# Mukul Yadav

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## Professional Summary

Mechatronics engineer with a strong foundation in robotics, system dynamics, and control, supported by industry experience at Tata Motors and research at IISc Bangalore. Skilled in mechanical design, control systems, and embedded hardware–software integration, with experience leading cross-functional projects from concept to implementation. Aspiring to advance the development of reliable robotic systems through rigorous modelling, control, and experimental validation.

## Education

**Manipal Institute of Technology**, B.Tech in Mechatronics — June 2019 – July 2023

- GPA: 8.75/10
- Batch Rank: 15/104
- Minor: Robotics and Automation
- Relevant Coursework: Linear Control Theory, Robot Dynamics and Control, Robot Path Planning and Mobile Robots
- Bachelor's Thesis: Electronics and Embedded Firmware for UAVs

**Jayshree Periwal High School (Physics, Chemistry, Math)** — April 2014 – May 2019

- All India Senior School Certificate Examination (AISSCE 2019): 82%

## Publications

**Aerodock (A Smart, Autonomous Charging and Docking Station for Unmanned Aerial Vehicles)** — March 2022

Laaboni Mukerjee, ***Mukul Yadav***, Amit Choraria, Atharv Tendolkar, Arjun Hariharan, M M Manohara Pai

10.1088/1742-6596/2161/1/012058

## Professional Experience

**Robotics Educator**, Open Horizon Robotics – Remote — June 2025 – Present
[Website]

- Authoring open-source robotics education projects (Embedded Systems From Source).
- Conducting simulation experiments and producing intuitive guided tutorials about control systems.
- Engaging in advanced study and preparation for graduate-level research in robotics and mechatronics engineering. Presently surveying the domain of UAV vision.

**Senior Manager - Product Development**, Tata Motors – Pune, India — July 2024 – June 2025
**Graduate Engineer Trainee - Product Development**, Tata Motors – Pune, India — July 2023 – July 2024
[Website]

- Supported the engineering, design and manufacturing teams in end-to-end product development, bridging design, manufacturing, and customer-focused engineering improvements.
- Contributed to the productionization of Nexon at TPEM's Sanand plant, engaging in beta build troubleshooting, on-ground quality assessments, and test vehicle dispatch coordination.
- Managed the implementation of the FE/E20 fuel pack for the Tiago/Tigor MY25 refresh, ensuring integration of new subsystems and compliance with evolving standards.
- Conducted nationwide product surveys, synthesizing user insights and field data into actionable design and performance feedback for engineering teams.

**Bachelor's Thesis**, Manipal Institute of Technology – Manipal, India April 2023 – July 2023

- Completed bachelor's thesis titled 'Electronics and Embedded Firmware for UAVs', drawing from research experience during internship at IISc Bangalore.
- This period was spent collating experimental results, preparing documentation, and delivering the final thesis presentation in July 2023.

**Research Intern**, Artificial Intelligence & Robotics Laboratory, IISc Bangalore December 2022 – April 2023
[Website]

- Developed custom STM32-based UAV flight controllers, including PCB design and ESP32 firmware, implementing PPM signal decoding and closed-loop PID motor control.
- Advanced UAV perception by integrating LiDAR and IMU sensors, designing complementary filters for robust roll and pitch estimation in flight.
- Executed sensor integration experiments by interpreting datasheets/reference manuals, enabling activation and calibration of commercial LiDAR modules for autonomous navigation.
- Designed and prototyped UAV augmentations (landing gear, camera fixtures) with Fusion 360 and 3D printing, enhancing modularity and test capabilities.
- Investigated embedded systems reliability through experiments on GPS, SD logging, and RTOS; results were documented and maintained in an internal GitHub repository.

## Notable Projects

**Embedded Systems From Source** [GitHub]

- Authored a guided GitHub course on STM32 Discovery covering interrupts, UART, SPI, I²C, and ADC experiments.
- Tools Used: STM32 Discovery, STM32CubeIDE, C, GitHub.

**MAVROS Quadcopter** [Webpage]

- Built and flown a PX4-based quadcopter with onboard Raspberry Pi as flight computer, integrating MAVROS for ROS-based autonomy.
- Tools Used: PX4, ROS, MAVROS, Raspberry Pi, GPS, telemetry radio, Mission Planner.

**Mini Injection Molding Machine** [Webpage]

- Developed the mechatronic system for a 5-ton molding machine with NEMA 34 steppers, PID temperature control, and PySimpleGUI interface.
- Tools Used: Raspberry Pi, Arduino, PySimpleGUI, stepper drivers, thermocouples, Fusion 360.

**Intelligent Unmanned Ground Vehicle (IUGV)** [Webpage]

- Built an autonomous UGV with Intel RealSense on a stepper gimbal and Raspberry Pi + Arduino control pipeline.
- Tools Used: Raspberry Pi, Intel RealSense, Arduino, L293D, Python (OpenCV), stepper drivers.

## Skills

- **Robotics & Control:** ROS, MAVROS, Robot Path Planning
- **Embedded Systems:** STM32, UAV Flight Controllers, Sensor Fusion
- **Simulation/Design:** Fusion, SolidWorks, MATLAB

## Additional Roles

RoboManipal (Electronics & Motor Control) • Allskier Solutions (IoT Prototypes & Aerodock) • NEXAMS (Injection Molding Machine) • IE MCT Student Chapter (Mentorship & Projects)

## Awards and Honors

**Semi-Finalist, eYRC 2022-23 || 1st Place, Disenyo PCB Challenge || Winner, MIT Ideation Competition || Honored with multiple certificates of appreciation from Tata Motors leadership.** (Awards Gallery)