# Mohammad Taha **Fakharian**

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## Education

**School of Electrical and Computer Engineering, University of Tehran** — *Tehran, Iran*

B.Sc. in Computer Engineering — *Sep. 2019 - Jul. 2024*

- **Cum. GPA: 19.47/20 (4/4)**, Faculty Average: 15.01/20
- Related Courses: Artificial Intelligence: 20/20(4/4), Data Mining(Master's course): 20/20 (4/4), Interactive Learning(Master's course): 20/20 (4/4), Cognitive Neuroscience: 18.5/20 (4/4), Engineering Probability and Statistics: 19.6/20 (4/4), Real Time Embedded Systems: 19/20 (4/4), Internet Engineering: 19.4/20 (4/4)

**Allameh Helli 3 High School** — *Tehran, Iran*

Diploma in Mathematics and Physics — *Sep 2016 - Jul. 2019*

- **Cum. GPA: 19.9/20**
- As a part of the National Organization for Development of Exceptional Talents (NODET)

## Research Interests

- **NeuroAI**
- **Machine Learning for Neuroscience**
- **Computational Neuroscience**
- **Neuroinformatics**
- **Brain-computer Interfaces**

## Research Experience

**Under the supervision of Prof. Shervin Safavi** — *CMC Lab, TU Dresden*

Research Assistant — *Jun. 2024 - present*

Trained RNNs on a set of cognitive tasks from the NeuroGym library and used dynamical similarity analysis (DSA) to investigate different factors affecting dynamics.

**Under the supervision of Prof. Timothée Masquelier** — *CNRS*

Research Assistant — *Oct. 2023 - Oct. 2024*

Investigated delay learning in convolutional spiking neural networks using surrogate gradient. Implemented axonal, dendritic and synaptic delay using dilated convolution with learnable spacings (DCLS) on SOTA models based on ResNet-18, for solving complex event-based datasets.

**Under the supervision of Prof. Mohammadreza Abolghasemi** — *Convergent Technologies Research Institute, University of Tehran*

Research Assistant — *Sep. 2023 - Jun. 2024*

Investigated biological-plausible improvements, like learning rules on existing spiking neural networks. Implemented adaptive threshold for neurons and complex Hebbian learning, using a library for high-performance SNN training named Spyker.

**Under the supervision of Prof. Azadeh Shakery** — *University of Tehran*

Research Assistant — *July. 2022 - Dec. 2022*

Applied graph convolutional neural networks to hate speech detection task. Tried different structures and methods and combined the concept with other SOTA models like Bert.

**Under the supervision of Prof. Behnam Bahrak** — *University of Tehran*

Research Assistant — *Aug. 2021 - Nov. 2022*

Introduced an alternative consensus protocol, based on Proof of Activity, to combine the benefits of using both the PoS and PoA protocols.

## Publications

A. Ghalambor, **MT. Fakharian**, R. Zeraati, S. Safavi (2024) **"Identifying task-specific dynamics in recurrent neural networks using Dynamical Similarity Analysis."** Bernstein Conference 2024.

S. Kamali, S. Shabihi, **MT. Fakharian**, A. Arbabi, P. Tajmehrabi, M. Saadati, B. Bahrak (2022) **"RPoA: Redefined Proof of Activity."** Preprint.

## Honors & Awards

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|---|---|---|
| 2024 | **Best data analysis project**, BR41N.IO Hackathon | *g.tec Spring School* |
| 2024 | **Ranked 1st among bachelor students of the Computer Engineering**, University of Tehran | *Tehran, Iran* |
| 2019 | **Ranked 96 (Top 0.1%) in National University Entrance Exam**, National Organization of Educational Testing (NOET) | *Tehran, Iran* |
| 2019 | **Received scholarship**, Supporter Foundation of the University of Tehran | *Tehran, Iran* |

