learning support systems. ($\approx 5\%$ higher than SOTA)

Visiting Researcher, **MaVi Research Group**, (Prof. Dima Damen & Dr. Michael Wray) | Bristol, UK ***Jun 2024 - Aug 2024***

- Investigating user learning patterns to design feedback strategies for enhancing personalized learning experiences.
- Developing an AI model that analyzes users' execution performance (real-time) for detecting mistakes and feedback generation.

Teaching Assistant, **Electrical Machines and Drives Lab.**, (Prof. Sanjib K. Panda) | Singapore ***Jan 2022 - May 2024***

- Delivered presentations and conducted experiments on "Motion control, characteristics and sizing of power semiconductor controlled electric drives" (EE4502) and "Power electronic converter circuits" (EE4503) lectures.

Researcher, **TUBITAK**, *(Prof. Dr. Taylan Yetkin)* | Turkiye ***Mar 2020 - Mar 2021***

- TUBITAK-1001 funded project (119F133): "Determination of Interaction Depth of 511 keV Energized Gammas in Inorganic Crystals Using Fiber and Silicon Photomultipliers".
- Designed customized PCB circuits, and optimized software solutions by using Digilent Zedboard Zynq-7000.

Research Assistant, **Cognitive Sys. Lab. Istanbul Technical Uni.**, *(Prof. Tahir Ç. Akıncı)* | Turkiye ***Feb 2018 - Feb 2020***

- FPGA-based reprogrammable board circuits design and applications, focusing on EEG, information theory, and signal processing.
- Supported by Coordinatorship of Scientific Research Projects under Grant No. MYL-2019-41852

Engineering Intern, **ALTU Technology LTD. (XAD Comm.)**, *(Dr. Yusuf Baltacı)* | Bristol, UK ***Jul 2017 - Oct 2017***

- Working as an engineer in the R&D Department to research and design PCB cards by using the EASY PC Programme
- Designing electronic circuits by using FPGA SPARTAN3E and Coding by using VHDL Programming Language in Xilinx ISE Design Suite

EDUCATION

4.20/5.0	**PhD in Electrical and Computer Engineering**, *National University Singapore (NUS)* | Singapore	***2021-25***
3.44/4.0	**MSc in Electrical Engineering**, *Istanbul Technical University (ITU)* | Istanbul, Turkiye	***2018-20***
3.50/4.0	**BSc in Electrical and Electronics Engineering**, *Istanbul Aydın University (IAU)* | Istanbul, Turkiye	***2012-17***
	BBA in Business Administration, *Anadolu University*| Eskisehir, Turkiye	***2013-18***

Achievements: Awarded second rank, High Honour Student, IAU | Honour Student, ITU | Honour Student, NUS
Scholarships: 119F133 Project TUBITAK | Coordinatorship of Scientific Research Projects, ITU | SINGA Scholarship, A*STAR & NUS
Courses: Statistics, Computational Nanoelectronics, ML, ANN, Operational Decision Making, Experiential Entrepreneurship

SKILLS

Programming	Python, Pytorch, Tensorflow, OpenCV, Matlab, C, Git, Linux, Arduino, Xilinx, VHDL, Easy PC, Altium, LaTeX
Soft Skills	Leadership, Communication, Problem-Solving, Time Management, Documentation, On-site Coordination
Hobbies	Table Tennis, Archery, Gastronomy, Travelling
Reviewer	ICCV, NeurIPS, ACMMM, AAAI, EMNLP

PROJECTS

Retrieval-Augmented Multimodal Mistake Predictor (Under review) ***Mar 2025 - Nov 2025***

- RAMMP detects procedural mistakes in real time and generates adaptive feedback using multimodal embeddings and LLMs.
- Integration of video-text retrieval, action-object reasoning, mistake classification, and feedback generation, demonstrating expertise in supporting human-centered knowledge learning systems.

Visually-Grounded Multimodal Procedural Planning (HCM Workshop (Oral) - AAAI26) ***Nov 2024 - May 2025***

- Proposed a scalable pipeline to structure procedural knowledge from uncurated IVs by combining visual-textual alignment with LLMs.
- Accurate MPP generation performance using video retrieval and multimodal alignment, validating the model on YouTube corpora.

Visually-Grounded Text-Video Prompting (Main - AAAI25) *Oct 2023 - Nov 2024*

- Designed multimodal T2V and V2T bridge framework to generate accurate MPPs from curated IVs using diffusion and LLM backbones.
- Support the human learning experience by better capturing procedural knowledge, up to 85% preference rate across multiple tasks.

