Ayaz Ahmed

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Summary

- 5 years of industry experience in design, development and control of complex hardware and software systems in highly collaborative environment, utilizing strong technical and communication skills.
- Hands-on experience with complex autonomous system engineering, through hardware and software design and integration through LabVIEW, Arduino and Pixhawk.
- Experienced in numerical modeling and simulation of actual hardware in C++, Python, MATLAB and Simulink
- Strong troubleshooting skills, adept problem solver, and effective team communicator facilitating collaborative solutions.

Education

University of Washington, Seattle. Master of Science in Aeronautics and Astronautics (Controls), 2025(Expected)
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
Courses – Control Systems Theory, Robotics, Atmospheric and Space Flight Mechanics, Linear Algebra, Multi-Disciplinary Optimization.

Skills

- MATLAB, Simulink, Python, C++, Julia
- 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, Aerodynamics, Autonomous Control System design, Model-based System Engineering

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++** with less than 30m/day error growth by simulating perturbations from multiple sources with adaptive time stepping integration.
- Integrated CSPICE package for planetary ephemeris, increasing accuracy to over 99.9% as compared to NASA's GMAT.
- Designed test setups, using numerical modeling and optimization for aerodynamics characterization of flight vehicles.
- Processed and analyzed large data sets from more than 1000 experimental tests, in Python and MATLAB.
- **Collaborated with a team of researchers from national and international research organizations**, in generation of comprehensive experimental data for flight vehicle over Mach 4 crucial for informed decisions on Trajectory planning.
- 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.**
- Validated system performance, by reproducing result from open literature with over 99% accuracy in damping data.
- Organized team meetings for brainstorming and troubleshooting; conveyed requirements to fellow system managers.
- **Delivered a vision-based state estimation package, for pose determination in Python with resolution <0.05 deg.**
- **Designed and implemented a pneumatic actuator and control system, enabling angular excitation up to 30 deg.**
- Mentored 3 undergraduate Capstone project on development of innovative flow measurement technologies.

Projects

Robotics Swarm Simulation (Oct, 2023): Built a Python simulation for swarm of ground robots in RAIN Lab at UW.
- Conducted trajectory planning using Potential function, Dijkstra's and A* algorithms for a fleet of autonomous vehicles.
- Integrated simulation with real robots and Motion capture system to track robots in real time.

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

BlackBoat (Sep, 2021): Designed and 3D printed an autonomous, Pump-jet boat test-bed for control algorithms.
- Programmed a precise PID based control algorithm to maintain straight-line motion with a deviation of less than 1 meter in challenging and uneven water currents for boat moving at over 15km/h speed.

Robotic Goalkeeper (Feb, 2017): Built a mechanical soccer goalkeeper capable intercepting target in less than 0.2seconds.
- Developed a fast algorithm to accurately predict trajectory of target with <1% error using a series of sensors.
- Optimized motion planning to reduce interception time by 30% compared to baseline motion.
- Engineered an optimum mechanism, to maximize reach and speed to block moving target in less than 0.2 seconds.

Driving simulator (April, 2020): Built a Windows-based driving simulator, encompassing hardware-software integration.
- Integrated driving simulator hardware with 4 sensors with PC applications using Arduino and Python.
- Achieved over 90% reliability by switching to wired serial communication and scored 4 out of 5 in user experience survey.