

Abolfazl Eskandarpour

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SUMMARY

Experienced **Robotics and AI Researcher/Scientist** specializing in **control, motion planning, dynamic** modeling, and **optimization**. Skilled in leveraging **deep learning** techniques such as **RL** and neural network architectures (**TCN, RNN, CNN**) in robotics, with a focus on designing **robust** and **adaptive controllers** and optimizing performance for **autonomous aerial vehicles**. Proficient in **Python**, and **C++** programming, as well as deep learning frameworks like **PyTorch, TensorFlow, and OpenCV**. Passionate about advancing research in robotics, control, and AI to innovate and enhance autonomous systems. ([My Portfolio](#)).

EDUCATION

Simon Fraser University

Ph.D. • Electrical & Computer Engineering • GPA: 4.17/4.33

Thesis Title: "Deep Learning-based Hybrid Dynamic Modeling and Tube-Based MPC Control of Unmanned Aerial Manipulators (UAMs)"

Burnaby, BC

Nov. 2019-Present

Tarbiat Modares University

M.Sc. • Electrical & Computer Engineering • GPA: 3.5/4.0.

Thesis Title: "A Cooperative Model Predictive Controller Design for a Group of Quadrotors using Particle Swarm Optimization"

Tehran, Iran

Graduation Date: Feb. 2015

Shiraz University of Technology

B.Sc. • Electrical & Computer Engineering • GPA: 3.5/4.0

Thesis Title: "Review and Simulation of Recent Reliability and Lifetime Improvement Approaches in Wireless Sensor Networks"

Shiraz, Iran

Graduation Date: Aug. 2012

PROFESSIONAL EXPERIENCE

Simon Fraser University (SFU)

Researcher Assistant

Burnaby, BC

2019 – Present

- **Software** and **Hardware** development of an **autonomous UAM** in both real-world and simulation using **ROS1/ROS2/Gazebo**: [Result](#)
- Created a hybrid dynamic model for the UAM using **deep learning architectures (FNN+TCN)** for precise system **identification**, achieving a 30% improvement in model accuracy from 3 hours of input-output flight data: [Result1](#), [Result2](#)
- Leveraged offline **RL** on a **large dataset** from the UAM platform to enhance state-space dynamic models and update policies, enabling improved policy **robustness** and **optimization** prior to deployment.
- Developed **adaptive robust data-driven controller** and **optimization** systems for a UAM, including a **deep learning-enhanced tube-based MPC**, improving uncertainty management by 20%, accuracy by 35%, and achieving a 99% success rate in payload handling: [Result1](#), [Result2](#)
- Developing a framework for seamless **UAM-human interaction** using **LLMs (GPT, Gemini, Llama)** for natural language commands and **computer vision** for **visual feedback**. This enhances **UAM autonomy** in tasks like payload grasping/retrieval [Primary Result](#).
- Developing a **LangChain agent** based on **ROS** to facilitate smooth communication between the UAM and human operators.
- Designed an **optimized robust switching** controller to improve **path planning** for tilt-rotor UAVs: [Result](#)
- Designed a **model-based RL** algorithm, paired with a **robust MPC**, to ensure **safe exploration** and **exploitation** in practical implementations where constraint satisfaction is vital: [Result](#)

Simon Fraser University

Teaching Assistant

Burnaby, BC

2019 - Present

- Served as a Teaching Assistant over 20 times in the Engineering Science (ENSC) and Sustainable Energy Engineering (SEE) departments at SFU.
- Managed tutorial and lab sessions, providing support and answering students' questions for an average of approximately 150 students each semester.
- Designed assignments, lab exercises, quizzes, and midterm/final exam questions, and responsible for grading them.

Huawei Technologies services

TX Engineer

Tehran, Iran

2016- 2018

- Executed the deployment and integration of fiber optic networks, involving the configuration of **network infrastructure components**, for 5 major Iran provinces
- Oversaw on-site installation activities and subcontractor operations, ensuring compliance with engineering specifications and industry standards.
- Coordinated with engineering teams to diagnose and address technical issues, **optimizing network performance** and reliability.
- Generated comprehensive technical documentation and progress reports detailing installation procedures, configurations, and system performance.

