Tejas Salian

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Education

Manipal Institute of Technology   *Manipal, India*
B.Tech in Instrumentation and Control   *July 2017 – June 2021*

- **Coursework:** Multi-Sensor Data Fusion, Advanced Sensor Technology, Modern Control Theory, Probability Theory and Linear Algebra, Robotics Systems and Control.

Research Experience

Robotics Research Centre, IIIT-H. ⬀   *Hyderabad, India*
Research Assistant   *May 2024 – Present*
Advised by Prof. Madhava Krishna ⬀

- Redesigned and optimized the AutoDP stack ⬀ for **seamless transition between simulated (CARLA/LHCS) and real-world (RHCS) environments,** improving coordinate frame handling.
- Migrated the SLAM module from **LegoLOAM to FastLIO2**, improving the **accuracy and robustness of localization**.
- **Dockerized** the complete Husky stack, streamlining deployment and testing of various algorithms, **enabling more efficient experimentation.**
- Developed a **Pure Pursuit controller** for a research project on "GPD:Guided Polynomial Diffusion," enabling conversion of obstacle-free trajectories from .npy files into a local plan for precise path tracking.
- Conducted in-depth **benchmarking of multiple SLAM algorithms**, comparing odometry accuracy across Lego-LOAM, LIO-SAM, Direct Lidar Odometry, Deep Patch Visual Odometry, Rtabmap-ICP, and Rtabmap-VO.

Professional Experience

Novus Hitech Robotics Systemz Ltd. ⬀   *Gurugram, India*
Research Engineer   *Oct 2022 – Mar 2024*

- Implemented Multisensor-aided Inertial Navigation System (MINS) ⬀ sensor fusion, to fuse **visual-inertial-wheel odometry(VIWO) data**, achieving a **60% improvement** in odometry accuracy.
- Engineered and deployed a custom ROS package enabling dynamic **multi-floor navigation** by seamlessly switching maps, resetting critical controls, and integrating with our SLAM module to enhance production-level capabilities.
- Created and integrated a 2D laser-based obstacle detection ROS package to enhance perception at drop locations, defining critical **region-of-interest** and triggering new navigation goals for more efficient operations.
- Spearheaded motion planning for a UR10e robotic arm **proof-of-concept** in automotive screwing applications, **calibrating "eye-in-hand"** camera positioning, and implementing a **real-time kernel** for instantaneous servo control, achieving **3mm precision**.
- Engineered a **memory-constrained deep learning pallet detection solution** on Nvidia Jetson Nano, leveraging external storage, containerization, and Ethernet integration to overcome hardware limits.
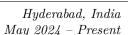
Robotics Engineer - ROS Intern   *Feb 2022 – Sept 2022*

- Created a **Unity-based Digital Twin** for "Novus Carry 500" and "Novus Pallet Mover" mobile robots, including a custom URDF lifter plugin and integrated 2D, 3D lidar and depth camera sensors to enable comprehensive, virtual product testing and visualization.
- Accelerated product development cycles, **improving performance and reducing costs** by streamlining testing in a simulated environment.

Selected Projects

ROS2-Based Pick and Place Robot Arm for Stacking Application   *github.com/tejasps28* ⬀

- Collaborated in the development of a **pick-and-place robot arm for stacking application** with Lentin Joseph ⬀.
- Set up Moveit2 to interact with the robot arm using Moveit2 APIs.
- Contributed to architecture, by dockerizing the stack, streamlining deployment and testing.
- Leveraged **Moveit Task Constructor** to perform repeatitive actions.
- Developed **stacking pattern logic** for placing boxes on pallet.
- Tools Used: C++, ROS2, Moveit2, Docker.

ROS2-Based Gantry Car Painting Robot Development *github.com/tejasps28* ↗

- ○ Collaborated in the development of a **gantry-based car painting robot arm** with Lentin Joseph ↗.
- ○ Set up a **Gazebo simulation** environment to mimic real-world conditions.
- ○ Utilized a depth camera for **region of interest (ROI) detection** and image segmentation.
- ○ Concatenated point-clouds to **reconstruct** car as an **Octomap** for **obstacle avoidance.**
- ○ Integrated the collected data for p**recise Cartesian path planning** and painting actions.
- ○ Tools Used: C++, ROS2, Moveit2, Gazebo

" DiffBot2D": 2D SLAM Simulation Testbed *github.com/tejasps28/* ↗

- ○ Developed a Unity3D-based testbed for 2D SLAM algorithms, implementing AMCL and GMapping for map generation.
- ○ Created an **educational tool** for demonstrating the ROS navigation stack, offering an easier alternative to Gazebo for beginners.
- ○ Enabled essential ROS data outputs like 2D laser scans and control over the robot's movements, including cmd_vel and odom, for **smooth SLAM simulation.**
- ○ Tools Used: Unity, ROS.

Motion Controlled Wheel-Chair *Report* ↗

- ○ Goal was to develop a **prototype of a motion controlled wheelchair** for ease of use, by differently-abled people.
- ○ The project was taken up to complete summer training in **Arduino**, and to get **hands-on knowledge of Sensor technology**.
- ○ The chair used **ultrasonic sensors and an accelerometer.** As the accelerometer was tilted, the chair would move accordingly and it would detect obstacles with the help of ultrasonic sensors.
- ○ Tools Used: C, Arduino IDE, Sensor Technology

Achievements

1. Led a junior engineering team through on-site customer challenges, performed RCA, swiftly implemented solutions, and earned a **Certificate of Excellence**.
2. Achieved a **top 20 national ranking out of 250 teams** in the 2020-21 Eyantra E-YRC Robotics Competition (IIT Bombay), excelling under the **Vitarana Drone theme**..

Position of Responsibility

Founder, **Manipal Robotics Support Group** *Aug 2021 – Oct 2023*

- ○ Founded and led the Manipal Robotics Support Group, **guiding over 150 peers** through ROS/Gazebo tutorials to foster collaborative learning and technical skill development.

Technologies

Languages: C++, Python, MATLAB

Software: ROS/ROS2, Linux, Git, Docker, Gazebo, Moveit, Unity, OpenCV, PCL.

Hardware: Jetson Orin/Nano, Arduino, Intel NUC, 2D Lidar, 3D Lidar, Depth Camera, IMU.