

YASH TURKAR

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EDUCATION

University at Buffalo (State University of New York)

Sep 2021 - Present

Doctor of Philosophy in Computer Science

University of Mumbai, India

Jul 2016 - Dec 2020

Bachelor of Engineering in Computer Science

TECHNICAL SKILLS

Programming Languages:	Python (OpenCV, Open3D, Numpy, Pandas, Torch, Tensorflow, Pytorch3D), CUDA, JAVA, SQL, C, C++, OCAML
Robotics & Simulation:	ROS, ROS2, Gazebo, NVIDIA Omniverse Isaac, Gibson-Env, Unity, PX4
Tools:	MATLAB, CAD, LaTeX, Git, GitHub, Docker, LXC

PROFESSIONAL EXPERIENCE

Graduate Research Assistant, University at Buffalo

Aug 2023 - Present

- Designed a point cloud quality evaluation framework for large dense maps enhancing correctness by a large margin compared to existing metrics
- Implemented the framework with an efficient time complexity of $O(n \log n)$ using parallelized multi-threading, achieving a huge improvement in performance efficiency, with continuous efforts underway to further accelerate performance using Torch and CUDA. (*In-review ICRA 2024*)
- Co-authored the paper "SAGA-FIT - Surface Aware Grip Adaptive Trajectory Generation for Autonomous Racing," which attains time-optimal racing trajectories that outperform minimum curvature by 20% in simulation and 15% in real-world tests. (*In-review ICRA 2024*)

Software Engineer Intern - Autonomous Robotics Operations, SLB (Schlumberger)

May 2023 - Aug 2023

- Played a vital role in designing a cutting-edge sensor evaluation framework for a custom sensor payload used in autonomous inspection
- Utilized advanced tools such as Torch, Pytorch3D, ROS, ROS2, Gazebo, NVIDIA Omniverse Isaac, CAD, Blender, and CAD, to evaluate a diverse range of multi-modal sensors, including high-resolution LiDAR, mono and stereo camera setups, thermal and acoustic sensors
- Collaborated with teams across centers to develop innovative robotic solutions for quadruped robots like Boston Dynamics Spot and ANYMAL D
- Recommended a detailed sensor configuration based on thorough research and simulations, yielding potential cost savings of thousands of dollars

Digital Intern - Autonomous Robotics Operations, SLB (Schlumberger)

May 2022 - Aug 2022

- Designed solutions for autonomous inspection at mid-stream new-product development using high-resolution LiDAR and dense SLAM methods
- Successfully deployed robots in an onshore oil and gas facility for autonomous inspection, leveraging RGBD, thermal cameras, and LiDAR
- Developed a technology proof of concept for new product development, resulting in potential revenue gains and reduced failure rate by 50%
- Conducted targeted evaluations of five dense SLAM methods in Gazebo, improving robustness by 40% using simulated and real-world data
- Built hardware and software solutions to integrate Boston Dynamics Spot into a variety of research projects, including but not limited to object detection, dense reconstruction, and remote operations

Graduate Teaching /Research Assistant, University at Buffalo

Jan 2022 - May 2023

- Led the team in developing a Proximal Policy Optimization (PPO) algorithm for autonomous racing, earning the "Graduate Leadership Award"
- Designed and implemented a robust software architecture for autonomous racing, integrating machine learning, Python, C++, and CUDA, all within the ROS framework for enhanced simulation and testing resulting in improvements in performance and F-1 Tenth autonomous racing
- Crafted comprehensive ROS-based programming assignments focusing on pivotal areas of robot perception such as Lidar mapping, vision-based sensing/odometry, and structure from motion reconstruction, as well as in-depth exploration into planning, control, and estimation
- Improved methodologies in areas - field of view analysis, sensor calibration, fusion, multi-modal sensing, and radar utilization for SLAM
- Conducted comprehensive research in robot perception, enhancing object detection, LiDAR feature extraction, and SLAM methodologies

PUBLICATIONS

- P. Meshram, **Y. Turkar**, K.Singh, P.Masilamani, C.Adhivarahan, K.Dantu, "QAL: A Quality Aware Loss Function and Absolute Learning Metric" (In review CVPR 2024)
- **Y.Turkar**, P.Meshram, C.Aluckal, C.Adhivarahan, and K.Dantu, "A Point Cloud Quality Evaluation Framework for Dense Maps" (In review ICRA 2024)
- Rajguru, Y. Dighe, **Y. Turkar**, C. Aluckal, N. Kale, and K. Dantu, "SAGA-FIT: Surface-adaptive grip-aware trajectory generation for f1tenth autonomous racing." (In review ICRA 2024)
- Y.Dighe, Y.Kim, S Rajguru, **Y.Turkar**, T.Singh, and K.Dantu, "Kinematics-only differential flatness-based trajectory tracking for autonomous racing," (Presented IROS 2023)
- **Y. Turkar**, C. Aluckal, S. De, V. Turkar and Y. Agarwadkar, "Generative-Network Based Multimedia Super-Resolution for UAV Remote Sensing," IGARSS 2022 - IEEE International Geoscience and Remote Sensing Symposium, 2022, pp. 527-530, doi: 10.1109/IGARSS46834.2022.9884486.
- **Y. Turkar**, Y. Dighe, C. Aluckal, S. Deshpande, and Y. Agarwadkar, "Conceptualization of UAV based waypoint generation for precision horticulture.," in IEEE India Geoscience and Remote Sensing Symposium (InGARSS), IEEE, 2020, pp. 150–153. doi: 10.1109/InGARSS48198.2020.9358973
- C. Aluckal, **Y. Turkar**, Y. Dighe, et al., "Dynamic real-time indoor environment mapping for unmanned autonomous vehicle navigation," in 2019 International Conference on Advances in Computing, Communication and Control, IEEE, 2019, pp. 1–6. doi: 10.1109/ICAC347590.2019.9036813
- Y. Dighe, **Y. Turkar**, C. Aluckal, and Y. Agarwadkar, "Dynamic path planning system for UAV remote sensing in urban environments.," in National Symposium on Innovations in Geospatial Technology for sustainable Development with special emphasis on NER, ISG, ISRS., 2019
- H. Tulapurkar, **Y. Turkar**, V. Turkar, B. K. Mohan "Curvelet Based Watermarking Of Multispectral Images And Its Effect On Classification Accuracy," 2019 URSI Asia-Pacific Radio Science Conference (AP-RASC), 2019, pp. 1-7, doi: 10.23919/URSIAP-RASC.2019.8738393.