Nathan Varghese

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Education

University of Colorado, Boulder Expected Fall 2025
Master of Science in Aerospace Engineering: Autonomous systems focus *Boulder, CO*
Relevant coursework: Statistical estimation for dynamical systems, Algorithmic motion planning

Maharashtra Institute of Technology (MIT ADT) August 2018 - June 2022
Bachelor of Technology in Aerospace Engineering, CGPA 7.99/10 *Pune, India*

Technical Skills

Programming: Python, ROS, Matlab, C++, C, Simulink, C# scripting, Git, LaTeX
Design and Simulation: SolidWorks, ROS-Unity, Fusion 360, Creo, ANSYS, Blender
Manufacturing: 3D printing, mill, drill, lathe, laser cutting, welding, vertical machining center, GD&T

Experience

Department of Aerospace Engineering Sciences, CU Boulder August 2023 – December 2023
Graduate Teaching Facilitator *Boulder, CO*

- Assist with grading, office hours, and exam invigilation for a class of 174 students in ASEN 3711 - Aerodynamics.

Department of Aerospace Engineering, MIT ADT November 2022 – April 2023
Junior Research Fellow *Pune, India*

- Spearheaded a concept test setup to study the effects of spin on combustion of rocket motors at High Energy Materials Research Laboratories. Capacity to achieve a 120 fold increase in spin-rate as compared to previous methods.
- Facilitated collaboration between the civil, mechanical, and aerospace departments resulting in a 100% completion within project timeline. Drafted all the technical documentation for the Armament Research and Development Establishment.
- Led the optimization of a Hybrid Parabolic Disc resulting in 20% increase in the Minimum Factor of Safety and a 12% increase in the Average Factor of Safety at 17000 rpm.

Armament Research and Development Establishment May 2021 – August 2022
Research Intern *Pune, India*

- ARDE awarded $56,000 for the development of a rapid high speed centrifugal fragment launcher for experimental material research. Achieved a 12 fold increase in the frequency of testing at supersonic speeds (Mach > 1.2) as compared to traditional methods of impact testing.
- Simulated the attachment for rotary components using finite element analysis (FEA) in ANSYS for Modal analysis, Factor of Safety, Stress analysis, etc. Investigated the trends in drag coefficient for different iterations.
- Supervised an 8-member fabrication team for over 400 hours. Managed $50-60 weekly, in vendor transactions.

High Energy Materials Research Laboratories November 2021 – December 2021
Project Intern *Pune, India*

- Led a team of 9 members in the assembly of an exhibition model showcasing a vertical static rocket motor test bed. Successfully completed the project within a 2 week time-frame.
- Utilized Fusion 360 to design and 3D print the model using PLA filament and laser cutting for detailed components.

Saakshi Machine and Tools Pvt. Ltd. January 2021 – February 2021
Manufacturing Intern *Pune, India*

- Assisted the quality control at the company. Gained an understanding of production line processes and protocols.

Projects

Development of ROS-Unity Simulator for Open Motion Planning Library | *Independent* December 2023

- Setup of ROS-TCP connection over IP address for seamless connection with Unity physics simulator for ASEN 5254.
- Integrated the foundation of ROS communication using python between Unity and planner using ROS topics and C# scripts and assigned to respective game objects.(**link**)

Cooperative Air-Ground Robot Localization | *Team Leader* December 2023

- Validation of linearized and extended Kalman filters for accurate and efficient tracking for ASEN 5044 using Matlab.
- Derived the CT Jacobians and DT linearized model about the specified nominal point. Implemented the EKF and LKF to estimate state trajectories using observation data.(**link**)