Shivani Kiran Kamtikar

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EDUCATION

University of Illinois at Urbana Champaign **Champaign, IL**
Ph.D. Computer Science, Advisor - Prof. Girish Chowdhary *Expected May 2026*
- Relevant coursework: Robot Learning | Meta Learning | Transfer Learning

Master of Science in Computer Science (MSCS), Advisor - Prof. Girish Chowdhary *May 2022*
- Relevant coursework: Learning-Based Robotics | Computer Vision | Robotics and Automation | Machine Learning

Savitribai Phule Pune University **Pune, India**
Bachelor of Technology in Information Technology *August 2020*
- Relevant coursework: Machine learning | Artificial Intelligence

PUBLICATIONS

Conference/Journal

- **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.
- K. Koe, S. Marri, B. Walt, **S. K. Kamtikar**, N. K. Uppalpati, G. Krishnan, G. Chowdhary, *"Model-Based Dynamic Position and Orientation Control of a Hybrid Soft Continuum Manipulator"*, under review.
- K. Koe, P. K. Shah, B. Walt, J. Westphal, S. Marri, **S. K. Kamtikar**, N. K. Uppalapati, G. Krishnan, G. Chowdhary, *"Detect2Grasp: Integrating Global and Local Visual Perception for Berry Manipulation with Low Cost Robots"*, under review.

Workshop

- **S. K. Kamtikar**, K. Koe, S. Marri, B. Walt, N. K. Uppalpati, 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.

RESEARCH EXPERIENCE

Graduate Research Assistant, University of Illinois – Urbana Champaign 2021 - Present

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 novel 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

End-to-End Goal Based Meta-Learning For Robotic Applications

- Implemented an RL-based method that combines end-to-end application feedback and meta-learning for manipulation tasks
- Used REINFORCE method for policy update of the RL system

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

Topics: Visual servoing, deep learning, 3D reconstruction, SLAM, 3D vision-guided manipulation, image segmentation, object detection, reinforcement learning, soft robotics

Programming Languages and frameworks: Proficient in Python (and deep learning libraries like PyTorch) and have experience with ROS

CONFERENCE/JOURNAL REVIEWER

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

- Presented paper at the 5th IEEE-RAS International Conference on Soft Robotics – RoboSoft 2022.
- Poster presentation at the 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

- 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
- Member of the national SWE (Socitey of Women Engineers)
- Diversity Advocate for a hiring committee at UIUC.

AWARDS AND RECOGNITION

- 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 a final-year undergraduate project.
- Awarded a full scholarship from iSURE - International Student Undergraduate Research Experience.
- Featured on the website of the University of Notre Dame.