Nishanth Adithya Chandramouli

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Education

Worcester Polytechnic Institute (WPI) — Worcester, USA
M.S. in Robotics Engineering — Aug 2025 – Present

SASTRA University — Tanjore, India
B.Tech. in Mechanical Engineering (Honors) — Jul 2019 – June 2023

Technical Skills

Programming Languages: Python, C++, C, Mathematica, MATLAB, HTML, CSS
Technical Stack: ROS 2, OpenCV, MoveIt, OMPL, PyTorch, Tensorflow, SolidWorks, ANSYS, Gazebo, Genesis
Tools: Git, Linux, LaTeX, CMake, Bash/Zsh

Research Experience

Thesis Student — Perception and Autonomous Robotics Lab (PeAR) — WPI *Worcester, USA*
Advisors: Prof. Nitin Sanket, Prof. Connor McCann *Aug 2025 – Present*

- Investigating co-design of mechanical shells and autonomy stacks for high speed quadcopters.
- Designing and testing multiple shell prototypes varying in elasticity, damping, and fracture toughness.
- Developing ROS 2 pipelines integrating stereo vision, VIO, and sensor fusion for onboard autonomy.

Research Associate — Manipulators Robotics Group, Robotics Lab — IIT Madras *Chennai, India*
Advisor: Prof. Sandipan Bandyopadhyay *Sep 2023 – Jul 2025*

- Kinematic and dynamic analysis of parallel manipulators (3-RRR, SRSPM, RRU-3RSS).
- Multi-objective path planning for a 6-6 SRSPM using NSGA-II with singularity-free constraints.
- Real-time collision detection for dual UR5s and SRSPM using spheroid-based link models (350 μs).
- Worked on Safe Working Zone (SWZ) algorithms allowing hemispherical workspace coverage of SRSPM.

Selected Publications

A semi-analytical approach towards determining the largest collision-free sphere in $\mathbb{R}^3$ inside the effective workspace of a 6-6 Stewart platform manipulator for given orientation workspace (2025)

- Introduced a computationally efficient approach to estimate maximal collision-free regions inside the effective workspace of a Stewart platform.

A Comprehensive Analysis of the Spherical Joint in A 6-6 Stewart-Gough Platform Manipulator and its Effects on the Joint Limit Compliant Workspace (2025)

- Derived workspace feasibility conditions enabling safe motion planning of parallel manipulators under constrained orientation.

Multi-objective path planning for 6-6 Stewart platform using the singularity-free tube (2024)

- Proposed analytical workspace characterization and NSGA-II–based singularity-free trajectory planning.

Projects

Task and Motion Planning for Block Manipulation using STRIPS in Genesis *Oct. 2025 – Dec. 2025*

- Implemented a full TAMP pipeline combining PDDL task planning with OMPL-based motion planning for block manipulation in simulation enabling execution–grounding–replanning

Semantic Segmentation using Self-Attention weighted U-Net *Sep. 2025 – Oct. 2025*

- Developed and trained a self-attention enhanced U-Net in PyTorch with data augmentation, improving IoU and Dice scores over baseline models.

Velocity Kinematics and Joint Position Control of the Actuators in 4-DoF OpenManipulatorX Robotic Arm *Nov. 2025 – Dec. 2025*

- Developed velocity kinematics and designed a custom PD controller for joint-level position control in ROS2 using effort-mode actuation, achieving fast convergence with minimal overshoot.

Learning-Based Boundary Detection and Edge Representation *July 2025 – Aug. 2025*

- Implemented classical edge and boundary detection pipelines and compared them with learning-based approaches using deep neural networks.