

ABOLFAZL MOHAMMADI ZOGHALCHALI

Sari, Mazandaran, Iran

📞 +989387450771 📩 abolfazmz81@gmail.com 🌐 abolfazmz81 LinkedIn Abolfazl Mohammadi GitHub 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 Tech- 2025-present

- nology

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
<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> 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	
<i>Instructed by: Dr.Ali Gholami Rudi Project Design and Phase Planning</i>	2025
Software Systems Analysis & Design	
<i>Instructed by: DR.Mehdi Emadi Project Mentorship and Phase Design & Planning</i>	2024
Operating Systems	
<i>Instructed by: Dr.Ali Gholami Rudi Final Project Design</i>	2024
Compiler Design	
<i>Instructed by: Dr.Ali Gholami Rudi Project Design and Phase Planning</i>	2024
Databases	
<i>Instructed by: DR.Mehdi Emadi Project Phase Design and Computer-Based Exercises</i>	2024
Data Structures	
<i>Instructed by: Mahyar Hassanpour Design and Evaluation of Paper-Based Exercises</i>	2023
Theory of Formal languages & Automata	
<i>Instructed by: Mahyar Hassanpour Holding Problem-Solving Sessions</i>	2023
Awards and Honors	
Ranked top 6% among the Participants of the 6th edition AlgoNIT Programming Competition	
<i>ranked the 11th team in 167 Participants</i>	2025
Ranked top student to finish in 7 main semesters	
<i>Among All the Faculties at the university</i>	2025
Finished a four year bachelor program in three and half years	
<i>Achieved 140 credits at Babol Noshirvani University of Technology</i>	2025
Ranked top 6% among students of Computer Science faculty	
<i>Among about 78 students over last four semesters</i>	2025
Ranked top 11% among the Participants of the 4th edition AlgoNIT Programming Competition	
<i>ranked the 25th team in 247 Participants</i>	2024
Ranked top 19% among the Participants of the 2nd edition AlgoNIT Programming Competition	
<i>ranked the 5th team in 27 teams</i>	2023
Ranked top 5% in Iranian university entrance exam	
<i>Among about 130,000 participants</i>	2021
Ranked top student in High School for Iranian university entrance exam	
<i>Among fellow students specializing in Mathematics and Physics</i>	2021
Achieved silver medal in the national jujitsu competition.	
<i>ranked 2nd place in the National Tournament of Martyr Hossein Ali Moradi Cup</i>	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 Nasiraei | 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 Maghsoudi | 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

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| * Listening: 9.0 | * Writing: 6.5 |
| * Reading: 9.0 | * Speaking: 7.5 |

References

DR. Mehdi Emadi

Faculty of Electrical & Computer Engineering | Babol Noshirvani University of Technology

Assistant Professor

m.emadi@nit.ac.ir

DR. Ali Gholami Rudi

Faculty of Electrical & Computer Engineering | Babol Noshirvani University of Technology

Assistant Professor

gholamirudi@nit.ac.ir

DR. Hesam Omranpour

Faculty of Electrical & Computer Engineering | Babol Noshirvani University of Technology

Associate Professor

h.omranpour@nit.ac.ir

Hobbies and Interests

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| · Playing the guitar | · Playing video games | · jujitsu |
| · Reading novels | · Calisthenics | |