Ayaz Ahmed

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Summary

- 5 years of industry experience in design, development and control of complex high precision hardware and software systems in a highly collaborative environment, utilizing strong technical and communication skills.
- Experienced in high-fidelity modeling and simulation in MATLAB, Simulink, C++ and Python.
- Proficient, with hands-on work in design and implementation of advanced controllers for complex autonomous systems

Skills

- MATLAB, Simulink, Python, C++, ROS2, Gazebo, GitHub
- LabView, Arduino, Raspberry Pi, Pixhawk, Microcontrollers
- Solidworks, CATIA, AutoCAD, Fusion 360, Adams, ANSYS
- 3D printing, Rapid Prototyping, machining
- Numerical modelling and simulation
- Microsoft Office Suite, LaTeX, Documentation
- Robotics, Mechatronics, Autonomous Control System design, Motion Planning, Optimization

Work Experience

Vikram Sarabhai Space Centre, Indian Space Research Organization — **Thiruvananthapuram, India**
Engineer, Level - SD — August 2018 – August 2023

- Collaborated on a spacecraft orbit propagation software tool in C++ capable of limiting error growth to less than 30m/day by modeling perturbations from multiple sources, with adaptive time stepping integration.
- Integrated CSPICE package for planetary ephemeris, increasing accuracy to over 99.9% when compared to NASA's GMAT.
- Collaborated with a team of researchers from national and international research organizations, in generation of comprehensive experimental data for flight vehicle crucial for informed decisions on Trajectory planning.

- Collaborated on measurement of aerodynamic oscillations during the terminal flight of free-falling body.
- Developed a 3D printed TPU-based flexible drop-test article to protect internal electronics from 50 meters drop tests.
- Installed Pixhawk-based inertial measurement units, along with storage, and power units for data acquisition.

- Led a cross-functional team in realization of a Mach 6-capable Dynamic Damping test setup for wind tunnel system.
- Organized team meetings for brainstorming and troubleshooting; conveyed requirements to fellow system managers.
- Delivered a vision-based state estimation package, for pose determination in MATLAB with resolution <0.05 deg.
- Designed and implemented a closed-loop controller for a pneumatic actuator for precise angular excitation up to 30 deg.
- Resolved disturbances from vibrations by carrying out a series of tests to quantify and passively suppress vibrations.

- Mentored 3 undergraduate Capstone projects on development of innovative flow measurement technologies.

APLD Lab — **Thiruvananthapuram, India**
Undergraduate Intern — January 2018 – April 2018

- Implemented a LabView program to operate the open jet facility at APLD Lab, taking into consideration valve operations, camera trigger, laser trigger and secondary flow injection.
- Designed and implemented controllers for opening and timing of over 5 solenoid valves for safe operation of test facility.
- Developed an image processing-based MATLAB code for calculation of mixing area using the Mie scattering images.

Projects

Robotics Swarm Simulation (Oct, 2023): Built a Python simulation for swarm of ground robots in RAIN Lab at UW.

- Integrated simulation with real robots and Motion capture system to track robots in real time with <0.1% position error.
- Integrated Vicon system for state estimation using Butterworth Filter achieving >99% precision in velocity estimations.

LLM based path planning for mobile ground robot (Dec, 2023): Leveraged LLMs to interpret complex high level instructions from user as low level instruction for artificial potential field based path planning algorithm.

- Implemented OpenAI's GPT-3.5 over Mistral AI's 7B model owing to better performance by GPT-3.5 on benchmark tests involving interpretation of human instructions with accuracy of over 90%.
- Integrated the system with Gazebo simulation using simulated hardware through ROS2 framework.

ControlCopter (Dec, 2022): Assembled a quadrotor(drone) testbed for development and evaluation of control algorithms.

- Programmed an in-house flight control software on microcontroller, resulting in 50% reduction in development cost.
- Formulated a Simulink model of quadrotor to test algorithms before implementing on hardware.

Automated TIG Welding (April, 2017): Collaborated on development of an high precision Automated TIG Welding System.

- Integrated SolidWorks for a 15% improvement in design accuracy and used Simulink with PID control.
- Developed and coded the system, resulting in a 30% reduction in welding time and ensuring a seamless 3D representation of the manipulator.

Education

University of Washington, Seattle. Master of Science in Aeronautics and Astronautics (Controls), 2025(Expected)
GPA - 4, Courses – Network System Dynamics, Non-Linear Control Systems, Linear System Theory, Stability and Control of Flight Vehicles.

Indian Institute of Space Science and Technology, India. Bachelor of Technology, Aerospace Engineering, 2018
GPA –9/10, Courses – Control Systems, Robotics, Atmospheric, Space Flight Mechanics, Linear Algebra, Multi-Disciplinary Optimization.