Banaan Kiamanesh

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Education

- **M.Sc., Control Systems Engineering(Robotics),** University of Padova, 2024 (GPA: 26.5/30 so far)
- **B.Sc., Electrical Engineering(Control Systems and Dynamics),** University of Tabriz, 2023(GPA: 16.53/20)
- High-School Diploma, Mathematics, National Organization of Exceptional Talents, 2018(GPA: 18.89/20)

Skills and Competencies

Programming Languages: MATLAB/Simulink (Expert), Python(Expert), C/C++(Expert), Java(Processing 3), Julia

Tech Stack: STM32, Arduino, Raspberry pi, Git, Linux, AVR Microprocessors, Sensors and Actuators, PCB Design using KiCAD, ROS2

Theory Stack: Machine Learning, Deep Learning, Computer Vision, Control Theory(Linear/Digital, NonLinear), Digital Signal Processing(Filtering and Estimation), Embedded Systems, Brain Computer Interfaces, Evolutionary Optimization

Languages

- **Persian**(native)
- **Turkish**(native)
- **English**(proficient) **TOEFL ibt** 102(R:26, L:29, S:23, W:24)

Work Experience

iEEG.co

Aug 2023 - Feb 2024

Role: Digital Signal Processing(DSP) R&D Engineer

Feature Engineering and Classification of EEG Signals for SSVEP and Motor Imagery Tasks using Machine Learning and Statistical Methods Powering an EEG Signal Powered Wheel Chair

iEEG.co(Internship)

Mar 2023 - June 2023

Role: R&D Intern in EEG Signal Processing

Filter Design on Raw EEG Signals to Getting a Clear Signal in Time/Frequency Domain

Academic Experience and Projects

Kinova-Gen3 7-DoF Robotic Arm Control

Aug - 2025

- Extraction of the Symbolic Dynamics of the Arm using **ManiDyn**
- Creating the **SimScape-MultiBody** Diagram of the Robot using the Robot URDF File
- Implementation of 6 Control Algorithms for a 6 DoF Task Space Trajectory Tracking Control of the Robot including (PD+Gravity, PID, InvDynamics, Feedback Linearization, Sliding Mode, etc.)

SIS Parameter Estimation Jun - 2025

• Implementation of EKF and MCMC on Real-Time Parameter Estimation of the SIS Non-Linear System

Flocking June - 2024

• Implementation of the Boid Algorithms on Particles
• Implementation of the Olfati-Flocking Algorithms on Particles
• Extending the Flocking Algorithms for a Swarm of Quadcopters

Fault Tolerant Control of Cooperative Load Carriage with QuadCopters June - 2024

• Quadcopter Model Derivation using Euler Lagrange Method
• Design of Sliding Mode Based Full-State Observer Quadcopter
• Design of Adaptive Sliding Mode Controller for a 6 DoF Quadcopter Under Disturbance and Uncertainty
• Trajectory Generation the Multi-Robot System Using Particle Swarm Optimization(PSO) Algorithm
• Implementing Fault Tolerance Logic Based on the Rope Failure

Path Planning May - 2024

• Optimization Based: **Particle Swarm Optimization(PSO) and Genetic Algorithm(GA)** Based **Smooth** Path Planning using **SPLINE** Method
• Graph Search Based Algorithms: **Dijkstra, A*, Ant Colony Optimization**

Icarus(Bachelor's Thesis) June - 2023

• Modeling and control(PID controller tuned with BBO optimization algorithm) of a 6 DoF quadcopter.
• An optimization based learning strategy for quadcopter multi-flips.
• Design and implementation of a non-linear robust sliding mode controller on a 6 DoF quadcopter.

System Identification and Intelligent Control of a Mass-Spring-Damper System Jan - 2023

• A Grey-box MVUE system identification process on a mass-spring-damper system.
• Designing a digital PID controller using 3 non-analytical methods(manual mode, MATLAB control toolbox and genetic algorithm).

Deep Learning for Navigation Aug - 2022

• Making a 9 DoF IMU data logger using Raspberry pi.
• Recording a dataset of 9 IMU signals with a 100 Hz sampling frequency for 40 mins.
• Implementation of a LSTM neural network as a replacement for a Kalman-Filter.
• Implementation of a KNR and SVR regression algorithm as a replacement for a Kalman-Filter for computational cost reduction.

Gesture Controlled QuadCopter Apr - 2022

• Body position estimation using deep learning(Google Media-Pipe Framework).
• A reliable gesture detection algorithm using decision trees.
• Controller design for tracking the human and taking orders using body gesture commands(distance set-points and flip).

Evo-Copter Apr - 2022

• Building a Raspberry pi based flight controller from scratch.
• Initial manual PID controller tuning.
• Utilizing the BBO optimization algorithm to fine-tune the controller based on step response of the system.

EEG Brain Computer Interface(Motor-Imagery and SSVEP) Jan - 2022

- Analysis of single and multi-channel EEG signals in Time, frequency(FFT and STFT) and Wavelet domains.
- Source Localization, Spatial(Temporal) Filtering: CAR, High Laplacian, Low Laplacian.
- BCI Channel reduction/selection using algorithms: CNN, CSP, CSSP, RCSP, RCSSP with filter-bank variants.
- SSVEP Channel reduction/selection using algorithms: PSDA, CCA, MSI, FBCCA, FoCCA, LASSO.
- Statistical analysis and feature extraction.
- Feature selection and feature mapping.
- Classification.
- Brain topographic map creation.

A EEG-Based Epilepsy-Seizure and Alzheimer's Disease Detection Feb - 2020

- Pre-Processing and Feature Engineering(Noise and artifact removal, EEG rhythm separation, Statistical feature extraction).
- Classification and Accuracy Comparison of Multiple ML Algorithms.
- Optimization-Based Feature Selection.

Open-Source Projects

ManiDyn MATLAB Toolbox Jul - 2025

- Matlab toolbox for symbolic derivation of serial manipulator dynamics and kinematics(forward and inverse) in optimized symbolic expressions or optimized C/MEX code.

Raspi-Kapta Flight Controller Aug - 2022

- A Raspberry pi and Arduino based flight software written in pure C++.
- Anti-windup PIDF controller.
- Arduino based reference signal reading module.
- BNO055 IMU module(written from scratch).
- PCA9685 PWM driver module(written from scratch).

Super-Low-Cost Radio Controller(SLC-Radio) Jul - 2020

- A computer interface similar to a radio controller using java(processing 3).
- A ground station using an Arduino and NRF24L01 communication transceiver module.

Certificates and Degrees

- Robotics Specialization - University of Pennsylvania
- Non-Invasive Brain Stimulation - National Brain Mapping Lab
- BCI & Neurotechnologies Spring School - g.tec Medical Engineering
- Mathematical Psychology: Deep Learning and Neural Networks - Shahid Beheshti University
- Mathematics for Machine Learning - Imperial College London
- MATLAB Programming for Engineers and Scientists Specialization - Vanderbilt University
- Signal Processing: EEG Signals(onlinebme.com)