Tushar Sial

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Objective

Master's student in Aerospace Engineering with over 3 years of research experience in designing control & optimization algorithms for dynamical systems. Seeking a research internship for the summer of 2025 in Guidance & Control of Robots, Aircraft, and/or Spacecraft. Adept with a strong foundation in control theory, astrodynamics, robotics, and efficient programming skills, I aim to contribute to cutting-edge advancements in these areas.

Education

Iowa State University, Ames — August 2024 – Present
Master of Science in Aerospace Engineering, GPA - 3.92/4 — *Ames, Iowa*

Birla Institute of Technology and Science - Pilani, Pilani Campus — August 2019 – May 2023
Bachelor of Engineering in Electrical and Electronics, CGPA - 7.95/10 — *Pilani, India*

Experience

Halder Group: Stochastic Control & Optimization — Aug 2024 - Present
Graduate Research Assistant — *ISU, Ames, Iowa*

- Computation Aware Algorithms for Cyber Physical Systems
  - Designing generative profiling algorithms for single and multicore platforms with applications to adaptive resource allocation and scheduling tasks. Research Collaboration between UCSC, ISU, and UPenn.
- Optimal Covariance Control
  - Designing an Optimal Covariance Steering Algorithm with Frobenius Terminal Cost for Linear Stochastic Systems over a finite time horizon.

Contact: Dr. Abhishek Halder, Associate Professor, Department of Aerospace Engineering, ISU

HDFC Bank: Digital Factory — July 2023 – July 2024
DevSecOps Engineer — *Bengaluru, India*

- Designed, maintained & secured CI/CD pipelines using Jenkins, Groovy, Git, Kubernetes, and Docker.
- Implemented infrastructure-as-code principles using Terraform to ensure secure and compliant cloud environment.

Contact: Deepak Kumar Gupta, VP, DevSecOps Team, HDFC Bank

Guidance, Control & Decision Systems Lab (GCDSL) — June 2022 – June 2023
Research Intern — *Bengaluru, India*

- Developed a Data-driven guidance algorithm for autonomous spacecraft rendezvous with non-cooperative satellite.
- Implemented a 3-D impact guidance-based approach for autonomous docking operation. (Video) (Github Link)

Contact: Dr. Debasish Ghose, Professor, Department of Aerospace Engineering, IISc

Intelligent Systems Group, CSIR-CEERI — July 2021 – Nov 2021
Research Intern — *Pilani, India*

- Developed the drive system of a small 4-wheeled rover for autonomous traversal in unmapped rough terrains.
- Modelled the drive system of the prototype based on the electronic differential principles and simulated PID-based speed and direction control algorithms on MATLAB. Simulink. and Raspberry Pi4.

Contact: Dr. Kaushal Kishore, Senior Scientist, CSIR-CEERI

Projects

Mars Rover Team | *MATLAB, Simulink, ROS, Gazebo, Fusion 360, Arduino, Raspberry Pi* — Jan 2021 – Jan 2022

- Co-founded CRISS Robotics (Consortium for Research in Space Systems), a student research technical team at BITS Pilani consisting of 60+ members for designing and manufacturing an all-terrain 6-wheeled Mars Rover.
- Designed the high-level Electrical Architecture of the Mars rover capable of Autonomous traversal, Equipment servicing using a 6-DOF Robotic Manipulator, and life detection using a Science module.
- CRISS qualified for the International Rover Challenge in 2022 finals at Chennai among 16 international teams, followed by winning the International Rover Design Challenge in 2023. (IRC Report) (IRDC Report)

Powertrain of a Formula Styled Electric Vehicle | *Fusion 360, MATLAB, Simulink* Aug 2019 – March 2022

- Member of formula student team **Inspired Karters Electric** at BITS Pilani comprising 40+ members for designing and manufacturing an electric formula car for National and International Formula Student events.
- Modelled car's powertrain using Simulink & Simscape for optimizing control parameters & system efficiency.
- Worked on the assembly & packaging of the Electrical components of the car. (CAD Video) (Design Report)

Flight Stabilizing Controllers for Agile Fixed-Wing UAV | *MATLAB, Simulink* Aug 2021 – March 2022

- Designed flight stabilizing control algorithms for an agile fixed-wing UAV using MATLAB & Simulink.
- Designed a wind observer to incorporate environmental disturbances(like wind shears, wind gusts, and atmospheric disturbances) to make the controllers robust and, thus, improve flight capability. (Video) (Github Link)

Autonomous Cleaning Bot | *WeBots, Python, ROS, Gazebo* Oct 2021 – Dec 2021

- Developed autonomous navigation algorithms for a cleaning mobile robot in unknown dynamic environments.
- Worked on sensor fusion and wheel odometry for localization and state estimation using LiDAR, GPS & IMU.
- Employed Bugs 0 algorithm for the mobile robot's path planning and obstacle avoidance. (Design Report)

Autonomous Delivery Quadcopter | *ROS, Python, Gazebo* Aug 2020 – Dec 2020

- Developed guidance & navigation algorithms for a simulated quadrotor capable of autonomous package delivery.
- Implemented pyzbar library-based CV algorithm for QR tag detection on delivery packages. (Video) (Github Link)

Publications

- R. Gifford, A. Eisenklam, G. A. Bondar, Y. Cai, **T. Sial**, L. T. X. Phan, A. Halder (2025), "CORD: Co-design of Resource Allocation and Deadline Decomposition with Generative Profiling" arXiv preprint arXiv:2501.08484.

Professional Activities

Journal Manuscript Reviewer

- System and Control Letters.
- ASME Journal of Dynamic Systems, Measurement, and Control.

Awards and Honours

AUGSD Project Funds Sept 2021

- Awarded Rs 25,000 for developing an adaptive drive control system for a Mars Rover prototype at BITS Pilani.

3rd Edition of National Engineering Olympiad (NEO) July 2020

- Achieved an All India Rank 19 in the 1st Year Engineering Category.

4th Annual FSEV Concept Challenge | *Formula Bharat* April 2020

- Achieved overall first position across India in the event.
- Worked on the design and assembly of the electrical powertrain package of an electric vehicle.

Technical Skills

Frameworks: Robotic Operating Software (ROS)
Software Simulation: Gazebo, Simulink, Simscape, RobotStudio
Design: Fusion 360, Solidworks, EagleCAD, LT Spice
Programming Languages: MATLAB, Python, C++, C, Java, Go
Libraries: CVX, Numpy, Pandas, OpenCV
Embedded: Embedded C, Arduino, STM32Cube, Raspberry Pi
Others: Linux, CI/CD, Git, Docker, Kubernetes, Terraform

Position of Responsibility

Powertrain Head | *Inspired Karters Formula Student, BITS Pilani* March, 2021 – March 2022

- Responsible for designing and integrating the Electric Powertrain of a formula student electric vehicle.
- Particularly, dealt with Motor, Motor controller, & Regenerative Braking.

Demonstration Head | *Department of Physics, BITS Pilani* May 2020 – April 2021

- Responsible for designing functional demonstrations in APOGEE i.e. the college's annual technical fest.

Languages

English (*Full Professional Proficiency*), Hindi (*Full Professional Proficiency*)