Malik Nauman Rauf

CONTACT INFORMATION

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RESEARCH INTERESTS

My research interests include flight physics, control systems and engineering, with a focus on model predictive control and adaptive control, as well as optimal control. I am also deeply interested in the modeling of uncertain and partially controllable systems, stochastic systems, astrodynamics, and astrophysics.

EDUCATION

Georgia Institute of Technology, Atlanta, Georgia US

M.S. Aerospace Engineering, August 2024 - Present

- Grade: 4.00/4.00
- Fulbright Scholar
- Primary Area: Flight Mechanics and Control
- Courses: AE 6530, MATH 6579, AE 8803 VAM, ECE 6553, MATH 6338, AE 6580
- Course Projects:
  - "Implementation of Q-learning for Multi-Agent Adversarial Games"; Python; AE 8803 Optimal Control for Learning and Games
  - "Safety Promoting Nearly-Optimal Neural Lyapunov Controllers"; MATLAB; AE 6580 Nonlinear Control

Institute of Space Technology, Islamabad, Islamabad Capital Territory PK

B.S. Aerospace Engineering, September 2018 - July 2022

- Grade: 3.93/4.00 (Summa Cum Laude)
- Valedictorian, Dean's Honor List
- Capstone Project: "Designing a Framework for Damage Tolerance Analysis of Metallic Structures
- Electives: Flight Control Systems, Spacecraft Dynamics and Controls, Guidance and Navigation of Aerospace Vehicles

HONORS AND AWARDS

Selected for the Georgia Tech Boeing FLT Program, 2025
Fulbright Scholarship for Masters, 2024
National Award of Pakistan - International Astronomy, and Astrophysics Competition, 2024
Gold Honor - International Astronomy, and Astrophysics Competition, 2024
Achieved Academy Participant, 2024
Teknofest Turkey 2022: Winner of Black Sea Competition, Honorable Mention Prize in International Free Mission vehicle Category
Six Provisional Asteroid Discoveries - International Astronomical Search Collaboration, 2023
Institute of Space Technology: Graduated Summa Magna Cum Laude, 2022; Presidential Gold Medal for Highest grade, 2022; Vice-Chancellor's Gold Medal for best Thesis, 2022; Brigadier Dr. Atiq-ur-Rehman Graduation Prize for Best Student of the Year 2022; Valedictorian of the Year 2022;

Merit Scholarship Holder, 2018-2022
Silver Honor - International Astronomy, and Astrophysics Competition, 2021
STEP Scholarship Holder for Bachelors, 2018

Computer Skills

- Languages: MATLAB, Python, C++, C#, LaTeX, SQLite, Oracle SQL, Shell Scripting, HTML, CSS, JavaScript, SysML, Julia, Wolfram, ROS, Arduino C
- Softwares: Windows, Linux Ubuntu, MS Office (Word, Powerpoint, Excel, Project, Publisher, Visio), Libre Office, ANSYS WorkBench, ABAQUS, CAD(Catia V5), Inkscape, Flight Dynamics Modelling (Athena AVL, Tornado VLM, US Datcom, XFLR5), SIMULINK, Presentation (Beamer, Lucid Press, Lucid Charts), Astrometrica, UNITY Game Development, VIM, Capella/ARCADIA (System Engineering), Valispace, Pschopy
- Operating Systems: Unix/Linux, Windows, MacOS.

Academic Experience

Georgia Institute of Technology, Atlanta, Georgia US
Graduate Student Researcher **Oct, 2024 - *Present***

[1] Working and researching the implementation of optimal control theory on the class of Positive and Compartmental Systems. (Feb, 2025 - *Present*)

[2] Worked as part of the Human Robot Collaboration Project at ROBOTICS Lab. Conducting Real-time experiments on the Manipulator arm collaboration with a Human and another robotic agent (Summer 2025)

Institute of Space Technology, Islamabad, Islamabad Capital Territory PK
Teaching Assistant **Feb, 2022 - June 2022**
Assisting in Preparation and Deliverance of Lectures along with Making and Grading of Assessments.

Publications

[1] M. N. Rauf, R. A. Khan, S. I. A. Shah, and M. A. Naqvi, "Design and analysis of stability and control for a small unmanned aerial vehicle," International Journal of Dynamics and Control, Nov 2023.

[2] M. N. Rauf, R. A. Khan, and S. I. Ali Shah, "Stability analysis & development of a control strategy for a small uav," in 2023 3rd International Conference on Digital Futures and Transformative Technologies (ICoDT2), pp. 1–6, 2023.

[3] M. N. Rauf, R. Khan, and G. Majeed, "Designing an Analysis Framework for estimating life of a component subjected to a constant load and a single overload using MATLAB Designing an Analysis Framework for estimating life of a component subjected to a constant load and a single overload using ," Journal of Material Science & Applied Engineering, pp. 1–10, 2022.

Conferences Attended

[1] "Stability Analysis & Development of Control Strategy for Small UAV", *International Conference on Digital Futures and Transformative Technologies*, Islamabad, Islamabad Capital Territory, PK

Professional Experience

4Earth Inc., Kennesaw, GA, United States
Automation & Controls Engineer **Jul, 2025 - Aug, 2025**
Duties: Responsible for assisting in CAD modeling, Design improvements of the Water Treatment unit.
Programming of Siemens Programmable Logic Controllers (PLC), and Siemens TIA Portal and Human-Machine Interfaces (HMI)
Projects:

[1] Design and Implementation of an Autonomous Water Treatment unit *July, 2025 - Aug, 2025*
Suggested improvements in the design and systems integration leading to 10% improvement in Accessibility and Data Transparency.

