# Neeraj Laul

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## Education

**University Of Maryland, College Park** — January 2024 – December 2025
*Master's Of Engineering, Robotics* — *College Park, MD, USA*

**P.E.S. Modern College Of Engineering, Pune** — June 2016 – May 2022
*Bachelor's Of Engineering, Mechanical* — *Pune, MH, IND*

## Skills

**Programming:** Python, C++, JavaScript
**Design Tools:** SolidWorks, AutoCAD, ANSYS - FEA and SpaceClaim
**Frameworks/Tools:** Linux, ROS2 (Humble), Raspberry Pi OS (Bullseye), Gazebo, Docker, Git
**Relevant Coursework:** Perception, Planning, Modeling and Control for Autonomous Robots, Python Applications in Robotics, Human Robot Interaction, Robot Learning, Reinforcement Learning, Automation in Manufacturing, Autonomous Robotics.
**Other Tools:** Adobe Premiere Pro, DaVinci Resolve, MS Office/Google Docs

## Highlighted Projects

**Surgical Tool Sorter** — October 2025 – December 2025
University of Maryland, College Park

*Tech: Python, ROS2 (Humble), Gazebo, OpenCV, MoveIt, RViz*

- Designed and simulated a 6-DOF robotic arm modeled after the UR3e for automated surgical tool sorting using ROS2 and Gazebo.
- Implemented vision-based object detection using OpenCV and integrated inverse kinematics and MoveIt - based motion planning for precise grasping and placement.
- Integrated perception, inverse kinematics, and motion planning into a unified ROS2 pipeline for autonomous pick-and-place task execution in simulation.

**Autonomous Block Retrieval Robot** — January 2025 – May 2025
University of Maryland, College Park

*Tech: Raspberry Pi, PiCamera, Python, Arduino, IMU, Wheel Encoders (Odometry), Motor Drivers, DC Motors, GPIO/PWM, Gripper*

- Built an autonomous mobile robot to search for colored blocks in a 10 ft × 10 ft workspace, retrieve them in a specified order (e.g.,Red, then Green, then Blue), and deliver them to a designated drop zone.
- Implemented vision-based color detection using Raspberry Pi + PiCamera and integrated a gripper mechanism for reliable pickup and placement.
- Integrated IMU-based heading feedback and wheel encoder odometry for motion tracking, using an Arduino sensor interface to stream IMU data to the Raspberry Pi control stack.

**Comparative Study Of DQN and DDQN for the Super Mario Bros Environment** — February 2025 – May 2025
University of Maryland, College Park

*Tech: Python, PyTorch, Reinforcement Learning, DQN, Double DQN, OpenAI Gym, Gym-Super-Mario-Bros*

- Implemented Deep Q-Network (DQN) and Double DQN agents for Super Mario Bros using a custom reward function based on forward progress, time penalties, and failure states.
- Conducted controlled training over 50,000 episodes, with Double DQN achieving first level completion at episode 978 versus 1586 for DQN (~38% faster convergence).
- Demonstrated improved stability with Double DQN achieving 4,652 successful level completions compared to 3,564 for DQN (~30% increase).

**Modeling and Operation of a Semi Truck with 2 Attached Trailers** October 2025 – December 2025
University of Maryland, College Park

*Tech: SolidWorks, SW2URDF Exporter, URDF/Xacro, ROS2 (Humble), Gazebo, Python, LiDAR, RViz, Teleoperation, Falcon Simulator*

- Designed and simulated a semi-truck with two articulated trailers in ROS2 and Gazebo, modeling joint constraints and vehicle-trailer kinematics for stable turning behavior.
- Integrated teleoperation and LiDAR-based navigation with closed-loop correction logic to maintain trailer alignment during tight maneuvers.
- Validated behavior across simulation environments by running the same system in Gazebo and Falcon Simulator and comparing tracking stability during turns.

**SectorSync Project Management Method Recommender** October 2025 – December 2025
University of Maryland, College Park

*Tech: TypeScript, React, Node.js, Express, MongoDB, Vercel*

- Designed and deployed a web-based tool that recommends an optimal project management methodology based on project requirements and constraints.
- Implemented a fuzzy scoring decision engine to evaluate candidate methods across weighted factors, producing consistent recommendations across diverse inputs.
- Achieved 94% recommendation accuracy on an internal evaluation set by aligning fuzzy outputs with expected ground-truth selections.

## Additional Experience

**Hospitality Supervisor** — Conferences and Visitor Services April 2024 – July 2024
University of Maryland, College Park

- Managed day-to-day resident hall operations during summer programs (camps, conferences, events), overseeing guest coordination and supervising a 15-person assistant staff.

**Drummer & Band Coordinator** — Bands and College Music Teams June 2016 – January 2024
Pune, India

- Performed as a drummer across self-founded bands and college music teams, releasing original music publicly, editing and publishing performance media, and completing a multi-city tour across India.

**President** — Music Experimentation Club, University of Maryland June 2024 – December 2025
College Park, MD, USA

- Led the club's operations and event planning, coordinating member activities, rehearsals, and performance initiatives to support student-led music creation and collaboration.