# Pranay Junare

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*Seeking internship opportunities for Summer & Spring 2025.

## Education

**University of Minnesota - Twin Cities** — Minneapolis, MN
*M.S. in Robotics (Courses-Machine Learning, Deep Learning for robot manipulation, Robot Vision)* — *Aug. 2024 – Present*

**College of Engineering Pune (COEP)** — Pune, India
*B.Tech. Electronics and Telecommunication, 2nd degree in Computer Science; CGPA: 8.54* — *Aug. 2018 – June 2022*

## Technical Skills

**Programming Languages**: C++, C, Python, Java

**Frameworks and Tools**: PyTorch, OpenCV, ROS, PCL, MATLAB, Gazebo, Altium PCB Designer, CMake

**Developer Tools**: Git, Docker, Jenkins, LaTeX

**Hardware**: Cameras, LiDAR, Encoders, MEMS Motion Sensors, ARM micro-controllers.

## Research & Industrial Experience

**Research Assistant** — Sept. 2024 – Present
*University of Minnesota* — *Minneapolis, USA*
- Currently working on multiview 3D reconstruction of smoke plume using Gaussian Splatting and NeRFs.
- Developing Vision-based algorithms for autonomous UAV swarm navigation to characterize smoke particles during wildfires.

**Software Developer** — June 2022 – Aug 2024
*ION Trading* — *Pune, India*
- Responsible for design, development and enhancement of low-latency "Trade & Risk Management" product of ION's WallStreet Suite treasury solution, which serves most Central banks and major Fortune-100 companies.
- Delivered backend features with high velocity and quality using a diverse technology stack including C++, Python, C++ Boost library, DBMS(Oracle, MS-SQL), Perl, Docker-CLI, Git, ION's internal frameworks, CI/CD pipeline, Automated testing, and with concepts such as OOPS, SOLID principles and clean code methodologies.

**Research Intern - NTU-India Connect Research Fellowship** — June 2021 – Aug 2021
*Nanyang Technological University, Singapore* — *Nanyang Avenue, Singapore*
- Developed a Collaborative UAV-UGV system for Search and Rescue Task, implementing a Octomap based 3-D mapping approach using UAV which can further be used by UGV for navigation. (Advisor: *Dr. Xie Ming*)
- Built a human detection system on the UAV using Yolo-v3 tiny model in order to detect persons to be rescued.

**Research Intern - Mitacs Globalink Internship Program** — May 2021 – Jul 2021
*Ontario Tech University, Canada* — *Oshawa, Canada*
- Worked on Autonomous electric wheelchair for children with physical disability. (Advisor: *Dr. Scott Nokleby*)
- Implemented complete navigation stack, assessed RTABMap & Octomap mapping approach using a custom simulation model of the wheelchair and built a system for detecting negative obstacles such as staircase.

**Undergraduate Research Member** — Mar 2019 – June 2022
*Centralized Robotics and Automation Lab, COEP* — *Pune, India*
- Contributed to multiple research projects, published research paper, conducted various workshops & participated in robotics competitions such as ABU Robocon. (Advisor: *Dr. Shantipal Ohol* )

**Robotics Intern - Binary Robotics** — Nov 2020 – Jan 2021
- Engineered & deployed end-to-end ROS navigation stack for AMR's in a dynamic environment such as healthcare facility.

## Projects

**Deep Learning based Robotic Grasping of unknown objects** | *PyTorch, Computer Vision* | Video | Report | Code | Paper
- Built a Deep Learning based robotic grasping model which predicts the 5-D grasp configuration with an accuracy of 83.3 %.
- Full end-to-end grasping pipeline is established right from capturing RGB-D image, prediction of rotated bounding boxes, ROS and Moveit support for the robotic arm, 3D grasp pose determination from predicted grasp configuration, Transforms from 2D image to the base link and finally the trajectory planning of robotic arm.

**Visual SLAM & Object Recognition for Autonomous Mobile Robot** | *ROS, Perception* | Video | Paper
- Implemented RTABMap SLAM algorithm on gazebo simulator and in real world using Kinect v2 RGB-D camera
- In addition to that alongside Yolo-V3 object detection model was implemented in order to achieve task of robust perception.

**Structure from Motion(SfM) & NeRF** | *Python, Volume Rendering, Epipolar Geometry*
- Using chirality, PnP and bundle adjustments implemented SfM and also implemented NeRF to synthesize novel scenes from a sparse set of input images by leveraging differentiable volume rendering for photorealistic image generation.

**Simulation and Design of Cubalance** | *Controls, MATLAB, Simulink* | Link
- Implemented control algorithms(PID, LQR) for a simulated robotic cube, capable of multi-terrain locomotion & balancing.

**Semi-Autonomous Omni-directional Mobile Robot for ABU Robocon** | *Robotics, Automation*
- Worked on perception, trajectory generation, sensor fusion and optimal control of omni-directional mobile robot.

## Publications & Awards

- "Deep Learning based end-to-end Grasping Pipeline on a lowcost 5-DOF Robotic arm.", IEEE 19th India Council International Conference (INDICON), 2022. *(Paper)*
- "Visual SLAM combined with Object detection for autonomous indoor navigation using Kinect V2 and ROS", IEEE 6th International Conference on Computing, Communication and Automation (ICCCA), 2021. *(Paper)*
- "Development of Robotic Arm Manipulator mounted on Self Balancing Two Wheeled Mobile Robot", Aerospace and Defence Related Mechanisms Symposium (ARMS-DRDO), 2021. *(Paper)*
- Recepient of JN Tata Scholarship, MITACS GRI Award, Complete list at https://pranay-junare.github.io/