Aman Tiwary

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Summary

I specialize in motion planning and controls and am adept at researching, developing, and optimizing software solutions for robotic systems. With a strong focus on performance and efficiency, I have extensive experience in collaboration and innovation. I am eager to contribute to cutting-edge projects and advance the field of autonomous systems.

Education

MS in Mechanical Engineering | **University of Washington** — Sep. 2021 - Aug 2024
Coursework: *Controls, Convex Optimization, Reinforcement Learning* — GPA: 3.80/4.0
Specializing in **Motion Planning and Controls**, advised by Dr. Behçet Açikmeşe

BE in Mechanical Engineering | **Birla Institute of Technology** — Aug 2013 - May 2017
Coursework: *Vehicle Dynamics, Finite Element Method, Data Structures & Algorithms* — GPA: 7.91/10.0
Graduated with distinction

Experience

Graduate Student Researcher | **Autonomous Controls Lab** | *UW Seattle* — Mar 2022 - present

- **Perception aware trajectory planning for coverage:** Developed and implemented **6DOF quad-rotor trajectory planning** using **Sequential Convex Programming** with **line of sight constraints**
- Formulated **minimum viewpoint problem** as a **Mixed Integer Optimization problem** and created a **view planning package**(C++, Python) for **3D object reconstruction** using **Point Cloud Library**(PCL) with object-oriented design
- Maintaining **Trajectory Optimization** software library for live flight demonstrations with quad-rotor(C++)
- Developing next generation of drone hardware and software stack to support perception and onboard trajectory computing tasks

Controls Engineering Intern | **MONARCH TRACTOR** | *California, US* — Jun 2022 - Sep 2022

- Conducted **system identification of an Electro-Hydraulic Steering Actuator** and designed a **feedforward steering controller**, improving the steering response by **100 ms**

Cost Engineering | **TATA Motors Ltd** | *Maharashtra, IND* — Jul 2018 - Jul 2021

- Led Cross-Functional Team for **Gearbox** and **Engine Cooling System** of Euro 6 vehicles and identified cost reduction opportunities through **DFMA**, **cost-driver analysis**, **Linear Performance Pricing**, and **VAVE** resulting in potential savings of **$2 million** for commercial and passenger vehicles

Projects

Reinforcement Learning for Flying Insect Robots | **UW** — Sep 2022 - Dec 2022

- Implemented the **Proximal Policy optimization** method in **AirSim** (Microsoft Simulator) to train a quad-rotor equipped with cameras to autonomously navigate the corridor without colliding

MPC for Autonomous Car | **UW Formula Motorsports-Driverless** — Jan 2022 - May 2022

- Implemented dynamic **vehicle-bicycle-model** in Python with **MPC** to find an optimal set of control inputs

Manipulating Images Using Autoencoders | **UW** — Jan 2022 - Mar 2022

- Developed and trained a **Convolutional Autoencoder** to denoise an image for classification(MNIST Dataset) using Pytorch achieving a minimum classification accuracy of **76.5%** at a noise factor of **0.9**(Gaussian noise)

Design Optimisation of a Car Underbody Diffuser | **Undergraduate Thesis** — Aug. 2016 - May. 2017

- Conceptualized and simulated the undertray design with the car in optimum lap, demonstrating an improvement of **2.5%** in a lap time of the car without undertray

Design of a formula student chassis | **Team Srijan(Formula Student)** — May. 2014 - May. 2016

- Optimized chassis weight by **8 kg** using FEM simulations in **ANSYS APDL** by identifying and relocating key members for torsional stiffness. Published in **IJRET**

Technical Skills

Programming	C/C++, Python, Matlab, Simulink
Tools	Linux, ROS2, LaTeX, GitHub
Libraries	Eigen, PCL, Open3D, CVXPY, OpenCV
Simulation/Design	AirSim, Rerun, Solidworks, AutoCAD, ANSYS