

# Apurv Kushwaha

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## EDUCATION

<b>University of Minnesota - Twin Cities, College of Science and Engineering</b>	Minneapolis, MN
Master of Science in Robotics	Aug. 2025 – May 2027
Coursework: Computer Vision, Artificial Intelligence, Intelligent Robotic Systems	
<b>Indian Institute of Technology Guwahati</b>	Guwahati, India
Bachelor of Technology in Engineering Physics	Jul. 2020 – May 2024
Coursework: Computational Physics, Simulation Techniques, Deep Learning, Digital Electronics and Microprocessors	

## EXPERIENCE

<b>Samaritan AI</b>	New Delhi, India
Robotics Engineer	Nov. 2024 – Jun. 2025
<ul style="list-style-type: none"><li>Led end-to-end development of a smart urine monitoring device (CAD, 3D printing, embedded electronics, IoT).</li><li>Programmed ESP32 microcontrollers in C++ and Rust; built real-time UI dashboard on TFT RGB display.</li><li>Integrated BLE/WiFi, I2C, UART, and Firebase sync using IoT protocols (MQTT).</li><li>Conducted 12-hour reliability tests, debugging firmware and hardware while optimizing performance and power usage.</li><li>Supervised 1 intern for validation tasks, preparing reports and presenting the prototype to 3+ investors and hospitals.</li></ul>	
<b>Swachh.io</b>	New Delhi, India
Research & Development Engineer	May. 2024 – Nov. 2024
<ul style="list-style-type: none"><li>Designed U-Net-based real-time smoke detection system, integrating hardware, sensors, and edge computer vision.</li><li>Managed interns across mechanical, electronics, and software, coordinating fabrication of pollution capture prototypes.</li><li>Delivered deployable systems integrating embedded controllers, sensors, and hardware design for reliable field testing.</li></ul>	
Research and Simulations Intern	May. 2023 – Jul. 2023
<ul style="list-style-type: none"><li>Developed an on-vehicle pollution monitoring system combining sensors, controllers, and Firebase-based remote servers.</li><li>Conducted CFD and FEA simulations analyzing pollutant dispersion and validating capture device designs.</li></ul>	
Engineering Intern	May. 2022 – Jul. 2022
<ul style="list-style-type: none"><li>Sole intern designing three CAD-based pollution-mitigation prototypes in Fusion360 with structural and flow analysis.</li><li>Supported funding applications with detailed simulation reports, helping secure \$40K + grant from CAQM.</li></ul>	

## PROJECTS

<b>Brain Stroke Lesion Segmentation using Deep Learning</b>   <a href="#">Code</a>   <a href="#">Report</a>	Aug. 2023 – Nov. 2023
<ul style="list-style-type: none"><li>Implemented U-Net++ with residual and inception blocks, enhancing long-range feature extraction accuracy.</li><li>Preprocessed ATLAS MRI dataset (Medical Imaging) with cropping, normalization, and augmentation.</li><li>Optimized training with AdamW optimizer, achieving 0.70 Dice coefficient outperforming ResUNet and PSPNet.</li><li>Evaluated segmentation masks against ground truth, demonstrating robustness across diverse lesion characteristics.</li></ul>	
<b>Prototype Mars Rover : Yuvaan IIT G</b>   <a href="#">Reports</a>	Jan. 2022 – Nov. 2023
<ul style="list-style-type: none"><li>Implemented ROS-based SLAM with LiDAR, stereo vision, and IMU fusion for autonomous navigation.</li><li>Integrated Jetson Nano and STM32 controllers with sensors, manipulator, and telemetry for modular task execution.</li><li>Designed rocker-bogie suspension, honeycomb wheels, and 6-DOF manipulator arm for stable traversal.</li><li>As Bio-Sciences Team Lead, guided integration of soil collection, testing, and environmental sensing modules.</li></ul>	
<b>Robowars</b>	Aug. 2022 – Mar. 2023
<ul style="list-style-type: none"><li>Led college's first Robowars project, mentoring sophomores in electronics, microcontrollers, and mechanical designing.</li><li>Directed design and fabrication of robot with high-torque actuators, robust weapon system, and power electronics.</li></ul>	

## TECHNICAL SKILLS

<b>Programming Languages:</b> Python, C/C++ MATLAB
<b>AI &amp; Software Frameworks:</b> PyTorch, TensorFlow, OpenCV, ROS2, Linux, SLAM, Sensor Fusion, Git, SQL, Firebase
<b>Hardware &amp; Systems:</b> ESP32, Arduino, PCB Design, Embedded Protocols (BLE, WiFi, I2C, UART, SPI), MQTT
<b>Design &amp; Simulation:</b> SolidWorks, Fusion 360, ANSYS (CFD/FEA), 3D Printing, Design for Manufacturing

## HONORS AND LEADERSHIP ROLES

<b>Events Manager and Core Team Member</b> , Robotics Club IIT Guwahati	Aug. 2022 – May 2023
2nd Runner up at <b>Robowars</b> , organized by IIT Kanpur Techfest	2023
<b>International Rover Design Challenge (IRDC)</b> , Team Yuvaan 16th rank (2021) and 11th rank (2022)	2021 – 2022
<b>International Rover Challenge</b> , Finalists with 9 others for Yuvaan Rover, Mars Society South Asia	2023