

# Vishnu Dutt Sharma

[GitHub](#)

[vishnuds@umd.edu](mailto:vishnuds@umd.edu)

[LinkedIn](#)

## EDUCATION

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### University of Maryland, College Park

June 2020 - May 2024 (expected)

Doctor of Philosophy (Ph.D.) in Computer Science

**Advisor:** Dr. Pratap Tokekar

### Virginia Polytechnic Institute and State University

August 2019 - May 2020

Doctor of Philosophy (Ph.D.) in Computer Engineering

**Advisor:** Dr. Pratap Tokekar

(Transferred to University of Maryland, College Park)

### Indian Institute of Technology Kharagpur

July 2012 - June 2017

Master of Technology, Bachelor of Technology

Major: Electronics & Electrical Communication Engineering

Specialization: Visual Information & Embedded Systems

Minor: Computer Science & Engineering

## RESEARCH & DEVELOPMENT EXPERIENCE

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### Robotics Algorithms & Autonomous Systems Lab

Aug'19 - Present

*Graduate Research Assistant*

- Working on interpretable decision making and risk-aware planning for multi-robot coordination
- Ongoing and prior work include Semantic Segmentation, Image Inpainting and Reinforcement Learning for robotic perception path planning

### 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

## PROJECTS

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### [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

### [SegNet: Reproducibility and Qualitative Analysis](#)

Analyzed reproducibility, generalizability, and effect of input image properties for SegNet architecture

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

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

### [Word Segmentation and Poetry Linearization in Sanskrit](#)

Contributed to projects focused on deep learning-based solutions for *Sandhi* segmentation and poetry-to-prose conversion in Sanskrit texts. These projects resulted in three conference papers

### [Autonomous Aerial Vehicle](#)

Worked on development of control stack of the Unmanned Aerial Vehicle. Part of the Best Team Co-operation 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

### [Plagiarism Detection using Tree-kernel methods](#)

Developed plagiarism detection algorithm using sub-tree kernel matching over the abstract syntax trees extracted from C source codes

### **Others Projects:**

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

## PUBLICATIONS

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- **Sharma, V. D.**, Toubeh, M., Zhou, L., & Tokekar, P. (2020). [Risk-Aware Planning and Assignment for Ground Vehicles using Uncertain Perception from Aerial Vehicles](#). In Proceedings of the 2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS-2020).
- Krishna, A., **Sharma, V. D.**, Santra, B., Chakraborty, A., Satuluri, P., & Goyal, P. (2019, July). [Poetry to Prose Conversion in Sanskrit as a Linearisation Task: A case for Low-Resource Languages](#). In Proceedings of the 57th Annual Meeting of the Association for Computational Linguistics (ACL-2019).
- Krishna, A., Santra, B., Bandaru, S. P., Sahu, G., **Sharma, V. D.**, Satuluri, P., & Goyal, P. (2018). [Free as in Free Word Order: An Energy Based Model for Word Segmentation and Morphological Tagging in Sanskrit](#). In Proceedings of the 2018 Conference on Empirical Methods in Natural Language Processing (EMNLP-2018).
- Reddy, V., Krishna, A., **Sharma, V. D.**, Gupta, P., Vineeth, M. R., & Goyal, P. (2018, May). [Building a Word Segmenter for Sanskrit Overnight](#). In Proceedings of the Eleventh International Conference on Language Resources and Evaluation (LREC-2018).

## Under Review

- Zhou, L., **Sharma, V. D.**, Li, Q., Prorok, A., Ribeiro, A., & Kumar, V. [Graph Neural Networks for Decentralized Multi-Robot Submodular Action Selection](#) (*Under review at ICRA 2022.*)
- **Sharma, V. D.**, & Tokekar, P. [Risk-Aware Path Planning for Ground Vehicles using Occluded Aerial Images](#) (*Under review at ICRA 2022.*)

## TECHNICAL STRENGTHS

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<b>Languages &amp; Scripts</b>	Python, C++, C, PySpark, Hive, MATLAB
<b>Packages &amp; Frameworks</b>	PyTorch, TensorFlow, OpenCV, AirSim, ROS

## RELEVANT COURSEWORK

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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

*\*Ongoing*