ALIASGHAR BAGHERI TIRTASHI

PhD Applicant | Electrical Engineering (Bioelectric) | AI in Healthcare

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RESEARCH INTERESTS

- **AI in Healthcare**
- Neural Decoding and Brain–Computer Interfaces
- Robust AI for Wearable Biosignals
- Multimodal Learning
- Biosignal Processing and Analysis
- AI for Rehabilitation and Assistive Devices
- Computational Neuroscience

EDUCATION

M.Sc. in Electrical Engineering (Bioelectric) | Sharif University of Technology Sep 2024 – Sep 2026

GPA: 17.53/20 (3.84/4) | Supervisor: Prof. Mehran Jahed

Thesis: *Neuromuscular Behavior Analysis Based on the Fusion of Electroencephalography and Electromyography Signals for Hand Movement Recognition in Rehabilitation Applications*

B.Sc. in Electrical Engineering (Bioelectric) | University of Tehran Sep 2018 – Sep 2023

GPA: 16.01/20 (3.42/4) | Supervisor: Prof. Mohammadreza Abolghasemi Dehaghani

Thesis: *Microsaccade Representation in the Visual Nervous System*

RESEARCH EXPERIENCE

Master's Thesis Research 2024 – 2026

- Led the research end to end under faculty supervision, from literature review and experimental design to biosignal acquisition, signal processing, modeling, evaluation, and first-author manuscript preparation.
- Designed and conducted synchronized recordings of 32-channel EEG (g.tec, 512 Hz) and six-channel surface EMG (Noraxon, 2,000 Hz) from eight healthy participants performing four hand/wrist gestures.
- Built an EEG–sEMG pipeline comprising filtering, ICA-based artifact reduction, resampling, time alignment, segmentation, and informative channel selection using wavelet transform coherence.
- Developed a multimodal deep-learning framework with parallel CNN encoders, Self-Attention, and Cross-Attention to model neural–muscular interactions; trained the models using TensorFlow/Keras and Google Colab GPUs.
- Benchmarked classical classifiers, CNN, GRU, and attention-based models; achieved **95.68%** mean accuracy in within-subject cross-validation and **92.45%** in task-based holdout evaluation with the Cross-Attention architecture.
- Evaluated robustness under *simulated* time- and frequency-domain muscle-fatigue-related signal degradation; the multimodal model retained **78.05%** and **75.46%** accuracy, respectively, under the strongest perturbations.

Fatigue-Resistant sEMG Gesture Recognition 2026

- Analyzed the sEMG recordings from the **same experimental sessions** as the multimodal study, addressing a distinct sEMG-only modeling problem rather than collecting a second dataset.
- Compared classical classifiers with CNN, GRU, and multi-head Self-Attention models on 250 ms sEMG windows; MHA+CNN achieved **98.23%** clean-data accuracy.
- Under the strongest simulated spectral degradation, MHA+GRU maintained **84.58%** accuracy versus **53.81%** for the CNN baseline. Evaluation was subject-specific, not a clinical or cross-subject validation.

B.Sc. Research Project Summer 2023

- Investigated microsaccades—very small, involuntary eye movements—in rodents using recorded gaze data.
- Identified microsaccadic eye movements from gaze recordings and analyzed how visual image statistics were associated with their occurrence.

PUBLICATIONS

1. **A. Bagheri Tirtashi** and M. Jahed, "Fatigue-Resistant s-EMG Hand Gesture Recognition with Lightweight Recurrent–Attention Networks," *34th International Conference on Electrical Engineering (ICEE)*, 2026. IEEE Xplore | DOI: 10.1109/ICEE70628.2026.11710601.
2. **A. Bagheri Tirtashi** and M. Jahed, "Robust EEG–sEMG Fusion for Hand Gesture Recognition Using Cross-Attention," *33rd International Conference on Biomedical Engineering (ICBME)*, 2026. *Accepted; awaiting publication.*

TEACHING EXPERIENCE

Teaching Assistant | Sharif University of Technology 2025 – 2026

- Head TA – Introduction to Biomedical Engineering and Introduction to Biomedical Engineering Laboratory.
- TA – Learning in Brain and Machine.
- TA – Introduction to Electrical Engineering.

Teaching Assistant | University of Tehran 2022 – 2023

- TA – Engineering Probability and Statistics.
- TA – Machine Learning.
- TA – Linear Control Systems .
- TA – Operations Research.
- TA – Principles of Management.

TECHNICAL SKILLS

Programming and research computing: Python, MATLAB, TensorFlow/Keras, PyTorch, scikit-learn, pandas, NumPy, Matplotlib; Google Colab (GPU), Jupyter Notebook, LaTeX.

Biomedical signal processing: EEG and sEMG acquisition; filtering, independent component analysis (ICA), synchronization, channel selection, wavelet coherence, time–frequency analysis, multimodal fusion.

Machine learning methods: Classical classifiers; CNNs, GRUs, Self-Attention and Cross-Attention; physiological time-series modeling and evaluation; natural language processing and deep generative models.

AI development Skills: Retrieval-Augmented Generation (RAG), Model Context Protocol (MCP), LangChain, Claude Code; integration with AI APIs from OpenAI, Anthropic, and Google.