



Salar Basiri

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📍 348 Coordinated Science Lab, The Grainger College of Engineering, University of Illinois at Urbana-Champaign, 1308 W. Main St., Urbana, IL, 61801

Research Interests

- Machine Learning, Data Analysis
- Mechatronics, Robotics, Robust Control
- Embedded Systems, HDL Design
- Power Electronics, Smart Grids

Education

Ph.D., Mechanical Engineering

University of Illinois at Urbana-Champaign (UIUC)

Advisor: Srinivasa M Salapaka

Expected Graduation: 2025

GPA: 4.0

M.Sc., Mechatronics

Sharif University of Technology (SUT)

Advisors: Ali Meghdari, Alireza Taheri, Minoo Alemi

Graduated: Feb 2021

GPA: 4.0

B.Sc., Mechanical Engineering

Sharif University of Technology (SUT)

Advisor: Saeed Behzadipour

Graduated: Sep 2018

GPA: 3.93

Experience

• Graduate Teacher/Research Assistant

University of Illinois at Urbana-Champaign (UIUC)

Aug 2021 – Present

Research: Autonomous UAV traffic management, Smart manufacturing, Interplay between control and machine learning. Teaching: Signal processing

• Graduate Teacher/Research Assistant

Sharif CEDRA Robotics Lab

Feb 2019 – Sep 2020

Research: implementing adaptive robotic architecture on a humanoid robot. Teaching: kinematics and dynamics of robots

Publications

- [1] **Optimizing UAV Network Efficiency: Integrative Strategies for Simultaneous Energy Management and Obstacle-Aware Routing**
American Institute of Aeronautics and Astronautics Scitech [accepted for publication]
- [2] **Sequence Generation via Subsequence Similarity: Theory and Application to UAV Identification**
<https://arxiv.org/abs/2301.08403>

- [3] **Orthogonal Non-Negative Matrix Factorization: A Maximum-Entropy-Principle Approach**
<https://arxiv.org/abs/2210.02672>
- [4] **Dynamic Sign Language Recognition using a Deep Neural Network**
International Journal of Social Robotics, Springer
DOI: 10.1007/s12369-021-00819-0
- [5] **Design and Implementation of a Robotic Architecture for Adaptive Teaching: A Case Study on Iranian Sign Language**
Journal of Intelligent & Robotic Systems, Springer
DOI: 10.1007/s10846-021-01413-2

Skills

Artificial Intelligence, Machine Learning & Data Science: Dynamic Programming, Algorithms, Computer Science, Natural Language Processing (NLP), Neural Networks, Deep Learning, Feature Selection, Data Structures, Data Mining, Advanced Linear Algebra, Learning Techniques, SQL Database Design, Performance Metrics, Segmentation, MDP & Reinforcement Learning, Git & Github, AWS, Cloud Computing

Programming Languages & HDL: Python (TensorFlow, PyTorch, Keras, Scikit-Learn, Pandas, NumPy, Matplotlib, Tkinter), C / C++, Matlab, Verilog

Electronics, Sensors & Signal Processing: FPGA Development, Power System Control, Data Collection, Test Execution, Microcontroller programming, debugging software / hardware, Filter Design, Analog Circuit Design, Image Processing, Sensor fusion, Digital Circuit Design, Kalman Filter, Digital Signal Processing, Communication (I2C, SPI) Schematic, Prototype Development, Embedded Systems, Troubleshooting, SCPI, Computer Architecture, Vivado, Opalkelly, Arduino, Texas Instruments (TI) Code Composer Studio

Control, Automation & Robotics: Controller Design & Analysis, Stability Analysis, Dynamics Modeling, State Estimation, Coordinate Transformation, Non-Linear System Analysis, Torque Production, Optimal Control, Robust Control Analysis, Model-Predictive Control, Motor control, Path planning, Servo Control, Motion Control, ROS (Robot Operating System), Gazebo, Machine vision (OpenCV), Linux (Ubuntu), Test Automation Tools (Jenkins), Computer Vision, Matlab Simulink

Optimization, Statistical Analysis & Information Theory: Mixed-Integer Programming, Genetic Algorithm, Metaheuristic Optimization, T-Test Analysis, Effect Size Analysis, Channel Optimization, Scheduling, Routing, and Planning, Microsoft Office

Entrepreneurship, Communication & Leadership: Start Ups, Written and Verbal Communication, Technical Writing, Team Building, Agile Techniques (Scrum), Public Presentation, Attention to detail, Collaborative Work, Flexibility and Adaptability, Public Presentation, MindMeister, LaTeX

Honors & Awards

- Member of Phi Kappa Phi honor society
- Selected Judge at the Undergraduate Research Symposium, UIUC, 2022, 2023
- Selected Student for the Silicon Valley Entrepreneurship Event, Technology and Entrepreneurship Center at UIUC, JAN 2023
- Presenter at the Dynamic Research Enterprise for Multidisciplinary Engineering Sciences (DREMES), Zhejiang University (ZJU) and the University of Illinois at Urbana-Champaign (Illinois) Joint Research, SEP 2022
- Credited for Master's Degree in Mechatronics as a high-ranked student, Brilliant Talents Group, Sharif University of Technology, MAY 2018

Courses

- **Ph.D. Courses:** ECE 515: Linear Control, ECE 517: Adaptive Control, ECE 528: Nonlinear System Analysis, CS 545: Machine Learning for Signal Processing, TAM 541: Mathematical Methods, ME 598: Physics-Informed Machine Learning, IE 511: Integer Programming, ME 561: Robust Control, ECE 437: Sensors and Instruments
- **M.Sc. & B.Sc. Courses:** Machine Learning, Mechatronics & Lab, Optimal Design, Intelligent Systems, Advanced Control, Fuzzy Systems, Academic Writing, Applied Electronics, Measurement and Control Systems, Musculoskeletal Biomechanics, Robotics Lab, Robots Kinematics and Dynamics

Projects

- Real-time object tracking System implemented on ARTIX-7 FPGA Using Verilog
- Physics-Informed System Identification by Koopman Decomposition using an Autoencoder
- Unmanned Aerial Vehicle Traffic Management (UTM) Using a Parametrized Sequential Decision Making (para-SDM) Framework
- Speaker Independent Speech Sentiment Analysis via Spectrum Analysis and Deep Learning
- Job-Shop Scheduling on a Robotic Network as Part of a Smart Manufacturing Setup
- Design & Implementation a robotic architecture on RASA for adaptive human-robot interaction
- Building a fully automated sensor-based and manual SMS-Controlled Smart Tele-operated Irrigation System