## Teaching Experience

### University of Tehran ACM Student Chapter

**Artificial Intelligence and Deep Learning Course Mentor** Summer of Code *Jul. 2022 - Sep. 2022*

### University of Tehran

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|---|---|---|
| **Head Teaching Assistant** | Introduction to Data Science, Prof. B. Bahrak, Prof. Y. Yaghoobzadeh | *Spring 2024* |
| **Teaching Assistant** | Software Engineering, Prof. R. Khosravi | *Spring 2024* |
| **Head Teaching Assistant** | Artificial Intelligence, Prof. Y. Yaghoobzadeh, H. Fadaei | *Fall 2023* |
| **Teaching Assistant** | Data Mining, Prof. A. Shakery | *Spring 2023* |
| **Head Teaching Assistant** | Advanced Programming, Prof. R. Khosravi | *Fall 2022 - Spring 2023* |
| **Supervising Teaching Assistant** | Engineering Probability and Statistics, Prof. B. Bahrak | *Fall 2022* |
| **Teaching Assistant** | Advanced Programming, Prof. R. Khosravi | *Spring 2021 - Fall 2021 - Spring 2022* |
| **Teaching Assistant** | Engineering Probability and Statistics, Prof. B. Bahrak | *Fall 2021* |
| **Teaching Assistant** | Discrete Mathematics, Prof. S. Mohammadi | *Spring 2021 - Fall 2021 - Spring 2022* |
| **Teaching Assistant** | Operating Systems, Prof. M. Kargahi | *Fall 2022 - Spring 2023 - Fall 2023* |
| **Teaching Assistant** | Artificial Intelligence, Prof. Y. Yaghoobzadeh, H. Fadaei | *Fall 2022 - Spring 2023* |
| **Teaching Assistant** | Formal Languages and Automata Theory, Prof. H. Hojjat | *Fall 2021 - Spring 2022* |

## Industrial Experience

**AbanPrime** *Tehran, Iran*

Software Engineer *Jun. 2024 - Dec. 2024*

Participated in developing a market maker bot. Designed and implemented risk management and efficient trading algorithms. Dealt with many learning opportunities and responsibilities while working in a crypto exchange startup.

**Tapsi** *Tehran, Iran*

Data Scientist *Mar. 2023 - Jan. 2024*

Improved the ability to think efficiently about problems and find the best breakdown for them while dealing with real-world challenges for an online ride-hailing system. Worked on a variety of products, from generative AI to recommender systems. The data science team was directed by Mr. Ali Elahi and managed by Mrs. Zeinab Taghavi.

## Licenses

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| **NeuroAI** | Neuromatch Academy | *Jul. 2024* |
| **Game Theory** | Standford University, The University of British Columbia | *Aug. 2023* |
| **Machine Learning Engineering for Production (MLOps) Specialization** | DeepLearning.AI | *Aug. 2022* |
| **Natural Language Processing Specialization** | DeepLearning.AI | *Jul. 2022* |
| **AI for Medicine Specialization** | DeepLearning.AI | *May. 2022* |
| **Generative Adversarial Networks (GANs) Specialization** | DeepLearning.AI | *May. 2022* |
| **Deep Learning Specialization** | DeepLearning.AI | *Feb. 2022* |
| **Machine Learning** | Stanford University | *Feb. 2022* |
| **Reinforcement Learning Specialization** | University of Alberta | *Feb. 2022* |

## Notable Academic Projects

**Spiral** *Computational Neuroscience*

A python package for spiking neural network simulation

Added features for better analysis and training during my personal research.

**Crystaline** *Cryptocurrency*

A cryptocurrency powered by a redefined PoA protocol

Developed as a proof of concept on pure Python, this cryptocurrency incorporates a newly defined Proof of Activity as its primary consensus protocol.

**Earthquake Damage Prediction Model** *Data Mining*

The final project of Data Mining course

Performed data preprocessing, feature selection and model selection with feature generation as a bonus part on Gorkha's buildings' dataset.

**Oak** *Internet Engineering*

The main project of Internet Engineering course

Implemented a project similar to Amazon marketplace using Java, Docker, Spring, ReactJS and Maven.

**Smart Pot** *Real Time Embedded Systems*

The First project of Real Time Embedded Systems course

Designed a smart pot that automatically waters the plant based on the soil moisture level and temperature. Implemented using Arduino and C++. Equipped with a temperature sensor, a humidity sensor, and a water pump. Different modules communicated via Bluetooth.

**XV6 Kernel** *Operating Systems Lab*

XV6 kernel with improvements

Added new features such as new system calls, three new custom task schedulers, and a process synchronization (using semaphore) to xv6 kernel.

**Socket Server** *Computer Networks*

Fully functioning socket servers

Implemented three fully functioning socket servers, consist of a ftp server, a web server and a chat server, with many capabilities implemented in C++ that uses socket programming to communicate with clients at a low level.

## Skills

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|---|---|
| **Programming** | High Intermediate: C++, Python<br>Intermediate: C, Java, Javascript, LaTeX<br>Beginner: Lua, Bash |
| **Data Science** | Pandas, NumPy, PySpark, Pytorch, Keras, Tensorflow, Trax and Scikit-learn |
| **Tools and Frameworks** | High Intermediate: Git, Django, Spring<br>Intermediate: Docker, Maven, VueJS<br>Beginner: K8, ReactJS |
| **Operating Systems** | Linux (Debian-based and Arch-based), Windows |

## Languages

**Persian** Native

**English** Professional working proficiency **Academic IELTS: 7.5/9 [R:8.5, L:8.5, S:6.5, W:6.5] (Oct. 2023)**