Abolfazl Mohammadi Zoghalchali

Sari, Mazandaran, Iran
+989387450771 abolfazmz81@gmail.com abolfazmz81 Abolfazl Mohammadi abolfazmz81.github.io

Research Summary

My research focuses on applying deep learning and multimodal AI models to healthcare applications, particularly in medical image processing and signal analysis for cardiovascular diagnosis. I am interested in developing intelligent systems that combine computer vision, natural language processing, and machine learning to solve real-world problems in clinical settings.

Education

Babol Noshirvani University of Technology(Ranked 501-600 via Times Higher Education) **2021 – 2025**
Bachelor of Science in Computer Engineering (GPA: 3.82/4 over last two years) *Babol, Mazandaran*

Experiences

Research Experience

- **Research Assistant, Artificial Intelligence Research Lab, Babol Noshirvani University of Technology** *2025–present*
  Engaged in research projects focusing on software systems and applications of artificial intelligence.

Research Interests

- Deep Learning
- Neural Networks
- Machine Learning
- Image Processing
- AI in Healthcare
- Prompt Engineering

On-going Research

The Role of Machine Learning in Diagnosis of Acute Occlusion Myocardial Infarction in Presence of Left Bundle Branch Block (LBBB) | *A Mohammadi, A Ariaei*

- Conducted under supervision of **Dr. Hesam Omranpour**.
- Uses deep learning and signal processing to segment ECG images and extract ECG signals.
- Data consists of annotated ECG images and corresponding patient records.
- Expected outcome: an interpretable model to detect myocardial infarction in ECGs with LBBB cases, improving diagnosis accuracy.

Academic Projects

Deep learning-based ECG image segmentation **On-going**

- Developed an ECG image segmentation application using **nnUNet** architecture trained on doctor-segmented RGB datasets (83 images).
- Data converted into Compressed NIfTI format (.nii.gz) for nnUNet compatibility.
- Achieved **90% segmentation accuracy** on one validation dataset.
- Technologies: **Python, PyTorch, nnUNet, OpenCV, NumPy**.
- Purpose: automate ECG image segmentation for efficient signal extraction for diagnostic AI systems.

Computational Intelligence Algorithms: Design, Implementation and Evaluation **2025**

- Implemented various computational intelligence algorithms, including Genetic Algorithms, LVQ, and reinforcement learning (from scratch).
- Also implemented MLP, K-Means, KNN, and SOM using Python libraries.
- Used multiple datasets for performance comparison and visualization.
- Technologies: **Python, scikit-learn, NumPy, matplotlib**.
- Outcome: comparative analysis report showing convergence rates and classification accuracy.

Design and Implementation of Teslang Compiler: A Lexical, Syntax, and Semantic Analyzer for a Custom Programming Language **2024**

- Built a multi-layer compiler (**Teslang**) with modular architecture.
- Implemented lexical, syntax, and semantic analysis with robust error recovery.
- Technologies: **Python, PLY**, custom grammar definitions.
- Purpose: to analyze and compile domain-specific code efficiently.

A CNN image classifier for CIFAR-10 dataset **2024**

- Developed a **PyTorch**-based CNN model for image classification on CIFAR-10 (60,000 images).
- Applied k-fold cross-validation for improved generalization.
- Purpose: test CNN architectures for small-scale natural image datasets.
- Outcome: achieved 85% accuracy on test set.

Smart University chatbot implementation: Telegram-Based QA with LLM Integration and prompt engineering **2024**

- Developed a domain-specific chatbot to assist NIT students in querying academic regulations.
- Supervised by **Dr. Mehdi Emadi**.
- Utilized **ChatGPT API, LangChain, Elasticsearch, Python, Telegram API**.
- Purpose: natural language querying of university guidelines and manuals.
- Outcome: interactive chatbot capable of retrieving relevant text passages from academic PDFs.

Design and Execution of a Fault-Tolerant File Encryption Service Using Sockets and Python **2024**

- Created a client-server encryption framework using **Python sockets, multiprocessing, and MD5 hashing**.
- Server dynamically spawns worker processes for concurrent encryption.
- Commander process monitors fault tolerance and replaces failed workers.
- Purpose: ensure reliable encrypted data transmission in distributed systems.

