Jaskaran Singh Sodhi

✉ jsodhi@andrew.cmu.edu 🌐 thisisjaskaran.github.io 🔗 Jaskaran Singh Sodhi ☎ (412) 512-2049

EDUCATION

Carnegie Mellon University   Apr 2025
Master of Science in Robotic Systems Development (MRSD) | **Capstone**: Wildfire Monitoring Drone   4.17/4.0
Coursework: Advanced CV, Robot Mobility, Manipulation Estimation Control, Systems Engineering

Indian Institute of Technology Kharagpur   Apr 2023
B.Tech. Manufacturing Science and Engineering (Mechanical Engineering Dept.)   GPA: 9.17/10
Honors: Institute Silver Medal, Prof J.C. Ghosh Memorial Prize, Prof G.S. Sanyal Cup
Coursework: Machine Learning, Soft Computing, Embedded Control & Software, Automotive Dynamics & Control

PUBLICATIONS

[1] S. Sood, **J. S. Sodhi** et al. "Multiple Waypoint Navigation in Unknown Indoor Environments", [ICCR 2022]

EXPERIENCE

AirLab   CMU
Guide : Dr Wenshan Wang, Prof Sebastian Scherer   Present
- Developing subcanopy wildfire monitoring solutions for wildland-urban interfaces, for firefighting operations.
- Devising generalizable learned Fisheye Visual Odometry with deep optical flow, for robust air-ground navigation.

Autonomous Mobile Robotics Laboratory   UT Austin
Guide : Prof Joydeep Biswas   Sep 2021 – Dec 2022
- Extended MPC-MPNet architecture to kinematics-constrained predictive local planning in cluttered environments.
- Developed I-RRT* global planner for non-holonomic constraints and achieved **900 Hz** average planning frequency.

Autonomous Ground Vehicle Research Group   IIT Kharagpur
Undergraduate Researcher [certificate]   Mar 2020 – Apr 2023
- Implemented photometry based residual minimisation for stereo camera relocalization in LiDAR environments.
- Reduced translation error using Ceres Solver to **0.2-0.3m** on KITTI urban dataset, tested on Gaussian noise.

Preimage   Bangalore, India
Computer Vision Intern   Sep 2021 – Dec 2021
- Built tracks-validation module for testing of feature matching pipeline for UAV-based offline 3D reconstruction.
- Optimized adaptive inlier thresholds for homography-based feature matching and removed intrinsic dependency.

Vecros Technologies Private Limited   New Delhi, India
Software Developer Intern [certificate]   May 2021 – Jul 2021
- Implemented altitude planning and surface tracking algorithms on UAVs using one dimensional LiDAR scans.
- Deployed depth mapping based obstacle avoidance and planning algorithms for UAVs in indoor environments.

PROJECTS

DRDO UAV-Guided UGV Navigation Challenge   DRDO & IIT Kharagpur
Winner, Inter IIT Tech Meet 10.0 [Presentation]   Mar 2022
- Coupled RGBD normal estimation and plane segmentation for road detection in snowy mountain conditions.
- Optimized tree-based UAV planner for precise motion control and next waypoint prediction of unmanned UGV.

Unmanned Rover for Astronaut Assistance   IIT Kharagpur
Team Lead, University Rover Challenge 2022 — Guide : Prof Debashish Chakravarty   Mar 2020 – Dec 2021
- Engineered wheel, chassis and suspension for rover prototype with 15° gradeability and maximum speed **20 cm/s**.
- Innovated a 5-DOF modular robotic manipulator with 2-finger grip for semi-autonomous on-board equipment repair.

Racecar Localisation in Mapped Environment   Indiana Motor Speedway, Indiana
Indy Autonomous Challenge 2021 — Guide : Prof Sohel Anwar   May 2021 – Oct 2021
- Designed tightly/loosely coupled *high-speed localisation in mapped environment* and **reduced bank error to 0.1°.**
- Led development of BVS sensor testing for the Indy Autonomous Challenge 2021, IUPUI-IITKGP-USB team.

[1] Navigation and Manipulation in Unknown Environments   Prague, Czech Republic
Winner, IROS-RSJ Navigation and Manipulation Challenge 2021 [Link]   July 2021 – Sep 2021
- Introduced a probabilistic planner capable of finding near-optimal global paths for multiple waypoint scenarios.
- Integrated real-time 2D LiDAR mapping, with probabilistic planning and adaptive MPC for indoor exploration.

DRDO DGRE's Vision Based Obstacle Avoidance Drone   DRDO & IIT Guwahati
1st Runner Up, Inter IIT Tech Meet 9.0 [Presentation]   Mar 2021
- Deployed gbplanner and next-best-view planners for AruCo detection and landing in an FSM based model.

TECHNICAL SKILLS

Languages C, C++, Python, MATLAB ‖ **Frameworks** ROS, Gazebo, ArduPilot, SQL, CARLA, LGSVL
Libraries   OpenCV, PyTorch, Open3D, OpenMP, PCL, OMPL, Ceres, Eigen, Keras, librealsense, dronekit