

# HARSHAVARDHAN SANJIV VIBHANDIK

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## EDUCATION

New York University, New York, USA

May 2025

Master of Science, Mechatronics and Robotics (*Recipient of Merit-based scholarship*)

- **Relevant Course Work:** Robot Localization and Navigation, Robot Perception, Rehabilitation Robotics, Advanced Mechatronics, Mathematics for Robotics, Kinematics and Dynamics.
- **Course Teaching Assistant** for Interactive Medical Robotics

MIT - Academy of Engineering, Pune, India

Jun 2022

Bachelor of Technology, Electronics Engineering

- **Relevant Course Work:** Analog & Digital Electronics, Digital Signal Processing, Computer Networks, Embedded Systems

## SKILLS

**Mechatronics:** Mechanical Design, Electronic System Design and Hardware, Sensor Integration, Actuator Integration

**Robotics:** ROS2, State Estimation (UKF, EKF), Microprocessor and Controller Architecture, Industrial Robotics, Mobile robotics

**Programming:** Arduino (Embedded C), Python, MATLAB, Gazebo, Robot Control (PID)

**Circuit Design:** Eagle PCB, Altium, Fine Soldering, Multi-layer PCB Design

**CAD/CAM:** Fusion 360, Catia, SolidWorks, 3D Printing, Mechanical design for Robotic Systems

**Hardware:** NVIDIA Jetson Nano, Raspberry Pi, Linux-based embedded systems, Arduino, SPI, I2C, UART, USART, TCP/IP

## EXPERIENCE

I-Hub AWAHDH - Indian Institute of Technology Ropar, India

Mar 2023 – Jul 2023

*Manufacturing Engineer*

- Engineered custom mechatronics systems, including IoT components, and increased production efficiency by 45% through control theory applications and automation techniques.
- Supervised in-house production of 15+ sensor boards, MCUs, and Grove Shields, optimizing quality using predictive modeling.
- Directed the automation of PCB assembly lines, achieving 80% process automation, improving workflow, and ensuring robust designs for vacuum and atmospheric environments.

R&D - Indian Institute of Technology Ropar, India

Aug 2022 – Feb 2023

*Research Engineer R&D*

- Spreadheaded electronics development for patented projects focused on medical devices and hydrogen fuel cells, incorporating control theory for precise instrumentation.
- Contributed to research projects for over 12 months as a research intern and research project associate, acquiring proficiency in circuit simulations using MATLAB and Simulink.

*Research Intern R&D, RMML*

- Devised and implemented internal circuitry for an invasive biomedical sensor, showcasing proficiency in electronics design.
- Conducted market analysis and literature review to identify gaps in existing products, ensuring our product's novelty and addressing industry shortcomings.

## PROJECTS

**Robotic Wrist Rehabilitation Exoskeleton (MS Thesis)** – MERIIT Lab, New York University

Dec 2024 - Present

- Created a 3D model of a robotic wrist exoskeleton for motor rehabilitation using Autodesk Fusion 360 to aid patient recovery.
- Incorporated motion-tracking sensors and actuators to achieve precise control and autonomous movement.
- Assisted in developing advanced rehabilitation techniques by enhancing system responsiveness and accuracy.

**Robot Localization and Navigation-** ARPL Lab, New York University

Jan 2024 - May 2024

- Designed an Extended Kalman Filter (EKF) by integrating Vicon motion capture and IMU data, improving state estimation accuracy by 20% for real-time robot localization and control.
- Executed camera calibration and pose estimation with April Tags; designed corner detection algorithms and optimized transformations, reducing localization error by 5%.
- Leveraged optical flow for velocity estimation and applied RANSAC, achieving a 30% reduction in outliers for robust navigation in real-time environments.

**Multi-Terrain Bot** – Advanced Mechatronics, New York University

Jan 2024 - May 2024

- Assembled a mobile robot capable of changing its morphologies for 3 different motions for navigation, including flying -quadcopter motion, 4-wheeled motion, and 2-wheeled motion.
- Utilized RC technology to transmit and receive commands within 500 to 1000 meters.
- Deployed an IMU sensor combining a 3-axis gyroscope and a 3-axis accelerometer for motion tracking, and gesture recognition.

## ACHIEVEMENTS

**Finalist:** KPIT Sparkle – I Can Crack It segment, 250+ participants.

**Semifinalist:** Eureka – Asia's largest business model competition by IIT Bombay, with 500+ participants.

**Quarterfinalist:** AICTE, DST, Texas Instruments India Innovation Challenge Design Contest, 500+ participants.

## PUBLICATIONS

**Medical Assistance Robot with capabilities of Mask Detection with Sanitization and Social Distancing Detection/Awareness,** published in (IEEE Explore) the 6th International Conference on Electronics, Communication and Aerospace Technology, ICECA 2022 (**Primary Author**)

**Design of Restaurant Service Robot for Contactless and Hygienic Eating Experience,**

International Research Journal of Engineering and Technology