

# Shivani Kiran Kamtikar

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## EDUCATION

### University of Illinois at Urbana Champaign

Ph.D. Computer Science, Advisor - [Prof. Girish Chowdhary](#)

Master of Science in Computer Science (MSCS), Advisor - [Prof. Girish Chowdhary](#)

### Savitribai Phule Pune University

Bachelor of Technology in Information Technology

Champaign, IL

Expected Dec 2026

May 2022

Pune, India

August 2020

## PUBLICATIONS

### Conference/Journal

- K. Koe, S. Marri, B. Walt, **S. K. Kamtikar**, N. K. Uppalapati, G. Krishnan, G. Chowdhary, "Learning-Based Position and Orientation Control of a Hybrid Rigid-Soft Arm Manipulator", Asme Journal of Mechanics and Robotics 2025.
- K. Koe, P. K. Shah, B. Walt, J. Westphal, S. Marri, **S. K. Kamtikar**, J. S. Nam, N. K. Uppalapati, G. Krishnan, G. Chowdhary, "Precision Harvesting in Cluttered Environments: Integrating End Effector Design with Dual Camera Perception", ICRA 2025.
- **S. K. Kamtikar**, S. Marri, B. T. Walt, N. K. Uppalapati, G. Krishnan, and G. Chowdhary, "Visual servoing for pose control of soft continuum arm in a structured environment", IEEE Robotics and Automation Letters (RA-L), and IEEE International Conference on Soft Robotics (RoboSoft) 2022 - oral presentation.
- **S. K. Kamtikar**, K. Koe, J. Wasserman, S. Marri, B. T. Walt, N. K. Uppalapati, G. Krishnan, and G. Chowdhary, "3D Vision-Guided Autonomous Manipulation of Hybrid Robots in Cluttered, Unstructured Environments", under review.

### Workshop

- **S. K. Kamtikar**, K. Koe, S. Marri, B. Walt, N. K. Uppalapati, G. Krishnan, G. Chowdhary, "Visual Servoing for Pose Control of Hybrid Continuum Manipulator in an Unstructured Environment", CoRL 2023 Workshop on Learning for Soft Robots.
- **S. K. Kamtikar**, E. Ji, N. K. Uppalapati, G. Krishnan, and G. Chowdhary, "Realistic Simulation Environments to Achieve Visual Servoing on Soft Continuum Arms in Constrained Environments" - Fourth International Workshop on Machine Learning for Cyber-Agricultural Systems (MLCAS) 2022.
- **S. K. Kamtikar**, S. Marri, B. T. Walt, N. K. Uppalapati, G. Krishnan, and G. Chowdhary, "Towards Autonomous Berry Harvesting using Visual Servoing of Soft Continuum Arm" - AI for Agriculture and Food Systems (AIAFS) workshop 2022.

## WORK EXPERIENCE

### Applied Scientist II Co-op, Amazon Robotics - [Dr. Taskin Padir](#)

Jan 2025 - July 2025

- Developed a vision-free tactile exploration framework enabling robots to localize and identify objects in cluttered, occluded environments
- Designed a learned policy combining behavior cloning and reinforcement learning for autonomous tactile exploration and object reconstruction
- Implemented algorithms for workspace exploration, contact-based mapping, and 3D shape completion using tactile point clouds
- Demonstrated 77% task success rate and improved reconstruction accuracy compared to baseline methods
- Advanced the use of tactile sensing as a primary perception modality for robotic manipulation in unstructured environments
- Leveraging tactile signals to distinguish between deformable and rigid objects

## RESEARCH EXPERIENCE

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Graduate Research Assistant, University of Illinois – Urbana Champaign

### *3D Vision-Guided Autonomous Manipulation of Hybrid Robots in Cluttered, Unstructured Environments*

- Novel approach demonstrating real-time, open-world object reaching using rigid-soft continuum manipulators in complex, unstructured environments
- Enabled obstacle avoidance through 3D-reconstruction and shape-informed path planning
- Developed a path planner paired with shape estimation using a Constant Curvature model, eliminating the need for expensive sensors
- Developed a novel learned controller that is capable of successfully actuating the hybrid arm system into any pose for manipulation with an accuracy of 98%.

### *Learning-Based Manipulation of Soft Robotic Arms in a Structured Environment*

- Developed a deep neural network-based method for robust 3D positioning of soft robotic arms using vision
- Developed a network to predict controls required for desired target poses, leveraging visual feedback from a camera mounted at the distal end of the arm
- Devised a proportional control law that utilizes visual feedback to minimize the error between desired and current poses
- Demonstrated the model's transferability to new environments with minimal effort, showcasing an adaptable and scalable robotic system
- Achieved state-of-the-art performance in manipulation of soft robotic arms with translation error less than 2 cm and rotation error less than 0.25 rad

### *Reinforcement Learning for Manipulation and Control in a Structured Environment*

- Trained a Deep Deterministic Policy Gradient (DDPG) model for tracking the path of the end effector to a target using real-world data
- Conducted ablation studies to identify optimal parameters for the DDPG model
- Explored the shortcomings of DDPG through systematic experiments and compared it to other learning-based pose-estimation methods

## TECHNICAL SKILLS

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**Topics:** soft robotics, computer vision, reinforcement learning, imitation learning, visual servoing, 3D vision-guided manipulation, foundation models, deep learning, 3D reconstruction, SLAM

**Programming Languages and frameworks:** Proficient in Python (and deep learning libraries like PyTorch), ROS and ROS 2

## CONFERENCE/JOURNAL REVIEWER

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[IEEE Robotics and Automation Letters \(RA-L\)](#)

[21st IEEE India Council International Conference \(INDICON\)-2024](#)

[Workshop on Agricultural Robotics for a Sustainable Future, IROS](#)

## TALKS AND PRESENTATIONS

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- Future Leaders of Robotics and AI Seminar Series, at the University of Maryland College Park - 2025
- At Fourth International Workshop on Machine Learning for Cyber-Agricultural Systems (MLCAS 2022).
- Workshop paper presentation at AI for Agriculture and Food Systems (AIAFS) workshop 2022.
- Research presentation at the Illinois Autonomous Farms (IAF) Workshop, UIUC - 2021.

## **LEADERSHIP EXPERIENCE**

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- [GradSWE](#) Director 2025-2026
- [weSTEM](#) 2025 Director
- Member of the Engineering Graduate Student Advisory Council ([EGSAC](#)), UIUC - 2023-2024
- General Chair for [CSL Student Conference 2024](#)
- Treasurer for [GradSWE](#) (Graduate Society of Women Engineers) at UIUC - 2021-2024.
- Robotics Chair for CSL Student Conference 2023

## **AWARDS AND RECOGNITION**

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- Award recipient of Future Leaders of Robotics and AI, University of Maryland College Park - 2025
- Award recipient of Student Leadership Award (GIANT Award) by the IDEA Institute
- Received "Best Outgoing Student Award" awarded by Savitribai Phule Pune University, Pune, India
- Patent granted by the Indian Patent Office for final-year undergraduate project
- Awarded a grant of 11000 USD from IBM for final-year undergraduate project
- Awarded a full scholarship from iSURE - International Student Undergraduate Research Experience