

# Farbod Raeisi

Biomechatronic Research Laboratory  
Department of Electrical Engineering  
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## Education

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### B.Sc. Electrical Engineering | 2021 - 2025

K.N. Toosi University of Technology, Tehran, Iran  
GPA: 3.5 of 4 (16.98/20) via 113 credits

### High School Diploma | Mathematics and Physics | 2017 - 2020

Allame Helli High School, National Organization for Development of Exceptional Talents  
GPA: 18.5 of 20

## Research Interests

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- Control Theory
- Robotics
- Biomechatronic
- System Identification
- Aeronautics
- IoT
- Deep Learning & ML
- Cognitive Neuroscience
- Power Systems

## Publications

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- F. Raeisi, Dr. M. Delrobaei, "Predicting Mind Wandering During SART Tasks Using Video Processing and Reaction Time Analysis" (Bachelor's Thesis, currently in data collection phase, submission forthcoming)

## Research Experience

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### Researcher

September 2023 – *present*

Biomechatronic Laboratory, K.N. Toosi University of Technology

- Under supervision of [Dr. Mehdi Delrobaei](#)  
Working on a research paper about assessment of mind wandering using visual signals.

### Research Assistant

August 2024 – *present*

SBMU Neuroscience Research Center (NRC)

- Under supervision of [Dr. Mahdi Aliyari-Shorehdeli](#)  
Assisting in addressing LFP data acquisition challenges from rat brains to support neuroscience research initiatives.

### Research Assistant

August 2023 – March 2024

Fault Detection & Identification Laboratory (FDI), K.N. Toosi University of Technology

- Under supervision of Dr. Mahdi Aliyari-Shorehdeli  
Part of a team analyzing NHTS data for a master's project, aimed at refining airbag performance prediction systems by evaluating American car crash sensor data.

## Internships and Summer Schools

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- Neuromatch Academy Summer School** Summer 2023  
Computational Neuroscience Program
- Explored research fundamentals in computational neuroscience using the Steinmetz dataset
- Internship at Fard Iran Inc.** Summer 2022
- Machine Learning and Image Processing Intern in Research & Development, working on development of car plate reader system.

## Teaching Experience

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- Teaching Assistant of Linear Control Course** September 2024 - present  
[Prof. Hamidreza Taghirad](#) | K. N. Toosi University of Technology
- Teaching Assistant of Advanced Programming Course** September 2024 - present  
[Hossein Yekta Moghadam](#) | University of Tehran
- Teaching Assistant of Probability and Statics Course** October 2022 – February 2023  
[Dr. Bahare Akhbari](#) | K. N. Toosi University of Technology
- provided data analysis with python and programming courses in additional to the final project of the lecture to the students

## Selected Projects

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### Rotational Inverted Pendulum System Simulation and Control

- Created state-space, bond graph, and Simscape simulations for a ball and beam system, with MATLAB model identification.

### Advanced Control and Simulation of a Robotic Arm Utilizing LQR Optimization Techniques

- Implemented LQR optimization to design an efficient control system for a robotic arm. The system's dynamics were modeled in SolidWorks, and simulations were run in MATLAB Simulink to test and refine performance.

### Design and Implementation of Control Systems for Propellant Spacecraft

- Conducted a detailed analysis of propellant spacecraft systems, deriving state equations, evaluating controllability and observability, and implementing state feedback and LQR control strategies.

### Assessing Choice Certainty as a Predictor of Performance Accuracy in Mice Using the Steinmetz Dataset

- Focused on decoding neural signals to explore how certainty in decision-making correlates with performance accuracy across different brain regions. This experience enhanced my understanding of computational neuroscience and research methodologies.

## Development and Application of a Fuzzy Logic System for Analyzing Production Costs and Sales

### Forecasting of Multi-Product Operations

- Designed a fuzzy logic system to predict production costs and sales rates for three products across multiple companies and locations, improving forecast accuracy and operational efficiency.

### Implementation of Synchronous Machine Current Prediction Using Neural Networks

- Used MATLAB neural networks to predict synchronous machine current based on factors like bar current and power factor, testing various architectures to find the best neuron configuration.

### Load Flow Analysis and Contingency Assessment of a 13-Bus Power System Using DIgSILENT

Used DIgSILENT software to conduct AC and DC load flow analyses on a 13-bus power system, evaluating the impact of contingencies like line and generator outages. The analysis offered valuable insights into system performance and reactive power constraints under various scenarios.

### Automated Vending Machine Simulation Through Digital Circuit Design Techniques Using Proteus

- Designed and simulated an automated vending machine for two chocolate types using Proteus. Developed a state table, state diagram, and optimized the circuit with flip-flops to handle 1-cent, 2-cent, and 4-cent coins, ensuring accurate display of the entered amount and proper functionality.

## Skills

### Artificial Intelligence

- Machine Learning
  - Supervised Learning
  - Unsupervised Learning
  - Reinforcement Learning
  - Computer Vision
- Deep Learning
  - Convolutional Neural Networks

### Software

- SolidWorks
- Altium Design
- Arduino IDE
- Proteus
- SPSS
- PSpice
- COMSOL Multiphysics
- CodeVision AVR

### Programming Languages

- Python
- C/C++
- html / CSS
- SQL

### Microcontrollers

- ESP32 Microcontrollers

### MATLAB

- System identification toolbox,
- Neural network fitting
- Simscape
- Simulink
- Fuzzy Logic Toolbox
- PID Tuner App

## Award & Honors

- Ranked 15<sup>th</sup> (top 10%) out of 150 students in the K. N. Toosi University of Technology, based on GPA and 3<sup>rd</sup> in control focused students
- Admitted to National Organization for Development of Exceptional Talent

## Volunteer Experience

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### Served as Executive Committee:

- The 3rd International Conference on Electrical Machines and Drives (ICEMD 2023)
- The 6th International Conference on Millimeter Wave Terahertz Technologies (MMWATT 2023)

### Served as IEEE Cultural Branch Iran Section member at K.N. Toosi University of Technology:

- Volunteer photographer and executive committee member at Jadi Python Workshop for young students. April-2023

### Served as Mentor:

- Open Doors Day for high school students at K.N. Toosi University of Technology. July-2024

### Served as Fundraising Participant:

- Collaborated with fellow students and staff to organize a fundraiser for flood relief victims in Western Iran (2017)

## Language Proficiency

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English: Full professional proficiency

- Academic IELTS band score 7.5 (Listening: 8.0 Reading: 8.5 Speaking: 7.5 Writing: 6)

Persian: Native

## Courses & Certificate

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**OpenCV Bootcamp** September 2024

- OpenCV

**Python for Data Science and Machine Learning Bootcamp** August 2024

- Udemy

**Signal Processing Problems, solved in MATLAB and in Python** August 2024

- Udemy

**Applied Electronics for Robotics** June 2023

- ARAS (Advanced Robotics and Automated System) | Hi-Tech Robotic Solutions Group

**Introduction to the Internet of Things and Embedded Systems** August 2023

- Coursera

**Computational Neuroscience** September 2023

- Neuromatch International Academy

## Hobbies

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Mountaineering

- Climbed Mount Alam Kuh (4,848 m) and Mount Sabalan (4,811 m): Received commendation from the Iran Federation of Mountaineering

Astronomical Photographer

Amateur Pianist

## References

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Available upon Request