

# YASH SHUKLA

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## RESEARCH INTERESTS

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- Reinforcement Learning
- Robotics / Robot Learning
- Foundational Models
- Neurosymbolic AI
- CV / DL
- Multi-agent systems

## EDUCATION

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### Ph.D. in Computer Science

Tufts University, Medford, MA

Relevant Courses: Reinforcement Learning, Probabilistic Robotics, Algorithms

Sept '20 – Present

(GPA - 3.8/4.0)

### Master of Science in Robotics Engineering

Worcester Polytechnic Institute (WPI), Worcester, MA

Relevant Courses: Deep Learning for Perception, Artificial Intelligence, Robot Control, Human Robot Interaction

Aug '18 – May '20

(GPA - 4.0/4.0)

### Bachelor of Engineering (Hons.) in Mechanical Engineering

Birla Institute of Technology and Science, Pilani, India

Relevant Courses: Digital Image Processing, Robotics and Mechanisms, Mechatronics

(Acceptance rate  $\sim$  2%)

Aug '14 – May '18

(GPA - 8.36/10)

## PEER-REVIEWED PUBLICATIONS

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### [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 Edegarware and Jivko Sinapov.

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

## SKILLS

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**Programming**: Python, C/C++, MATLAB, Java

**Robotic Frameworks**: Robot Operating System

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

## EXPERIENCE

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### Lecturer at Tufts University, Medford, MA

Sept '23 – Dec '23

- Designing and instructing CS 138 Reinforcement Learning.

### Georgia Tech Research Institute, Atlanta, GA

May '23 – Sept '23

- Utilizing foundational models (LLMs, VLMs, etc.) to aid learning ability of robotic RL agents.
- Integrating foundational models with neurosymbolic AI approaches to aid reasoning for RL agents.

### 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 Sim2Real Transfer and, Integrating Planning and 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.
- The Checkerboard Detection algorithm designed for Fisheye Cameras had better true positive detection even for images from Pinhole and Stereo 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 a novel image processing algorithm for efficient road segmentation in unstructured environment.
- Generated pointcloud costmap in ROS using Velodyne LIDAR, Stereo Camera and Ultrasonic sensor.
- Achieved better segmentation accuracy (91 %) as compared to existing Pyramid Scene Parsing Network (79 %).

## PROJECTS

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### Zero-Shot Policy Transfer through observation mapping for Robot Learning

Jan '21 – Present

- Developed zero-shot policy transfer by cloning a policy with observations mapped using modified CycleGAN.
- Transferred policy from a simulated robotic domain (PyBullet) to a physical robot (IROS 2023).

### Dynamic novelty accommodation in plan execution failures, Tufts University

May '21 – Jan '22

- Built a framework for dynamic open-world novelty accommodation in incomplete domain knowledge scenarios.
- Co-authored a paper accepted at the International Conference on Development and Learning (ICDL), 2022.

### Multi-Source Feature Alignment for Collaborative Robot Learning, Tufts University

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.

### Graphical Neural Network For Real-Time Simulation of Soft Robotic Snakes, WPI

Jan '20 – May '20

- Developed a graph neural network to model structure of a soft snake robot for efficient locomotion.
- Achieved improved time to threshold and regret on PPO compared to non graphical model.

### 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.
- Implementing the algorithms on Franka Emika Panda Robot.

### 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.

### Control Lyapunov Barrier Strategy for Adaptive Cruise Control, WPI

Aug '18 – Dec '18

- Combined Control Lyapunov and Barrier Functions to achieve Adaptive Cruise Control for a vehicle.
- Extended this control strategy in 2 Dimensions with incorporation of the dynamic model of turtlebot.