Teaching Assistant

Compiler Design
Instructed by: Dr.Ali Gholami Rudi | Project Design and Phase Planning *2025*

Software Systems Analysis & Design
Instructed by: DR.Mehdi Emadi | Project Mentorship and Phase Design & Planning *2024*

Operating Systems
Instructed by: Dr.Ali Gholami Rudi | Final Project Design *2024*

Compiler Design
Instructed by: Dr.Ali Gholami Rudi | Project Design and Phase Planning *2024*

Databases
Instructed by: DR.Mehdi Emadi | Project Phase Design and Computer-Based Exercises *2024*

Data Structures
Instructed by: Mahyar Hassanpour | Design and Evaluation of Paper-Based Exercises *2023*

Theory of Formal languages & Automata
Instructed by: Mahyar Hassanpour | Holding Problem-Solving Sessions *2023*

Awards and Honors

Ranked top 6% among the Participants of the 6^{th} edition AlgoNIT Programming Competition
ranked the 11^{th} team in 167 Participants *2025*

Ranked top student to finish in 7 main semesters
Among All the Faculties at the university *2025*

Finished a four year bachelor program in three and half years
Achieved 140 credits at Babol Noshirvani University of Technology *2025*

Ranked top 6% among students of Computer Science faculty
Among 78 computer engineering entries *2025*

Ranked top 11% among the Participants of the 4^{th} edition AlgoNIT Programming Competition
ranked the 25^{th} team in 247 Participants *2024*

Ranked top 19% among the Participants of the 2^{nd} edition AlgoNIT Programming Competition
ranked the 5^{th} team in 27 teams *2023*

Ranked top 5% in Iranian university entrance exam
Among about 130,000 participants *2021*

Ranked top student in High School for Iranian university entrance exam
Among fellow students specializing in Mathematics and Physics *2021*

Achieved silver medal in the national jujitsu competition.
ranked 2^{nd} place in the National Tournament of Martyr Hossein Ali Moradi Cup *2016*

Notable Courses

Fundamentals of Computational Intelligence
Instructed by: DR.Hesam Omranpour & DR.Fateme Zamani | Babol Noshirvani University of Technology *2024*

Fundamental of Computer Vision
Instructed by: DR.Mehdi Ezoji | Babol Noshirvani University of Technology *2024*

Fundamentals of Secure Computing
Instructed by: DR.Hassan Nasiraee | Babol Noshirvani University of Technology *2024*

Introduction to the Information Retrieval
Instructed by: DR.Mojtaba Mansoori | Babol Noshirvani University of Technology *2024*

Fundamentals and Applications of Artificial Intelligence
Instructed by: DR.Fateme Zamani | Babol Noshirvani University of Technology *2023*

Algorithm Design
Instructed by: DR.Fateme Zamani | Babol Noshirvani University of Technology *2023*

Applied Linear Algebra
Instructed by: DR.Nooshin Maghsoodi | Babol Noshirvani University of Technology *2023*

Extracurricular Activities

Executive Member of the 5th National Programming Contest (AlgoNIT)
Electrical & Computer Engineering Faculty | Babol Noshirvani University of Technology *2024*

Part of the Public Relations Team of the RainoCup International Event
Multiple Faculties | Babol Noshirvani University of Technology *2023*

Technical Skills

Programming Languages & Frameworks: Python, C#, Java, VHDL, Matlab, Shell, .NET

Libraries: scikit-learn, Pandas, Numpy, OpenCV, matplotlib, pytorch, LangChain, Entity Framework

Technologies: Docker, Microservices, ChatGPT API, Git, Unity, LaTeX

Test Scores

IELTS Academic: Overall Band 8.0

- Listening: 9.0
- Reading: 9.0
- Writing: 6.5
- Speaking: 7.5

References

DR. Mehdi Emadi — **Assistant Professor**
Faculty of Electrical & Computer Engineering | Babol Noshirvani University of Technology *m.emadi@nit.ac.ir*

DR. Ali Gholami Rudi — **Assistant Professor**
Faculty of Electrical & Computer Engineering | Babol Noshirvani University of Technology *gholamirudi@nit.ac.ir*

DR. Hesam Omranpour — **Associate Professor**
faculty of Electrical & Computer Engineering | Babol Noshirvani University of Technology *h.omranpour@nit.ac.ir*

Hobbies and Interests

- Playing the guitar
- Reading novels
- Playing video games
- Calisthenics
- jujitsu