

# Mohammad Pasande

Tehran- Iran

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## Education

### University of Tehran (UT)

Tehran, Iran

M.Sc. IN ELECTRICAL ENGINEERING (CONTROL MAJOR)

Sep 2019 - Feb 2023

- GPA: 17.05/20.00 (3.65/4.00)
- Thesis: Online Learning for Large Scale Mixture Model.
- Supervisors: Dr. Reshad Hosseini & Dr. Babak N. Araabi

### Imam Khomeini International University (IKIU)

Qazvin, Iran

B.Sc. IN ELECTRICAL ENGINEERING (CONTROL MAJOR)

Sep 2014 - Sep 2018

- GPA: 17.25/20.00 (3.64/4.00)
- Thesis: Robust PID Controller Design using Kharitonov Theorem and Stability Boundary Locus (SBL) Method
- Supervisor: Dr. Mehdi Rahmani

## Interested Area

- Optimization
- Machine Learning Theory
- System Est. & Optimal Control
- Game Theory
- Causality

## Skills

### Computer Skills

**Proficient:** Python, MATLAB.

**Intermediate:** R, Git,  $\text{\LaTeX}$

### Hardware Des. Language (HDL)

**Proficient:** VHDL. **Intermediate:** Verilog.

### Software

MATLAB, Spyder, Google Colab, RStudio, Visual Studio Code, ISE Design Suite, TexStudio, Microsoft Excel, Word, PowerPoint.

### Languages

- Farsi: Native
- English: Proficient - **TOEFL Overall: 98** (R: 25 - L:28 - S: 22 - W: 23).

## Academic Projects

**M.Sc. Thesis:** Implementation, modification and visualization of following subjects as object oriented code in python (more specifically using Pytorch & NumPy) and MATLAB:

- Manifold Optimization,
- Stochastic Optimization,
- Gaussian Mixture Models and their properties,
- Flow-Based Models (Deep Neural Networks)

**B.Sc. Thesis:** Research on following topics and implementing codes in MATLAB:

- Kharitonov Theorem and Robust Control Theory
- Stability Boundary Locus and Convex Optimization

**Machine Learning:** In-course exercises (using Python libraries such as NumPy, SciPy and Scikit-Learn) on:

- Density Estimation,
- Classifiers,
- Dimensionality Reduction Technique,
- Clustering & Unsupervised Learning

**Deep Learning:** All studies were implemented with the TensorFlow (Keras) framework and Numpy library in needed cases,

- A comparative study on ARIMA, RNNs and CNN-LSTM for time series forecasting
- Supervised learning and Transfer Learning of CNN for image classification
- Implementation of Sequential Models for text generation
- DCGAN model for image generating
- Deep Reinforcement Learning (Deep Q-Learning) on frozen lake game

**Numerical Optimization: (In Progress)** Implementation of following tasks using Pytorch framework:

- First & Second order Methods,
- MetaHeuristic Methods,
- Quasi Newton Methods,
- Linear and Nonlinear Conjugate Gradient Method,
- Gauss-Newton & Levenberg-Marquardt Method.

**Statistical Inference:** Practical implementation of following topics using R as processing and visualization tool:

- Linear Regression model, Logistic Regression model
- Multiple parametric & Non-parametric statistical tests

**System Estimation & Identification:** Conceptual and practical practices (Using MATLAB) on:

- Least Squares (LS) and its extensions,
- Prediction error method (PEM),
- MLP, RBF
- Fuzzy and NeuroFuzzy models,
- Nonlinear Optimization methods.

**Cognitive Neuroscience:**

- Semantic Priming,
- Prediction of personal morality index,
- Implementation of a cognitive task using PsychoPy,
- Development of behavioral model for Iowa gambling task,
- Lie detection using EEG signal,
- (basic knowledge of fMRI data and FSL).

**Game Theory:** In-course exercises(Using MATLAB) on:

- Simple-form and Extensive-form game,
- Bayesian games,
- Nash bargaining Solution in cooperative games,
- Learning in Games,
- Evolutionary games and minimax Q-Learning in games.

**Optimal Control and Nonlinear Systems:**

- Simulation of a single neuron behavior
- Simulation of a 2-lane train passage, linearization, and design LQR optimal controller
- Simulation of a single connection servo motor crankshaft, linearization, and design state feedback compensator

## Publication

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### Journal Papers

UNDER REVIEW

- **Pasande M**, Hosseini R, Araabi BN. (2023). Stochastic First-Order Learning for Large-Scale Flexibly-Tied Gaussian Mixture Model. arXiv preprint [arxiv 2212.05402](https://arxiv.org/abs/2212.05402)

## Selected Courses

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**M.Sc. Courses:**

- NN & Deep Learning (17.0/20.0),
- Statistical Inference (18.8/20.0),
- System Est. & Identification (19.0/20.0),
- Game Theory (19.3/20.0),

**B.Sc. Courses:**

- Operation Research (19.0/20.0),
- Digital Control Systems (18.6/20.0),
- Modern Control Systems (17.5/20.0),
- Mechatronics (20.0/20.0)

## Experience

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**Teacher Assistant**

TA

*Iran*

2015 - 2022

• **UT 2019 - 2022**

— M.Sc Courses

- \* System Estimation and Identification (Two semesters)
- \* Neural Networks & Deep Learning (Three consecutive semesters)

- \* Optimal Control
- \* Statistical Inference
- \* Game Theory

— B.Sc Courses

- \* Intelligent Systems (Chief TA)

- \* Linear Control System (Two semesters)

• **IKIU 2015 - 2018**

— B.Sc Courses

- \* Basic Physics II
- \* Numerical Mathematics
- \* Circuit Theory I

- \* Logic Circuit I & II
- \* Linear & Digital Control System Lab

**Algorithm Developer at SEDNA**

*Tehran, Iran*

ML ENGINEER - PART-TIME

August 2021– March 2023

- Due to the building's rules and regulations in Iran, the thermostats usually contain both power and control board together; hence the power board makes unwanted heat which disturbs the sensor's data. I came up with the idea of designing a test environment to model the distribution and model it using ML techniques. (**Sensorless Calibration**)

## Teaching

### TEACHER

- Linear, Digital & Modern Control System using MATLAB
- Design of logic circuit with FPGA using VHDL

Iran

2015 - 2018

## Honors

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- 2019 **Ranked 10th and 11th**, in the Iranian university entry exam for master students of Bioelectrical engineering and Control of participants of the Iranian university entry exam
- 2018 **Ranked 3rd GPA**, among graduating students of EE-control major in B.Sc. at IKIU (class 2014)
- 2014 **Ranked within top 1.5%**, of 180000 participants of the Iranian university entry exam
- 2013 **Qualified for the second stage**, of physics student olympiad

## References

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- **Dr. Babak N. Araabi**, Professor, Department of Electrical and Computer Engineering, UT, Tehran, Iran, [araabi@ut.ac.ir](mailto:araabi@ut.ac.ir) .
- **Dr. Reshad Hosseini**, Assistant Professor, Department of Electrical and Computer Engineering, UT, Tehran, Iran, [reshad.hosseini@ut.ac.ir](mailto:reshad.hosseini@ut.ac.ir) .
- **Dr. Mehdi Rahmani**, Associate Professor, Department of Electrical Engineering, IKIU, Qazvin, Iran, [mrahmani@eng.ikiu.ac.ir](mailto:mrahmani@eng.ikiu.ac.ir) .