

# YASH SHUKLA

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## RESEARCH INTERESTS

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- Reinforcement Learning
- Robotics / Robot Learning
- Foundational Models (LLMs)
- CV; DL; ML
- Natural Language Processing
- Neurosymbolic AI

## EDUCATION

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**Ph.D. in Computer Science** Sept '20 – Present  
Tufts University, Medford, MA (GPA - 3.8/4.0)  
Relevant Courses: Reinforcement Learning, Probabilistic Robotics, Algorithms

**Master of Science in Robotics Engineering** Aug '18 – May '20  
Worcester Polytechnic Institute (WPI), Worcester, MA (GPA - 4.0/4.0)  
Relevant Courses: Deep Learning for Perception, Artificial Intelligence, Robot Control, Human Robot Interaction

**Bachelor of Engineering (Hons.) in Mechanical Engineering** (Acceptance rate ~ 2%) Aug '14 – May '18  
Birla Institute of Technology and Science, Pilani, India (GPA - 8.36/10)  
Relevant Courses: Digital Image Processing, Robotics and Mechanisms, Mechatronics

## EXPERIENCE

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**Research Intern at Mitsubishi Electric Research Lab, Cambridge, MA** Oct '23 – Apr '24  
· LLM and VLM assisted human robot collaboration for assembly tasks in robotic manipulation settings.  
· Recognizing human intent to improve and speed up human robot collaboration in a safe manner.

**Lecturer at Tufts University, Medford, MA** Sept '23 – Dec '23  
· Designing and instructing CS 138 Reinforcement Learning (*First student at Tufts to teach RL*).

**Research Intern at Georgia Tech Research Institute, Atlanta, GA** May '23 – Sept '23  
· Utilizing foundational models (LLMs, VLMs) to suggest task plans that aid the learning ability of robotic RL agents.  
· Learning long-horizon behaviors for RL agents by integrating output from LLMs/VLMs and offline RL algorithms.

**Research Assistant at Tufts University, Medford, MA** Aug '20 – Present  
· Designing efficient neurosymbolic AI techniques to improve sample efficiency of robotic agent learning.  
· Formulating new ideas in the field of Generative AI, Reinforcement Learning, and Robot Learning.  
· First authored publications at IROS '23, ICAPS '23, AAMAS '22, ICDL '22, SRL (ICRA) '22, Sim2Real (RSS) '22.

**Computer Vision Team, MathWorks, Natick, MA** May '19 – Aug '19  
· Formulated an innovative CV algorithm to improve accuracy of camera calibration parameters for Fisheye Cameras.  
· Achieved better checkerboard detection precision (98 %) as compared to the existing technique (83 %).

**Centre for Artificial Intelligence and Robotics, Bangalore, India** Jan '18 – June '18  
· Developed on-the-fly object recognition pipeline for efficient robotic navigation in indoor settings.  
· Integrated object recognition with semantic SLAM in ROS for natural language command based robotic navigation.

## PUBLICATIONS

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[LgTS: Dynamic Task Sampling using LLM-generated sub-goals for Reinforcement Learning Agents](#)  
Yash Shukla, Wenchang Gao, Vasanth Sarathy, Alvaro Velasquez, Robert Wright, Jivko Sinapov  
*International Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2024.*

[Logical Specification-Guided Dynamic Task Sampling for Reinforcement Learning Agents](#)

**Yash Shukla**, Tanushree Burman, Abhishek Kulkarni, Alvaro Velasquez, Robert Wright, Jivko Sinapov  
*Under review*

[A Framework for Few-Shot Policy Transfer through Observation Mapping and Behavior Cloning](#)

**Yash Shukla**, Bharat Kesari, Shivam Goel, Robert Wright, and Jivko Sinapov.

*International Conference on Intelligent Robots and Systems (IROS), 2023.*

[Automaton-Guided Curriculum Generation for Reinforcement Learning Agents](#)

**Yash Shukla**, Abhishek Kulkarni, Robert Wright, Alvaro Velasquez, and Jivko Sinapov.

*International Conference on Automated Planning and Scheduling (ICAPS), 2023.*

[ACuTE: Automatic Curriculum Transfer from Simple to Complex Environments](#)

**Yash Shukla**, Christopher Thierauf, Ramtin Hosseini, Gyan Tatiya, Jivko Sinapov.

*International Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2022.*

[RAPid-Learn: A Framework for Learning to Recover for Handling Novelty in Open-World Environments](#)

Shivam Goel\*, **Yash Shukla\***, Vasanth Sarathy, Matthias Scheutz, and Jivko Sinapov.

*International Conference on Development and Learning (ICDL), 2022.* \* - Denotes equal contribution

[A Framework for Curriculum Schema Transfer from Low-Fidelity to High-Fidelity Environments](#)

**Yash Shukla**, Jivko Sinapov.

*Closing the Reality Gap in Sim2Real Transfer for Robotics at Robotics: Science and Systems (RSS), 2022.*

[An Object-Oriented Approach for Generating Low-Fidelity Environments for Curriculum Schema Transfer](#)

**Yash Shukla**, Kaleb Loar, Robert Wright, Jivko Sinapov.

*Scaling Robot Learning Workshop at International Conference on Robotics and Automation (ICRA), 2022.*

[Haptic Knowledge Transfer Between Heterogeneous Robots using Kernel Manifold Alignment](#)

Gyan Tatiya, **Yash Shukla**, Michael Edegware and Jivko Sinapov.

*International Conference on Intelligent Robots and Systems (IROS), 2020.*

## SKILLS

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**Programming:** Python (*Expert*), C/C++ (*Expert*), MATLAB (*Intermediate*), Java (*Intermediate*)

**Robotic Frameworks and Simulators:** Robot Operating System, MuJoCo, Isaac Gym, PyBullet

**Deep Learning Frameworks:** PyTorch, Tensorflow, Keras

## OTHER PROJECTS [Under preparation / Pre-PhD Works]

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**LLMs & VLMs for handling failure in sequential decision making Robotic tasks** Sept '23 – Present

- Using vision, tactile and motion planner to close the loop and further refine LLM suggested task plans.
- Inventing methods that aid Robotic agents develop creative problem solving tools (collab w/ *Chris Paxton, Meta*)

**Offline RL with human feedback for Robotic Manipulation** Jan '23 – Present

- Working on incorporating human feedback in a diverse offline RL dataset to improve efficiency of Robotic Learning.

**Multi-Source Feature Alignment for Collaborative Robot Manipulation** Jan '20 – May '20

- Designed representation for knowledge transfer using kernel manifold alignment (KEMA). (Accepted at IROS 2020)
- The representation enabled two source robots to transfer knowledge about novel objects to a target robot.

**Learning based Motion Planning for Manipulators, WPI** Aug '19 – Dec '19

- Designed and applied DDPG-MP to a 4 DOF manipulator to achieve motion planning faster than RRT.
- Compared and evaluated Imitation Learning, Supervised Learning and DDPG-MP approaches for motion planning.

**Viewpoint optimization for aiding grasp synthesis using Supervised learning, WPI** Jan '19 – Dec '19

- Implemented active vision methodology to optimize depth sensor viewpoint to increase synthesized grasp quality.
- Employed supervised learning techniques to obtain viewpoint optimized policy by generating automated data.

**Ship Detection and Segmentation from Aerial Images, WPI** Aug '18 – Dec '18

- Implemented a two model Deep Learning architecture to segment ships from aerial images on Airbus Dataset.
- Applied ResNet to classify images containing ships and later segmented them using a stacked Hourglass model.