Arpit Dwivedi

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Education

Stanford University **Sept 2024 – Jun 2026**
Master of Science in Aeronautics and Astronautics Engineering

- **Coursework:** Convex Optimization, Robot Perception, Principles of Robot Autonomy, 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:** Adaptive Control, Non-Linear Dynamical System, System Theory, 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 consisting of resin 3D printed ABS modules 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 steer controller with other modules for real-time deployment, conducting vehicle testing under ideal conditions, and establishing communication with the drive-by-wire system using the CAN module

Control Design for Offshore Wind Turbine | *Control Engineering Lab, UBC Vancouver* **May 2023 – Jul 2023**
Guide: Prof. Ryozo 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

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%

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

Technical Proficiency

Programming Languages	C++, Python, MATLAB
Softwares & Tools	ROS, Linux, Gazebo, Git, RViZ, SolidWorks, ANSYS, Simulink, Arduino
Libraries & Packages	PyTorch, OpenCV, PyBullet, CVXOPT, roscpp, rospy, NumPy, Pandas, SciPy, Matplotlib, Seaborn, Plotly, Keras