

LAKSHAY ARORA

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EDUCATION

Doctor of Philosophy, Aerospace Engineering
Carleton University, Ottawa, Canada

September 2020 - Present

- Research topic: **Path planning(Guidance and control) for Spacecraft rendezvous and proximity operations under uncertainties, using Machine Learning techniques**

Master of Science (Thesis-based), Aerospace Engineering
Wichita State University, Wichita, United States

August 2017 - May 2020

- Area of Study: Dynamics and Control
- Thesis title: **Reinforcement Learning Framework for Spacecraft Low-Thrust Orbit Raising**

Bachelor of Technology, Aeronautical Engineering
Manipal Institute of Technology, Udupi, India

August 2013 - May 2017

SKILLS

- **Programming languages:** MATLAB, Python, Julia, R, C++
- **Modelling and simulation software:** ANSYS(CFD), CATIA V5, Solid Edge, Simulink
- **Frequently used:** NumPy, Pandas, Scikit-learn, Keras, TensorFlow, matplotlib, PySpark, PyTorch, IBM Watson Studio, Jupyter Notebook, NLP, SQL, Tableau, SPSS, Microsoft Office- Word, PowerPoint, Excel, Neuralworks Pro II, L^AT_EX
- **Language skills:** English, Hindi and German (A2 level)
- **Soft skills:** Confident, Creative, Analytical, Articulate, Able to work with minimum supervision, Self-Motivated, Communication, Team Player

WORK EXPERIENCE

Graduate Research Assistant
Spacecraft Robotics and Control Laboratory, Carleton University, Ottawa, Canada

September 2020 - Present

- Developing a novel **path planning** algorithm for spacecraft rendezvous and proximity operations, using machine learning.

Graduate Research Assistant - Machine Learning
Mitacs Business Strategy Internship - AI Quest Inc and George Brown College, Toronto, Canada

May 2022 - September 2022

- Performed data analysis on large scale drug datasets (40GB) to discover and analyze relationships between drug compound structure and Adverse drug reactions

Graduate Teaching Assistant
Mechanical and Aerospace department, Carleton University, Ottawa, Canada

September 2021 - December 2021

- Conducted theory and labs tutorials for the course MAAE 3202 A, graded weekly assignments, labs, reports, etc, and proctored examinations held for the course.

PROJECTS

Image Classification for Cifar10 Dataset
Applied Artificial Intelligence, Carleton University, Ottawa

October 2022

- Deep learning project regarding the classification problem of the CIFAR-10 dataset using Convolutional Neural Networks. Best accuracy is provided by Optimizer - SGD for the best model with 83 % accuracy.

Adaptive Control of Robotic Arm under Time-varying Uncertainties
Nonlinear Systems Analysis, Carleton University, Ottawa

December 2020

- Implemented Function Approximation Technique (FAT) adaptive control scheme for 2-DOF robot arm carrying uncertain time-varying payload and also tested for different desired trajectories and cases to check the tracking performance of the controller.

Flight Ticket Fare Prediction
Personal Project

July 2020

- A complete end-to-end project to predict the domestic flight prices in India depending on various features using **Random Forest Regressor** and **XGBoost Regressor** which is then deployed as a Flask Web Application on Render.

Pseudo-Inverse Boat Controller

May 2019

Neural Networks Model/Control, Wichita State University, Wichita

- Successfully created a **Neural network psuedo-inverse** controller for the boat described by a specified dynamic model in order to generate a path till a given position. Best training RMS error : 0.7 %

HR Analysis on Graduate Turnover

May 2019

Big Data Analytics in Engineering, Wichita State University, Wichita

- Project based on the graduate employee turnover dataset which consists of HR information collected at the time of recruitment process which contains scores and ratings. Predicted graduate turnover based on their personal traits and other assessment scores using **Logistic regression** and **Decision trees** in **R** programming language.

PUBLICATIONS/POSTERS

Arora L., Dutta A.

Reinforcement Learning for Sequential Low-Thrust Orbit Raising Problem

January 2020

30th AAS/AIAA Space Flight Mechanics Meeting in conjunction with the AIAA Science and Technology Forum and Exposition (SciTech 2020)

- Developed a reinforcement learning algorithm, Deep Q-learning to be more specific, using **MATLAB** for optimal tuning of the weights of the objective function for the electric orbit-raising problem of the spacecraft. Best MSE: 0.0025.

Dutta A., Arora L.

Objective Function Weight Selection for Sequential Low-Thrust Orbit-Raising Optimization Problem

January 2019

- Explored the impact of weights the objective function components on the optimality gap of computed orbit-raising trajectories, and numerical examples based on a variety of orbit-raising scenarios are used to illustrate this effect.

CERTIFICATIONS

Business Analytics Course by IMS Proschool

December 2020

- Worked with various data sets, using statistical methods and software such as R, Python, and Excel, to analyze and interpret data and develop actionable insights for businesses.
- Acquired a deep understanding of the fundamental concepts and tools of Business Analytics to communicate data insights to stakeholders using visualizations, dashboards, and reports.

IBM Data Science Professional Certificate

December 2019

- Included 9 courses with latest job-ready skills and techniques covering a wide array of data science topics including: open source tools and libraries, methodologies, Python, databases, SQL, data visualization, data analysis, and machine learning.