

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 <i>Master of Science in Aerospace Engineering, GPA - 3.92/4</i>	August 2024 – Present <i>Ames, Iowa</i>
Birla Institute of Technology and Science - Pilani, Pilani Campus <i>Bachelor of Engineering in Electrical and Electronics, CGPA - 7.95/10</i>	August 2019 – May 2023 <i>Pilani, India</i>

EXPERIENCE

Halder Group: Stochastic Control & Optimization <i>Graduate Research Assistant</i>	Aug 2024 - Present <i>ISU, Ames, Iowa</i>
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- 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 <i>DevSecOps Engineer</i>	July 2023 – July 2024 <i>Bengaluru, India</i>
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- 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) <i>Research Intern</i>	June 2022 – June 2023 <i>Bengaluru, India</i>
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- 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 <i>Research Intern</i>	July 2021 – Nov 2021 <i>Pilani, India</i>
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- 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 <i>MATLAB, Simulink, ROS, Gazebo, Fusion 360, Arduino, Raspberry Pi</i>	Jan 2021 – Jan 2022
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- 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

- 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*)