Tarbiat Modares University

Researcher Assistant

Tehran, Iran

2012 – 2016

- Developed an advanced **optimized MPC controller** for a quadrotor **path-following** problem and provided **stability** analysis: [Result](#)
- Designed a **cooperative distributed MPC** controller, including Particle Swarm Optimization (PSO), for a group of quadrotors, including algorithms for **formation control, trajectory tracking, planning**, and obstacle avoidance: [Result](#)
- Conducted **experimental implementation** of Constrained MPC for the quadruple tank process, achieving improved trajectory tracking performance.
- Designing a **predictive guidance** and control system for maneuverable **ground moving vehicle** in **3D space** using a Hexarotor: [Result](#)

ENGINEERING SKILLS

Technical Skills: C++, Python, Matlab/Simulink, Pandas, PyTorch, Numpy, OpenCV, Docker, TensorFlow, Anaconda, Git/Github, Embedded systems

Robotic Software/Hardware: ROS1/ROS2, Gazebo, Isaac SIM, PX4 Autopilot, Qgroundcontrol, Ardupilot, Raspberrypi, Microcontrollers

Control & Robotic Skills: Controllers (Robust and Adaptive PIDs, TMPC, NMPC, LQR, H-infinity, Backstepping, Sliding mode), Path Planning, SLAM, Kinematics and Dynamics

LLM Knowledge: Transformers, LLM inference optimization, GPT models, LLaMA, Parameter-Efficient Fine-Tuning (PEFT), LoRA, Prompt Tuning/Engineering

AI Knowledge: Model free/based RL algorithms, offline RL, Generative AI and LLM, NN algorithms: TCN, CNN, FNN, RNN, LSTM

Optimization Software/Knowledge: YALMIP, Baron, Gurobi, CasADi, MOSEK, Gradient descent and Convex optimization

Others: Persistent problem-solver with strong problem-solving skills, Self-motivated, Innovative Thinker, Good teamwork spirit and adaptability, Fast-learner

PUBLICATIONS

Journals:

- A. Eskandarpour and I. Sharf, "A constrained error-based MPC for path following of quadrotor with stability analysis," Nonlinear Dyn, vol. 99, no. 2, pp. 899–918, Jan. 2020, doi: 10.1007/s11071-019-04859-0.
- A. Eskandarpour, M. Soltanshah, M. Mehrandezh, K. Gupta" [Decoupled Dynamic Modeling by Decomposing the Cross-Coupled Dynamics and Tube-Based LPV-MPC Control Scheme for Aerial Manipulation](#)", IEEE Transactions on Aerospace and Electronic Systems, March 2024, Revised
- A. Eskandarpour, M. Mehrandezh, K. Gupta, A. Ramirez-Serrano, M. Soltanshah "A constrained robust switching MPC structure for tilt-rotor UAV trajectory tracking problem" Nonlinear Dyn 111, 17247–17275 (2023). <https://doi.org/10.1007/s11071-023-08787-y>
- A. Eskandarpour, S. M. M. Dehghan, and J. Karimi, "Designing a predictive guidance and control system for maneuverable ground moving target tracking in 3D space using a Hexarotor," Journal of Control, pp. 0–0, //10.
- A. Eskandarpour, M. Soltanshah, M. Mehrandezh, K. Gupta" Data-driven visual servoing and control of aerial manipulators utilizing RL and deep neural networks (DNN) for efficient load grasping, retrieval, and trajectory tracking."IEEE Robotics & Automation Magazine, In progress

Conferences:

