

# Kshitij Madhav Bhat

+1 (412) 641-9491 [kmadhavb@cs.cmu.edu](mailto:kmadhavb@cs.cmu.edu) [linkedin.com/in/kshitij-bhat](https://www.linkedin.com/in/kshitij-bhat) [kshitijbhat.github.io](https://kshitijbhat.github.io)

## EDUCATION

---

- Carnegie Mellon University** Aug. 2024 – May 2026  
*Master of Science, Robotic Systems Development | GPA: 4.08/4.00* Pittsburgh, PA  
Coursework: Advanced Computer Vision (A<sup>+</sup>), Systems Engineering, Manipulation Estimation & Control, Robot Mobility
- Indian Institute of Technology, Indore** Nov. 2020 – July 2024  
*Bachelor of Technology, Mechanical Engineering | GPA: 8.98/10* Indore, India  
Coursework: Computer Vision, Principles of Product Design, Vehicular Communication, Instrumentation and Control

## EXPERIENCE

---

- IIT Delhi** Aug. 2023 – Dec. 2023  
Research Intern under Dr. Prem Kalra New Delhi, India
- Assisted in the design of a generative graph neural network enhanced with topological regularization, to improve SLAM for autonomous driving by removing dynamic objects from sparse LiDAR point clouds without segmentation labels.
  - Demonstrated superior performance against existing methods (44% lower Chamfer Distance than state-of-the-art) in three real-world and simulated datasets, against five distance metrics with 32 times sparse LiDAR scans.
  - Contributed to a deep generative model for adversarial point injections on LiDAR scans, demonstrating superior performance in degrading map quality without compromising scan integrity on KITTI and CARLA-64 datasets.

- Lakehead University** May 2023 – Aug. 2023  
Research Intern under Dr. Thiago Alves E. Oliveira Thunder Bay, Ontario, Canada
- Engineered a four-wheel steering and driving (4WS) mobile robot platform using Design for Assembly (DFA) techniques, resulting in a modular and easily maintainable platform for kinodynamic navigation algorithm development.
  - Developed C firmware for Raspberry Pi Pico microcontrollers, and integrated feedback control to actuators and enabling joint state data collection and velocity feedback, enhancing navigational accuracy in unstructured environments.
  - Created hardware-agnostic C++ software to interface PID angle and velocity controllers using the ROS Control framework via serial communication, leading to general middleware suitable to any 4WS robot platform.

- Ati Motors** May 2022 – July 2022  
Summer Intern, Autonomy Bengaluru, India
- Optimized Model Predictive Control (MPC) for Autonomous Mobile Robots (AMR) to achieve a 3x reduction in the turning radius, enabling sharp turns and in-place manoeuvres for space-constrained industrial units.
  - Reformed MPC cost function optimization problem to consider physical motor constraints and latency, redesigned Jacobian matrix to speed up the solution compute time and validated it with comprehensive on-site testing.
  - Shaped a post-processing routine for raw point cloud and IMU data in Rosbags for easy integration and validation of state-of-the-art 3D-LiDAR-based SLAM algorithms on real-world datasets of warehouses and shop floors.

## PROJECTS

---

- Autonomous Dexterous Bimanual Manipulation** | Under Dr. Nancy Pollard, CMU Sep. 2024 – Present
- Architecting ROS 2 based software for perception and motion planning for a dual-arm configuration using xArm 7 manipulators with printable soft end effectors for applications in autonomous bell pepper harvesting.
- Dense 3D Point Cloud Generation from Multi-View Geometry with SAM** | CMU Oct. 2024 – Dec. 2024
- Generated dense 3D point clouds from 2D segmentation masks from SAM (Segment Anything Model) by combining depth maps with multi-view geometry and statistical outlier removal using Open3D.
- Formation Control of Multiple Micro Aerial Vehicles (MAVs)** | Inter-IIT Tech Meet 11.0 Dec. 2022 – Feb. 2023
- Developed comprehensive Python API with multi-threading for controlling multiple MAVs and created a robust PID-controlled multi-agent waypoint navigation algorithm with visual feedback from ArUco markers.



## TECHNICAL SKILLS

---

**Programming Languages:** Python, C++, C, MATLAB  
**Frameworks / Libraries:** ROS / ROS 2, Pytorch, Keras, OpenCV, Tensorflow, PCL, Open3D  
**Other:** Git, Docker, Linux, VSCode, Arduino IDE, SolidWorks, AutoCAD, Eagle PCB design, L<sup>A</sup>T<sub>E</sub>X

## SELECTED PUBLICATIONS

---

- GLiDR: Topologically Regularized Graph Generative Network for Sparse LiDAR Point Clouds** [Paper](#)   
Prashant Kumar, **Kshitij Madhav Bhat**, Vedang Bhupesh Shenvi Nadkarni, Prem Kalra Accepted at **CVPR 2024**
- SLACK: Attacking LiDAR-based SLAM with Adversarial Point Injections** [Paper](#)   
Prashant Kumar, Dheeraj Vattikonda, **Kshitij Madhav Bhat**, Prem Kalra Accepted at **ICIP WC 2024**