GazeVQA & AssistGaze (Main - EMNLP23) *Sep 2022 - Dec 2023*

- Collected a new multiview, industrial, and gaze-enhanced dataset (GazeVQA), capturing real human attention during task execution.
- Build a novel multimodal AI-Assistant to assist the user in completing industrial tasks (AssistGaze).

FPGA-Based Re-Programmable Circuits (Journal of Engineering Science & Technology) *Jan 2019 - Jun 2020*

- Developed high-performance, low-cost, and customizable training board kit with a novel sandwich design.

Safety of Driverless Autonomous Train Systems and Stations *Jan 2017 - June 2017*

- Proposing a new safe and intelligent station design and novel braking system design for the autonomous train systems.

CO-CURRICULAR ACTIVITIES

President, **NUS Graduate Student Society (NUS-GSS) 39. Executive Committee**, | Singapore *Aug 2024 - Aug 2025*

- Formulating the society's vision and mission in collaboration with the Executive Committee (ExCo).
- Facilitating communication and liaison with key university administrators and departments.
- Organized more than 15 events, $\approx 40\%$ increase in the number of members. (+2600 members)
- Will be served as an Honorary Auditor at the NUS-GSS 40^{th} ExCo.

General Secretary, **NUS Graduate Student Society 38. Executive Committee**, | Singapore *Aug 2023 - Aug 2024*

- Overseeing key responsibilities at the heart of graduate students' social and academic life. (+1800 members)
- Acting as a pivotal role between the graduate students and university authorities by voicing feedback from diverse cohorts.

Vice President-Strategy Team, **Istanbul Metropolitan Municipality Youth Assembly** | Turkiye *Oct 2014 - Feb 2019*

- As a Parliament Member and Vice President in the Strategy Team, leading the team for working on youth-oriented strategies.
- Successfully coordinated and organized many events, for the welfare and development of the youth community.

Volunteer - Tour Guide, **Dolmabahce Palace, (Directorate of National Palaces)**, | Turkiye *Jul 2013 - Jun 2016*

- Successfully led and guided groups of over 50 individuals for each tour at Dolmabahce Palace.
- Provided accurate and engaging information about the historical significance and architectural marvels to international visitors.

CERTIFICATIONS

2022	**Introduction to Statistics**, Stanford University	*Coursera-Online*
2018	**Systems Engineering Program**, HAVELSAN	*Turkiye*
2017	**Engineering Economics; Total Quality Management; Multi-Criteria Decision Making**, IAU	*Turkiye*

ACHIEVEMENTS

2021-2025	**SINGA Scholarship**, A*STAR & National University of Singapore	*Singapore*
2024	**Second Rank at Best-Poster Award, SINGA**, A*GA - A*STAR	*Singapore*
2020-21	**Project Scholarship, 119F133 TUBITAK Project**, TUBITAK & Mimar Sinan Fine Arts University	*Turkiye*
2018-20	**Project Scholarship, Coordinators of Scientific Research Projects**, Istanbul Technical University	*Turkiye*
2017	**Erasmus Internship Scholarship**, Istanbul Aydın University – ALTU Technology	*Bristol, UK*
2017	**Merit-based Scholarship & Awarded second rank - High Honour Student**, Istanbul Aydın University	*Turkiye*
2006-08	**First Place**, Table Tennis Tournament, Bagcılar Municipality	*Turkiye*

PUBLICATIONS

Ilaslan, M. F., et. al. (2025). "Retrieval-augmented mistake detection in procedural planning via multimodal action-object reasoning", under review, 2025.

Ilaslan, M. F., et. al. (2025). "VG-MPP: Visually Grounded Multimodal Procedural Planning from Unstructured Instructional Videos", Association for the Advancement of Artificial Intelligence, Human-Computer Interaction (HCM-AAAI26), Singapore. AAAI Press.

Ilaslan, M. F., et. al. (2025). "VG-TVP: Multimodal Procedural Planning via Visually Grounded Text-Video Prompting". Association for the Advancement of Artificial Intelligence (AAAI25), pp. 3886–3894. Philadelphia, PA, USA. AAAI Press.

Ilaslan, M. F., et. al. (2023). "GazeVQA: A Video Question Answering Dataset for Multiview Eye-Gaze Task-Oriented Collaborations". Empirical Methods in Natural Language Processing (EMNLP23), pp. 10462–10479. Singapore. Assoc. for Computational Linguistics.

Ilaslan, M. F., et. al. (2020). FPGA-Based Reprogrammable Main Circuit Board and Auxiliary Circuit Board Design. Journal of Engineering Science and Technology, 15(6), 3955-3970.

Ilaslan M.F. (2018). "The Multiresolution Wavelet Analysis of the Brain Signals of Epilepsy Patients". The J. of Cog. Sys., 3(2), 30-33.