

Vishnu Dutt Sharma

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EDUCATION

University of Maryland, College Park
PhD Candidate, Dept. of Computer Science
Advisor: Dr. Pratap Tokekar

May 2020 - Dec 2024 (expected)

Virginia Polytechnic Institute and State University
PhD Student, Dept. of Electrical & Computer Engineering
Advisor: Dr. Pratap Tokekar
(*Transferred to University of Maryland, College Park*)

August 2019 - May 2020

Indian Institute of Technology Kharagpur
Master of Technology, Bachelor of Technology
Major: Electronics & Electrical Communication Engineering
Specialization: Visual Information & Embedded Systems

July 2012 - June 2017

RESEARCH INTERESTS

Robotics, Embodied AI, Computer Vision, Deep Learning

PUBLICATIONS

- **Vishnu D. Sharma**, Jingxi Chen, & Pratap Tokekar. [ProxMaP: Proximal Occupancy Map Prediction for Efficient Indoor Robot Navigation](#). IROS 2023.
- Harnaik Dhami*, **Vishnu Dutt Sharma***, Pratap Tokekar. [Pred-NBV: Prediction-guided Next-Best-View for 3D Object Reconstruction](#). IROS 2023.
- **Vishnu D. Sharma**, Lifeng Zhou, & Pratap Tokekar. [D2CoPlan: A Differentiable Decentralized Planner for Multi-Robot Coverage](#). ICRA 2023.
- Lifeng Zhou*, **Vishnu D. Sharma***, Qingbiao Li, Amanda Prorok, Alejandro Ribeiro, Pratap Tokekar, & Vijay Kumar. [Graph Neural Networks for Decentralized Multi-Robot Submodular Action Selection](#). SSR 2022.
- **Vishnu D. Sharma**, Maymoonah Toubeh, Lifeng Zhou, & Pratap Tokekar. [Risk-Aware Planning and Assignment for Ground Vehicles using Uncertain Perception from Aerial Vehicles](#). IROS 2020.
- Amrith Krishna, **Vishnu D. Sharma**, Bishal Santra, Aishik Chakraborty, Pavankumar Satuluri, P., & Pawan Goyal. [Poetry to Prose Conversion in Sanskrit as a Linearisation Task: A case for Low-Resource Languages](#). ACL 2019.
- Amrith Krishna, Bishal Santra, Sasi Prasanth Bandaru, Gaurav Sahu, **Vishnu D. Sharma**, Pavankumar Satuluri, & Pawan Goyal. [Free as in Free Word Order: An Energy Based Model for Word Segmentation and Morphological Tagging in Sanskrit](#). EMNLP 2018.
- Vikas Reddy, Amrith Krishna, **Vishnu D. Sharma**, Prateek Gupta, M. R. Vineeth, Pawan & Goyal. [Building a Word Segmenter for Sanskrit Overnight](#). LREC 2018.

Workshop Papers

- Anukriti Singh, **Vishnu D. Sharma** & Pratap Tokekar. [FLIP-TD: Free Lunch Inpainting on Top-Down Images for Robotic Tasks](#). (ICRA-2023 Workshop on Pretraining for Robotics).
- **Vishnu D. Sharma**, Jingxi Chen, Abhinav Shrivastava & Pratap Tokekar. [Occupancy Map Prediction for Improved Indoor Robot Navigation](#). (ICRA-2022 Workshop on Robotic Perception and Mapping: Emerging Techniques).
- **Vishnu D. Sharma** & Pratap Tokekar. [Risk-Aware Path Planning for Ground Vehicles using Occluded Aerial Images](#). (ICRA-2022 Workshop on Robotic Perception and Mapping: Emerging Techniques).

- Shivani Nanda, **Vishnu Dutt Sharma**, Guangyao Shi, Jingxi Chen, Pratap Tokekar. [Semantic Navigation for Assistive Robots: Identifying, Mapping, and Navigating to Door Signs in Indoor Environments](#). (IROS 2022 workshop on Social and Cognitive Interactions for Assistive Robotics Workshop).

Under Review

- **Vishnu D. Sharma**, Jingxi Chen, & Pratap Tokekar. Improved Occupancy Map Prediction for Improved Indoor Robot Navigation. (*Under review at ICRA-2023*).

