Muhammad Nouman Tahir

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Education

National University of Sciences and Technology (NUST) - Undergraduate — Nov 2021 – Jun 2025
School of Mechanical and Manufacturing Engineering (SMME)
Bachelor of Engineering in Mechanical Engineering

Research Interest

I am passionate about automation of robotic systems, and advancing UAV technologies, focusing on AI-driven control, computer vision, and real-time robotic perception. My work includes autonomous navigation, target detection, and collaborative robotics, with applications in UAV interception and delivery systems. I aim to innovate at the intersection of robotics and mechanical systems, contributing to cutting-edge solutions in intelligent automation.

Research Publications

- Deep Learning-Based UAV Swarm Mirroring Hand Trajectory - Ready to Submit
- Design and Manufacturing of an Autonomous Delivery Bot - Ready to Submit
- Real time Control System Design for Two Wheeled Self Balancing Robot - In Progress
- Drone Path Planning (Focusing on Disaster Related Path Planning) - In Progress

Research Experience

Drone Path Planning - Research Project — June 2025 – Present

- Collaborating on drone path planning project with **Dr. Samer Hanoun** from **Deakin University**, Australia.
- Using ROS 2 Humble, Gazebo Harmonic and PX4-Autopilot for simulation along with model training for detection and segmentation.

Research Intern - Aerial Robotics Lab, SINES, NUST — Jun 2023 – Aug 2023

Deep Learning-Based UAV Swarm Mirroring Hand Trajectory

- Designed and implemented a system that enables multiple drones to communicate with a central access point, replicating hand trajectory movements across all drones in real time using deep learning algorithms and computer vision.

Drone Swarm Controller

- Created a Python-based controller to manage and control multiple drones simultaneously, allowing for efficient fleet control and task coordination.

Gesture-Controlled Hand Follower Drone

- Developed an autonomous drone algorithm that follows hand gestures in real-time using OpenCV and MediaPipe, enabling intuitive control.

Autonomous Face Follow Drone

- Designed an algorithm for drone to autonomously detects and tracks a person's face using OpenCV and MediaPipe, enhancing autonomous navigation by following it.

Final Year Project

Design and Manufacturing of an Autonomous Delivery Bot — Sep 2024 - May 2025

- Developed a GPS-enabled autonomous delivery bot with a curb-climbing mechanism, tailored for secure and efficient package delivery in controlled environments.
- Supervised by **Dr. Saqib Nazir** (Department of Robotics & AI, SMME, NUST) and co-supervised by **Dr. Doğu Çağdaş ATİLLA** (Dean, Institute of Graduate Studies, Altınbaş Üniversitesi, Türkiye).
- Integrated computer vision and depth camera-based obstacle detection with optimized routing algorithms for autonomous navigation and 24/7 operation.

Projects

Team Lead - Team Vitesse — Oct 2024 – Present
Autonomous VTOL, Quadcopter & UGV - TEKNOFEST (Türkiye) 2025 — Feb 2024 - ongoing

- Mision 1: Developing and designing a dual-UAV system featuring a **VTOL** UAV for autonomous disaster reconnaissance and a **multirotor** UAV for precise payload delivery, utilizing AI-based computer vision for survivor detection and real-time data transmission.
- Mission 2: Developing an **UAV** and **UGV** interlinked system in which UAV is capable of landing precisely on a randomly moving UGV.

Autonomous Quadcopter - IMechE UAS Challenge Pakistan 2024 — Oct 2024 - Apr 2025

- Lead the development and automation of an **Autonomous Quadcopter** for blood sample delivery autonomous missions capable of detecting landmark using computer vision.

Fixed Wing UAV - NDBFC'24 — Oct 2024 - Dec 2024

- Designed a **Fixed Wing UAV** for payload delivery, maneuvers, and precision landing for **National Design, Build, and Fly Competition (NDBFC'24)** organized by **AIAA Ghulam Ishaq Khan Institute (GIKI)**.
- It was a single boom structure, tapered wings, and tractor configuration, manufactured using materials such as balsa wood, XPS foam, depron, and carbon fiber for lightweight and durable construction.

Automation Engineer - Team Vitesse — Jul 2024 – Oct 2024
Autonomous Quadcopter - International UAV Competition, TEKNOFEST 2024

- **Only Pakistani Team** to qualify as the **Finalist** of **International UAV Competition** of **TEKNOFEST 2024** held in Kahramanmaraş, Türkiye.
- Developed an **Autonomous Quadcopter** capable of target(UAVs) detection and interception using a `NetGun`.
- Developed **UAV Automation System** using `pymavlink` and `Jetson Nano` along with `OAK-D` for `computer vision` and `depth estimation`.

Powertrain Engineer - Team Wild Wheelers — May 2023 – Present
Design & Manufacturing of an Off-road Buggy - Piston Cup SMME

- Designed and manufactured an off-road buggy, focusing on optimizing powertrain and suspension systems for rugged terrain performance.
- Participated in **Piston Cup SMME'23** and in **Piston Cup SMME'24**.
- Achieved **2nd Runner-up Position** in Piston Cup SMME'23 and **Best Maneuverability Award** in Piston Cup SMME'23 and Piston Cup SMME'24.

Awards & Honors

- **Rector's High Achievers Gold Medal - NUST 2024**: Recognized and awarded Gold Medal by Rector NUST Lt. Gen. (R) Dr. Zahid Latif for representing NUST on international stage (TEKNOFEST, Türkiye).
- **Rector's High Achievers Award - NUST 2023**: Recognized by NUST and awarded by Pro-Rector Dr. Osman Hasan for my exceptional performance in national level competition (Piston Cup).

- **TEKNOFEST 2024 Finalist**: Represented Pakistan as the only team from Pakistan to qualify for the finals of the International UAV Competition in Türkiye.
- **Lapel Pin Award - NUST**: Awarded for outstanding service as the ASHRAE NUST Student Chapter Office Bearer during the 2023-2024 tenure.
- **2nd Runner-Up - Piston Cup SMME 2023**: Awarded for designing and manufacturing an off-road buggy, securing 2nd Runner-Up position in the Piston Cup competition.
- **Best Maneuverability Award - Piston Cup SMME 2023 & 2024**: Awarded two times for showcasing excellent maneuverability of our off-road buggy straight for two years.

Technical Skills

- **Programming & Scripting**: Python, C, C++, MATLAB, LabVIEW
- **Robotics & Automation**: RPI, Jetson Nano, Arduino, ESP32, Gazebo, PX4, Ardupilot, Webots Simulation
- **Computer Vision & AI**: OpenCV, MediaPipe, Deep Learning Algorithms
- **Mechanical Design & Simulation**: SolidWorks, AutoCAD, Ansys Fluent, Comsol
- **Control Systems & UAV Technologies**: `pymavlink`, Drone Swarm Control, Autonomous UAV Development

Languages

English (Fluent), Urdu (Native)

References

- Dr. Saqib Nazir (saqib.nazir@smme.nust.edu.pk)
- Prof. Dr. Riaz Ahmad (hodaero@smme.nust.edu.pk)