Naqcode Technologies Pvt. Ltd., Islamabad, Islamabad Capital Territory PK

Team Lead (Flight Mechanics and Propulsion) **Sep, 2023 - Jul, 2024**

Duties: Managed the Technical Project Execution of both Propulsion and Controls teams; Projects included Design and Development of SRMs, Modeling, Control & Simulation of UAVs, Designing of a UAV launch Platform.
Technical Execution and oversight of Flight Mechanics Projects, Modeling Framework design and Simulations.

Projects:

[1] Design of Vehicle-Top UAV Launcher as well as a Catapult Launch mechanism *May, 2024 - July, 2024*
Initial Schematic Design, Structural Analysis, and Integration.

[2] Development of a Warhead system *Nov, 2023 - Mar, 2024*
Warhead System Design; Detonation Point Monitoring.

[3] Design, Performance analysis, and Optimization of SRM *Nov, 2023 - Jul, 2024*
Design and Analysis of Missile Propulsion system; Parametric studies of SRM metrics; Optimization of design variables via Genetic Algorithms.

[4] FDM and Control of Precision Glide Vehicle *Mar, 2023 - Jan, 2024*
Development of a suitable flight control law for a Precision Guided System; Structural Sizing of Control Surfaces.

[5] Design and Development of deployable SUCAV *Aug, 2022 - Present*
Assessment of Stability; Development of Flight Dynamics Model

Flight Mechanics & Control Engineer **Aug, 2022 - Aug, 2023**

Duties: Flight Dynamics modeling, Stability and Controllability assessment for Unconventional Vehicles; Mission Designing, and developing Guidance, & Navigation strategies; Control Systems Architecture design including Stability Augmenters, and Autopilots; Ensuring compliance of built systems with Established Standards.

Projects:

[1] FDM and Control Development of Loitering Munition *Aug, 2022 - Nov, 2023*
Assessment of Stability; Development of Flight Dynamics Model; Designing and Verifying the Control Systems Architecture for 6DOF Control; Software Designing of Navigation Autopilots.

Other Experiences

GT Boeing

Mentee **May, 2025 - Sep, 2025**

Duties: Mentee under Hunter Kim in GT Boeing FLT Program 2025

Achieved Academy SGAC

EPD Team Member **Feb, 2025 - *Present***

Duties: Working as part of the Communication team in Education and Professional Development Sector of SGAC lead by Achieved Academy

All Pakistan Asteroid Search Campaign, Islamabad, Islamabad Capital Territory PK

Co-Founder **Aug, 2021 - *Present***

Duties: Self Launched campaign in affiliation with International Astronomical Search Collaboration and NASA; Technical Writing Lead.

Projects:

[1] APASC Campaign 2024 *Sep, 2023 - Oct, 2023*
Increased Teams to 15 with 60 partcipants in total.

[2] APASC Campaign 2023 *Sep, 2023 - Oct, 2023*
Collaborated with SGAC and Attock Astronomical Society to Launch the campaign nation wide.

[3] APASC Campaign 2022 *Sep, 2022 - Oct, 2022*
Our Pilot campaign launched through Space Society IST in collaboration with Attock Astronomical Society.

GT CRAB Lab Robophysics Bootcamp

Participant **July, 2025 - July, 2025**
Duties: Selected as one of the 10 participants in the 2025 rendition of the Robophysics Bootcamp organized by CRAB Lab. Learned about principles of physics-informed robot design and designed a 4-link snake-emulating robot.

Space Generation Advisory Council

Mentor **Dec, 2024 - May, 2025**
Duties: Participated in the 2024 Mentorship Program, and served as an Academic and Professional Mentor to Carl Anthony Sta Ana

Aviation Training Hub, Islamabad, Islamabad Capital Territory PK

Aviation Intern **Nov, 2021 - Jan, 2022**
Duties: Aviation Maintenance Training

Kamra Aeronautical Complex, Kamra PK

Aerospace Intern **Aug, 2021 - Sep, 2021**
Duties: Observing and Learning the design, and production of trainer and other aircrafts.

References

Available on request

Professional Affiliations

I. Techmasters (Toastmasters International) Club Apr, 2025 - *Present*
II. Honor Society Feb, 2025 - *Present*
III. The Planetary Society Jan, 2025 - *Present*
IV. Order of the Engineers Dec, 2024 - *Present*
V. The American Society of Mechanical Engineers (ASME) Sep, 2024 - *Present*
VI. Institute of Electrical and Electronics Engineers (IEEE) Sep, 2024 - *Present*
VII. Royal Aeronautical Society Aug, 2024 - *Present*
VIII. Fulbright Association May, 2024 - *Present*
IX. American Society for Testing and Materials May, 2024 - *Present*
X. Institution of Engineers Pakistan May, 2024 - *Present*
XI. European Low Gravity Research Association Feb, 2024 - *Present*
XII. Moon Village Association Apr, 2023 - *Present*
XIII. Space Generation Advisory Council Feb, 2023 - *Present*

EXTRACURRICULAR

GT Buzz Buddies, Atlanta, GA, USA

Mentor July, 2025 - Dec, 2025

Moon Village Association, International

Project Member of PESC project Apr, 2023 - *Present*

Space Generation Advisory Council, International

Mentor at 2024 SGAC Mentoring Program Dec, 2024 - May, 2025
Member of Space Exploration Project Group Feb, 2024 - *Present*
Project Member in Small Satellite Group Feb, 2023 - *Present*

Space Society IST (Publications Department), Institute of Space Technology, PK

Director Jan, 2022 - Sep, 2022

Google Development Student Club (IST-Chapter), Institute of Space Technology, PK

Executive Member (Publication) Sep, 2021 - Sep, 2022

Space Summer School, Institute of Space Technology, PK

Team Member (Student Management Team) July. 2022

Seventh ICASE Conference, Institute of Space Technology, PK

Team Manager (Publication) Dec. 2021