**Equal Contribution*

WORK EXPERIENCE

Nokia Bell Labs

Jun'23-Aug'23

Robotics and 3D Modeling Intern, Modeling and Optimization Group

- Designed and implemented a hybrid local planner for ground robot navigation
- Showed the safe and efficient operation of the proposed robot through multiple experiments on a Clearpath Jackal robot
- Selected among the top 18 finalists across Bell Labs global internship program to present the work to the leadership team

Comcast Corporation

May'21-Aug'21

Graduate Research Intern, Applied AI for CX Team

- Contributed to the improvement of the maintenance truck scheduling system using learning algorithms
- Designed a deep learning architecture to replace the heuristic-based variables, and weak-supervision rules for label improvement
- Implemented data monitoring pipelines for the existing data, and data processing modules for the new variables with PySpark

American Express India Pvt Ltd

Jul'17 - Jul'19

Risk Analyst, Machine Learning & Data Science Team

- Developed deep learning models for applications including fraud detection, credit authorization and new accounts approval with specific focus on RNNs
- Contributed towards deep learning model deployment, benchmarking on cloud platform (AWS) and analyzing emerging techniques like distributed learning
- Implemented a variable creation tool using RNN aimed for enterprise-wide adoption

FlytBase Labs (Formerly NavStik Labs)

May'16 - Jul'16

Summer Intern

- Integrated Semi-Direct Visual Odometry (SVO) package with FlytPOD flight computer for indoor localization
- Analyzed position estimation with visual odometry incorporating SVO for simple and complex trajectories in GPS-denied and GPS-assisted conditions
- Achieved indoor relocalization error contained within 10cm for linear and circular trajectories

American Express India Pvt Ltd

May'15 - Jul'15

Summer Intern, Commerce Data Science Team

- Designed a categorization algorithm using SKU (Stock Keeping Unit) description for retail items
- Implemented a rule-based categorization system in Python for generating database by web-crawling and processing results for web search with Natural Language Processing Toolkit (NLTK) and other open-source libraries
- Achieved 60% accuracy in categorizing item across type, gender and brand dimensions

TECHNICAL STRENGTHS

Languages & Scripts

Python, C++, PySpark, Hive, MATLAB

Packages & Frameworks

PyTorch, TensorFlow, ROS, OpenCV, AirSim

PROJECTS

[Persistent-Monitoring using Multi-Robot \(UAV-UGV\) Coordination](#)

Proposed a heuristic-based and a deep reinforcement learning-base approach for persistent monitoring by a team of UGVs and a UAV

[Empirical Study of Second-Order Optimizers for Deep Learning Applications](#)

Studied the effect of architecture and data on CNN and MLP with SGD, L-BFGS, and K-FAC optimizers for regression and classification tasks

[DeepVO: A Deep Learning approach for Monocular Visual Odometry](#)

Implemented a CNN-based solution for Monocular Visual Odometry for ground robot

[Autonomous Aerial Vehicle](#)

Worked on development of control stack of the Unmanned Aerial Vehicle. Part of the Best Team Cooperation Award-winning team at the International Aerial Robotics Competition 2016

[Autonomous Underwater Vehicle](#)

Contributed towards the development of the embedded and control stack of the underwater vehicle

Others Projects:

[SmartKart](#) (Semi-autonomous shopping cart), [ROACH](#) (Semi-autonomous all-terrain vehicle), [Sirius](#) (All-terrain vehicle with hybrid leg design)

RELEVANT COURSEWORK

Advanced Techniques in Visual Learning and Recognition, Deep Learning, Advanced Machine Learning, Computer Vision, Data Analytics, Decision Making for Robotics, Advanced Numerical Optimization, Empirical Research Methods in Computer Science, Natural Language Processing

AWARDS AND SERVICES

- ICRA 2023 travel grant recipient
- Volunteer at WAFR 2022
- Reviewer at IROS (2021, 2022, 2023), ICRA (2023, 2024), RA-L (2020, 2023), T-RO (2023), MRS (2023)
- Mentor at [AI4ALL](#) summer camp at UMD (2020, 2022)