RUGVED KATOLE

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Career and Impact Summary

- **PhD in Computer Science**
- **4 Years of Experience in Robotic Systems**
- **Raised $ 100k in Research Grants**
- **Publications in NeurIPS, IROS, ICPP**

Professional Research Experience

Graduate Research Associate | *THE OHIO STATE UNIVERSITY* August 2024 – Present

- *Developing techniques to augment real-world video datasets using **world foundation models**, focusing on **authentic video generation** and faster inference—achieving a **5.9× speed-up** in dataset augmentation.*
- *Integrating world foundation models with **Vision-Language-Action (VLA)** models to address data scarcity, enabling efficient VLA **policy training** with minimal demonstration trajectories while maximizing task performance.*
- *Developing a **digital-twin platform** for wildlife monitoring in **NVIDIA Omniverse**, enabling ecologists to test algorithms virtually with realistic animal behaviors, programmable responses to **drone interactions**, and herd/inter-animal dynamics before field deployment.*

Project Research Assistant | *TIH FOUNDATION, IIT BOMBAY* December 2022 – May 2024

- Deployed an autonomous ground rover for vineyard data collection, integrating a segmentation neural network and depth sensing to maintain lane centering under uneven terrain, achieving robust navigation with up to 40° slip compensation in field tests.
- Developed a multi-agent reinforcement learning framework integrated with a CNN for optimal field scouting reducing the scouting requirements by 60% while maintaining 80% accuracy, reducing labor costs 4.8x and boosting farmer profits by 36%.
- Developed a Level 3.5 motion and behavior planning stack for autonomous vehicles and designed a decentralized intersection management framework leveraging road-marking-based intent detection and graph-theoretic coordination—providing communication-free, safe navigation and deadlock-free solution across 255 possible scenarios.
- Led a successful $100K research grant proposal, coordinating cross-team objectives and integrating interdisciplinary requirements, while mentoring two students and instructing a graduate-level course on ROS 2 to strengthen the lab's technical capacity.

Research Intern | *ARMS LAB, IIT BOMBAY* May 2021 – December 2022

- Developed a distributed online patrol-planning algorithm to balance priority and non-priority site coverage via scalable robot trajectories, ensuring finite-time visits and improved patrolling efficiency in security-critical environments.
- Contributed to the development and validation of a swarm synergy algorithm, focusing on simulation, experiments and multi-robot testing to evaluate autonomous, communication-free community formations.
- Executed sim-to-real transfer and multi-robot validation of both algorithms in controlled lab settings, confirming real-world reliability and consistency with simulation outcomes.

Skills

Foundation models and AI: Vision-Language-Action Models, **Synthetic Data Generation**, **World Modeling**, Deep Learning, Computer Vision

Robotics: Control Systems, SLAM, Gazebo, Carla, Motion Planning, Behavior Planning, **ISSAC Sim**, MATLAB/simulink, **Sim-to-Real Transfer**

Programming: C/C++, Linux, Git/CI-CD, Containerization [Docker, Singularity], Slurm, **Python [Pytorch, Tensorflow, Jax]**

Soft Skills: Cross-functional Collaborations, Technical Leadership, **Attention-to-detail**, Critical Thinking, **Problem Solving**, Communication

Education

The Ohio State University August 2024 – May 2029
PhD in **Computer Science** | **GPA: 3.6/4** (expected)

Birla Institute of Technology and Science, Pilani August 2018 – May 2022
BE Mechanical Engineering | GPA: **8.52/10**
*Thesis: Balancing Priorities in patrolling with Rabbit Walks (**Robotics**)*

Selected Publications (go.osu.edu/rk-scholar)

Ortho-Fuse: Orthomosaic Generation for Sparse High-Resolution Crop Health Maps Through Intermediate Optical Flow Estimation 2025
Rugved Katole, Christopher Stewart
*International Conference on Parallel Processing (**ICPP**), Harvest 2025*

SmartWilds: Multimodal Wildlife Monitoring Dataset 2025
Jenna Kline, Anirudh Potlapally, Bharath Pillai, Tanishka Wani, Rugved Katole, Vedant Patil, et. Al
***NeurIPS** Workshop on Imageomics*

Multi-Agent Reinforcement Learning for Heterogeneous UAV Swarm Enabling Detailed Crop Health Assessment 2023
Rugved Katole, Kevyn Angueira, Arpita Sinha, Christopher Stewart
*International Conference on Intelligent Robots and Systems (**IROS**), Agrobotics 2023*

Balancing priorities in patrolling with Rabbit walks 2023
Rugved Katole, Deepak Mallya, Leena Vachhani, Arpita Sinha
Arxiv: 2312.16564

A low-cost Framework for Decentralized Autonomous Intersection Management 2023
Rugved Katole, Arpita Sinha
ArXiv:2311.17681

Swarm Synergy: A Silent and Anonymous Way of Forming Community 2023
Sweksha Jain, Rugved Katole, Leena Vachhani
ArXiv:2311.17697