Shivani Kamtikar

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Education

- **Unversity of Illinois – Urbana Champaign** — **Champaign-Urbana, IL, USA**
  Ph.D. Computer Science - Advised by Prof. Girish Chowdhary — *May 2022 - Present*
  Relevant courses: Learning to Learn (Meta Learning)
- **Unversity of Illinois – Urbana Champaign** — **Champaign-Urbana, IL, USA**
  M.S. Computer Science, ***CGPA: 3.5/4.00*** — *Sept 2020 - May 2022*
  Relevant courses: Learning-Based Robotics | Computer Vision | Robotics and Automation | Machine Learning - Advised by *Prof. Girish Chowdhary*
- **Savitribai Phule Pune University, Pune, India** — **Pune, India**
  B.Tech Information Technology, ***CGPA: 8.75/10*** — *Aug 2016 - Oct 2020*

Publications

- **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), pp. 1–1, 2022 *and* 5th IEEE-RAS International Conference on Soft Robotics – RoboSoft 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, Vancouver, Canada.
- **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)

Relevant Experience

University of Illinois at Urbana-Champaign — **Champaign, IL, USA**
Graduate Research Assistant (DASLab), Advisor: Prof. Girish Chowdhary — *Jan 2021 - Present*

- Demonstrated reliability of CNN based visual servoing to control position and orientation of soft arms (SCA).
- Demonstrated ability to control position as well as orientation of SCA, unlike other methods.
- Achieved <2 cm translation error and less than 0.25 radians rotation error (current best).
- Exhibited quick adaptability of the self-supervised system in a new environment in 3-4 hours.
- Currently working on visual servoing for SCAs in cluttered unstructured environments.

University of Notre Dame — **South Bend, IN, USA**
Research Intern, Advisor: Prof. Zhiyong (Johnny) Zhang — *June 2019 - July 2019*

- Worked on a project titled "Statistical Social Network Analysis for Behavioral Research".
- Developed a network model that maps behavioral traits to mathematical equations to analyze personality.
- Improved the performance of the existing behavioral model by 28%.

Dravin Solutions Pvt. Ltd. — **Pune, India**
Intern, Supervisor: Mr. Yogesh Mishra — *Oct 2017 - Dec 2017*

- Collaborated with analysts from stock market and gathered information about Futures and Options.
- Successfully built a tool that provides buy and sell signals in real-time market.

Teaching

University of Illinois at Urbana-Champaign — **Champaign, IL, USA**
Graduate Teaching Assistant, Professor: Prof. Svetlana Lazebnik — *Sept 2020 - Dec 2020*

- Teaching assistant for the course 'Introduction to Deep Learning'.

Academic Projects

End-to-End Goal Based Meta-Learning For Robotic Applications (Sept 2022 - Dec 2022)

- Implemented an RL-based method that combines end-to-end application feedback and meta-learning.
- Method requires little supervision and is generalizable to different robot learning tasks.
- Used REINFORCE method for policy update of the RL system.

Towards Reach-Avoid using Visual Servoing on a Soft Continuum Arm (March 2022 - May 2022)

- Applied SfM based methods to reconstruct cluttered scenes in 3D using 2D RGB images.
- Constructed occupancy grid to determine obstacles in the scene.
- Formulated best path from source to destination using Dijkstra's algorithm
- Found waypoints, to reach the target, along the path using heuristics.

Reinforcement Learning for Visual Servoing in a Structured Environment (Sept 2021 - Dec 2021)

- Trained a DDPG for tracking the path of the end effector of SCA to target using real-world data.
- Performed various ablation studies to find the best parameters for the DDPG.
- Demonstrated the shortcomings of DDPG on the system using experiments.
- Compared the system with other learning-based pose-estimation methods and investigated the shortcomings of DDPG.

Learning Based Relative Pose Estimation for Visual Servoing of a Soft Robot, (March 2021 - May 2021)

- Implemented and trained 4 different CNN based architectures to learn relative pose between 2 images.
- Performed ablation studies to find the best parameters for each of the architectures.
- Demonstrated the performance of different architectures on SCA to reach a target from a given position.
- Compared the performance on the SCA prototype and demonstrated the best performing architecture.

Indian Sign Language Recognition using Deep Learning Frameworks (Jan 2019 - Aug 2020)

- Created a novel dataset by collecting images of Indian Sign Language (ISL) alphabets.
- Built a custom CNN based model from scratch to identify and classify ISL.
- Proved the robustness of the model on images in various lighting conditions, orientations, etc.
- Achieved an optimal accuracy of 97.3% on the gesture recognition task using a CNN trained from scratch.

Technical Proficiency

- *Python and specific libraries(PyTorch, keras, numpy, pandas, opencv, scipy, scikit-learn), ROS, C*

Awards and Recognition

- Received "Best Outgoing Student Award" awarded by Savitribai Phule Pune University, Pune, India.
- Patent filed with the Indian Patent Office for final-year project.
- Awarded a grant of 11000 USD from IBM for final-year project.
- Featured on the website of the University of Notre Dame.
- Awarded a full scholarship from iSURE - International Student Undergraduate Research Experience.

Leadership Experience

- Treasurer of GradSWE (Graduate Society of Women Engineers) at UIUC. - 2021 - 2023
- Volunteered at the weSTEM conference at UIUC - Feb 2022
- Appointed the Diversity Advocate for a hiring committee at UIUC. - 2021
- Volunteered as a committee member at the We21 conference hosted by SWE. - 2021
- Gave a talk on Visual Servoing for Soft Arms at the Illinois Autonomous Farms (IAF) Workshop, UIUC - 2021

Interests

Reading | Painting | Travelling | Blogging