Farbod Raeisi

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Education

B.Sc. Electrical Engineering | 2021 - *present*

K.N. Toosi University of Technology, Tehran, Iran
GPA:17 of 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

- Control Theory
- Robotics
- Neural engineering
- System Identification
- Mechatronics
- IoT
- Deep Learning & ML
- Cognitive Science
- Power Systems

Publications

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

Research Experience

Researcher September 2023 – *present*
Biomechatronic Laboratory, K.N. Toosi University of Technology

- Under supervision of Dr. Mehdi Delrobaei
  Working on a research paper about the correlation of mind wandering and SART fixation signa

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.

Internship and Summer School

Neuromatch Academy Summer School Summer 2023

- 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

Teaching Assistant of Probability and Statics Course October 2022 – February 2023
Dr. Bahare Akhbari

- provided data analysis with python and programming courses in additional to the final project of the lecture to the students

Selected Projects

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.

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.

Software Development for Project Economic Analysis and Optimization

- Developed software for analyzing and optimizing project economics, incorporating key financial inputs like depreciation, tax rates, and interest rates. The tool offers insights and strategies to enhance financial performance, completed as part of the Engineering Economics course.

Award & Honors

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

Volunteer Experience

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)

Skills

Artificial Intelligence

- Machine Learning
  - Supervised Learning
  - Unsupervised Learning
  - Reinforcement Learning
  - Computer Vision
- Deep Learning
  - Convolutional Neural Networks (CNNs)v

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

Software

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

Language Proficiency

English: Full professional proficiency

- IELTS test scheduled for April 23rd

Persian: Native

Courses & Certificate

Python for Data Science and Machine Learning Bootcamp August 2024

- Udemy

Signal Processing Problems, solved in MATLAN 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

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

Available upon Request