

# ABOLFAZL MOHAMMADI ZOGHALCHALI

Sari, Mazandaran, Iran

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## 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.

<b>A CNN image classifier for CIFAR-10 dataset</b>	2024
<ul style="list-style-type: none"> <li>Developed a <b>PyTorch</b>-based CNN model for image classification on CIFAR-10 (60,000 images).</li> <li>Applied k-fold cross-validation for improved generalization.</li> <li>Purpose: test CNN architectures for small-scale natural image datasets.</li> <li>Outcome: achieved 85% accuracy on test set.</li> </ul>	
<b>Smart University chatbot implementation: Telegram-Based QA with LLM Integration and prompt engineering</b>	2024
<ul style="list-style-type: none"> <li>Developed a domain-specific chatbot to assist NIT students in querying academic regulations.</li> <li>Supervised by <b>Dr. Mehdi Emadi</b>.</li> <li>Utilized <b>ChatGPT API, LangChain, Elasticsearch, Python, Telegram API</b>.</li> <li>Purpose: natural language querying of university guidelines and manuals.</li> <li>Outcome: interactive chatbot capable of retrieving relevant text passages from academic PDFs.</li> </ul>	
<b>Design and Execution of a Fault-Tolerant File Encryption Service Using Sockets and Python</b>	2024
<ul style="list-style-type: none"> <li>Created a client-server encryption framework using <b>Python sockets, multiprocessing, and MD5 hashing</b>.</li> <li>Server dynamically spawns worker processes for concurrent encryption.</li> <li>Commander process monitors fault tolerance and replaces failed workers.</li> <li>Purpose: ensure reliable encrypted data transmission in distributed systems.</li> </ul>	
<b>Teaching Assistant</b>	
<b>Compiler Design</b>	
<i>Instructed by: Dr.Ali Gholami Rudi   Project Design and Phase Planning</i>	2025
<b>Software Systems Analysis &amp; Design</b>	
<i>Instructed by: DR.Mehdi Emadi   Project Mentorship and Phase Design &amp; Planning</i>	2024
<b>Operating Systems</b>	
<i>Instructed by: Dr.Ali Gholami Rudi   Final Project Design</i>	2024
<b>Compiler Design</b>	
<i>Instructed by: Dr.Ali Gholami Rudi   Project Design and Phase Planning</i>	2024
<b>Databases</b>	
<i>Instructed by: DR.Mehdi Emadi   Project Phase Design and Computer-Based Exercises</i>	2024
<b>Data Structures</b>	
<i>Instructed by: Mahyar Hassanpour   Design and Evaluation of Paper-Based Exercises</i>	2023
<b>Theory of Formal languages &amp; Automata</b>	
<i>Instructed by: Mahyar Hassanpour   Holding Problem-Solving Sessions</i>	2023
<b>Awards and Honors</b>	
<b>Ranked top 6% among the Participants of the 6<sup>th</sup> edition AlgoNIT Programming Competition</b>	
<i>ranked the 11<sup>th</sup> team in 167 Participants</i>	2025
<b>Ranked top student to finish in 7 main semesters</b>	
<i>Among All the Faculties at the university</i>	2025
<b>Finished a four year bachelor program in three and half years</b>	
<i>Achieved 140 credits at Babol Noshirvani University of Technology</i>	2025
<b>Ranked top 15% among students of Computer Science faculty</b>	
<i>Among about 70 students over last four semesters</i>	2025
<b>Ranked top 11% among the Participants of the 4<sup>th</sup> edition AlgoNIT Programming Competition</b>	
<i>ranked the 25<sup>th</sup> team in 247 Participants</i>	2024
<b>Ranked top 19% among the Participants of the 2<sup>nd</sup> edition AlgoNIT Programming Competition</b>	
<i>ranked the 5<sup>th</sup> team in 27 teams</i>	2023
<b>Ranked top 5% in Iranian university entrance exam</b>	
<i>Among about 130,000 participants</i>	2021
<b>Ranked top student in High School for Iranian university entrance exam</b>	
<i>Among fellow students specializing in Mathematics and Physics</i>	2021
<b>Achieved silver medal in the national jujitsu competition.</b>	
<i>ranked 2<sup>nd</sup> place in the National Tournament of Martyr Hossein Ali Moradi Cup</i>	2016

## Notable Courses

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### 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

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### 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

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**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

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### IELTS Academic: Overall Band 8.0

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

## References

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### DR. Mehdi Emadi

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

Assistant Professor

[m.emadi@nit.ac.ir](mailto: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](mailto:gholamirudi@nit.ac.ir)

### DR. Hesam Omranpour

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

Associate Professor

[h.omranpour@nit.ac.ir](mailto:h.omranpour@nit.ac.ir)

## Hobbies and Interests

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