- A. Eskandarpour and V. J. Majd, "Cooperative formation control of quadrotors with obstacle avoidance and self collisions based on a hierarchical MPC approach," in 2014 Second RSI/ISM International Conference on Robotics and Mechatronics (ICRoM), Oct. 2014, pp. 351–356, doi: 10.1109/ICRoM.2014.6990926.
- A. Eskandarpour, M. Soltanshah, K. Gupta, M. Mehrandezh" [Hybrid Dynamic Modelling using FeedForward and Temporal Convolutional Networks \(FNN+TCN\) and Robust Control Scheme for Aerial Manipulators](#)", 2024 IEEE 20th International Conference on Automation Science and Engineering
- M. Soltanshah, A. Eskandarpour, M. Mehrandezh, K. Gupta "Robust Partitioned Visual Servoing for Aerial Manipulation Utilizing Controllable-space Image Planning and Adaptive Image Representation", 2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
- M. Soltanshah, A. Eskandarpour, M. Mehrandezh, K. Gupta " Toward Autonomous Aerial Object Retrieval Utilizing RL-based Eye-to-hand/Eye-in-hand Feature Matching and Controllable-space Image Planning for Partitioned Visual Servoing", 2025 IEEE International Conference on Robotics and Automation (ICRA)-Submitted

Recommendations

Please [visit here](#) to view my recommendations from my supervisors.

AI CERTIFICATIONS

- Reinforcement Learning Specialization**
Coursera • 2023 • Credential ID: [KSWYXM9YTDY4](#)
- Fundamentals of Reinforcement Learning**
Coursera • 2023 • Credential ID: [9S76Z5XFH8SJ](#)
- A Complete Reinforcement Learning System**
Coursera • 2023 • Credential ID: [HYQXJWMF544Q](#)
- Neural Networks and Deep Learning**
Coursera • 2024 • Credential ID: [QEVUPZR7S7NE](#)
- Structuring Machine Learning Projects**
Coursera • 2024 • Credential ID: [WRZ70DFN0YDS](#)
- Sequence Models**
Coursera • 2024 • Credential ID: [ODCDK9V40ZXZ](#)

- Sample-based Learning Methods**
Coursera • 2023 • Credential ID: [YEC4QD353E49](#)
- Prediction and Control with Function Approximation**
Coursera • 2023 • Credential ID: [PBMERWUUIXQY](#)
- Generative AI with Large Language Models**
Coursera • 2024 • Credential ID: [CIK38HLH5X6Q](#)
- Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization**
Coursera • 2024 • Credential ID: [GRBKWL3OJSQJ](#)
- Convolutional Neural Networks**
Coursera • 2024 • Credential ID: [SRP53ZIG2T9M](#)
- Deep Learning Specialization**
Coursera • 2024 • Credential ID: [2UU162WT7YOU](#)

HONORS AND AWARDS (For more information, please check the last page of my [transcript here](#))

- Winner of the Graduate Fellowship Award five times, awarded by Simon Fraser University for Fall 2020–2024 and Summer 2022
- Winner of the Faculty of Applied Sciences Graduate Fellowship two times, awarded by ENSC at Simon Fraser University for Spring 2021 and Summer 2024
- Recipient of MITACS Research Training Award, Awarded by MITACS for Fall 2020
- Recipient of Helmut and Hugo Eppich Family Endowment Fund five times, awarded by the Senate Graduate Awards Adjudication Committee for Spring 2021-2025
- Winner of Lang Wong Memorial Endowment Scholarship two times, awarded by Graduate Department at SFU for Spring 2022 and 2024
- Recipient of PhD Research Scholarship awarded by Simon Fraser University for fall 2023

RELEVANT COURSEWORK

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|---|--|
| Machine Learning SFU University, Computer Science Department • 2020 • Grade: A+ | Robotic Autonomy SFU University, Computer Science Department • 2021 • Grade: A+ |
| Introduction to Robotics SFU University, Engineering Science Department • 2020 • Grade: A | Model Predictive Control Tarbiat Modares University, Electrical & Computer Engineering Dep. • 2014 • Grade: A+ |