

Arpit Dwivedi

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Education

Stanford University

Sept 2024 – Jun 2026

Master of Science in Aeronautics and Astronautics Engineering

- **Coursework:** Principles of Robot Autonomy, Convex Optimization, Robot Perception, Advanced Robotic Manipulation, Decision Making Under Uncertainty, Optimal and Learning Based Control

Indian Institute of Technology Bombay

Nov 2020 – May 2024

Bachelor of Technology with Honors in Mechanical Engineering

GPA: 9.43/10

Minor in Artificial Intelligence and Data Science

- **Coursework:** Embedded Control & Robotics, Adaptive Control, Non-Linear Dynamical System, Differential Geometric Methods in Control, Reinforcement Learning, Advanced Machine Learning, Estimation on Lie Groups, Online Learning and Optimization

Research Experience

Design and Control of Snake Robot | Controls and Computing Lab, IIT Bombay

Jul 2023 – Jul 2024

Guide: Prof. Dwaipayan Mukherjee

- Developed a novel decentralized control algorithm for stabilization and precise trajectory tracking for snake robot
- Designed & fabricated modular snake robots using Dynamixel MX-64R smart actuators with parallel joint axes
- Formulated dynamics & tested open loop control inputs for the serpentine locomotion of assembled snake robot

Self-Driving Car (SeDriCa – UMIC) | Innovation Cell, IIT Bombay

Feb 2022 – Feb 2023

- Implemented Non-linear Model Predictive Control (NMPC) with discrete-time dynamic bicycle model for optimal control inputs ensuring smooth driving and communication among modules in Robot Operating System (ROS)
- Improved ego vehicle path planning & safety tracking by fusing Artificial Potential Fields with Model Predictive Control
- Integrated low-level steering controller for real-time deployment using an Arduino microcontroller, conducted vehicle testing under ideal conditions, and established communication with the drive-by-wire system via the CAN module

Control Design for Offshore Wind Turbine | Control Engineering Lab, UBC Vancouver

May 2023 – Jul 2023

Guide: Prof. Ryoze Nagamune

- Designed and tuned a PID nacelle-yaw controller for the IEA-15MW semi-submersible offshore turbine, achieving an overall 6.6% fluctuation from mean output power
- Developed a learning control strategy for offshore wind turbines using the deep deterministic policy gradient method

Selected Publication

Y. Niu, A. Dwivedi, J. Sathiaraj, P. P. Lathi and R. Nagamune, "Floating Offshore Wind Farm Control via Turbine Repositioning: Unlocking the Potential Unique to Floating Offshore Wind", IEEE Control Systems, vol. 44, no. 5, pp. 106-129, 2024, doi: 10.1109/MCS.2024.3432342

Projects

Multirobot Navigation Under Uncertainty | Stanford University

Sep 2024 – Dec 2024

- Implemented an Extended Kalman Filter (EKF)-based state estimator for improving multi-robot navigation accuracy
- Deployed a multi-agent control strategy by adapting POMCP double progressive widening algorithm to solve POMDP

Vision based Pick and Place | Stanford University

Sep 2024 – Dec 2024

- Achieved 96% mIoU in object detection with U-Net-based segmentation for precise feature delineation in 2D images
- Trained an end-to-end grasping algorithm using grasping affordance maps for enhanced object manipulation

Adaptive Control of Spacecraft Attitude | IIT Bombay

Aug 2022 – Nov 2022

- Developed a Control Lyapunov Function (CLF) based controller to stabilize the pre-defined attitude dynamics
- Utilized adaptive integrator backstepping for precise trajectory tracking under initial inertia offset of 30%

Technical Proficiency

Programming Languages

C++ , Python, MATLAB

Softwares & Tools

ROS, Linux, Gazebo, Git, RViz, SolidWorks, ANSYS, Simulink, Arduino, XEP100

Libraries & Packages

PyTorch, OpenCV, PyBullet, CVXOPT, roscpp, rospy, NumPy, Pandas, SciPy, Matplotlib, Seaborn, Plotly, Keras