

Haresh Karnan

Austin TX, USA

☎ (+1) 979-985-8738 | ✉ haresh.miriyala@utexas.edu | 🏠 hareshkarnan.github.io | 📷 HareshKarnan | 🌐 hareshkarnan

Education

The University of Texas at Austin

PHD IN MECHANICAL ENGINEERING (ROBOTICS PORTFOLIO PROGRAM)

- Graduate Courses : Reinforcement Learning, Autonomous Robots, Deep Learning, Machine Learning.
- Advised by Dr. Peter Stone, Learning Agents Research Group.
- Research Area : Robotics, Deep Reinforcement Learning, Sim-to-Real, Computer Vision, Autonomous Driving.

Austin, TX, USA

August. 2018 - Dec. 2022

Texas A&M University

MS. IN AEROSPACE ENGINEERING, DYNAMICS AND CONTROL

- Graduate Courses : Artificial Intelligence, Estimation Theory, Optimal Control, Pattern Recognition, Probabilistic Robotics.

College Station, TX, USA

August. 2016 - July. 2018

National Institute of Technology, Tiruchirappalli

B.TECH. IN INSTRUMENTATION AND CONTROL ENGINEERING

- Undergraduate Courses : Computer Vision, Data Structures and Algorithms, Linear Control, Neural Networks, Sensors and Instrumentation.

Tiruchirappalli, TN, India

June. 2012 - July. 2016

Work Experience

Amazon DEX Robotics (Amazon Scout)

APPLIED SCIENTIST INTERN

[VISUAL REPRESENTATION LEARNING]

- Implemented a contrastive learning based visual representation learning algorithm for coarse robot localization using image retrieval.
- Successfully learned weather and lighting invariant visual representations for coarse robot localization, improving retrieval success by 32%.
- Deployed the learned visual feature extractor on an Amazon Scout robot, integrating it with the localization stack.

[DEEP LEARNING FOR POSE ESTIMATION]

- Worked on deep learning based computer vision algorithms to improve localization accuracy of Amazon Scout package delivery robots.
- Implemented and benchmarked deep learning based keypoint extraction algorithms for robot localization in the real world.
- Achieved over 55% improvement in fine pose estimation accuracy by implementing visual 3D localization in unstructured environments.

[DEEP GENERATIVE LEARNING FOR ROBOT LOCALIZATION]

- Applied generative adversarial training to extract semantic image features for monocular robot localization in sidewalks.
- Improved transfer from simulation to real-world by applying domain randomization techniques.
- Benchmarked our novel approach with existing visual localization pipelines and achieved 30% improvement in localization accuracy.
- Submitted as a patent to the US patent office.

Austin, TX, USA

May. - Aug. 2019/20/21

Projects

ACTIVE MEMBER OF UT AUSTIN'S ROBOCUP@HOME TEAM - UTAUSTINVILLA

- Participated in RoboCup 2019 and 2021 representing UTAustinVilla and won third place at RoboCup 2021. [\[Paper\]](#)
- Implemented "Take out the Trash" task to perform autonomous cleanup of an indoor environment by the HSR robot. [\[Video\]](#)
- Implemented a synthetic data generation pipeline to train object detection and segmentation networks on YCB objects.

Jan. 2019 - Present

MEMBER OF UT AUSTIN'S ROBOCUP STANDARD PLATFORM LEAGUE - ROBOSOCCER TEAM - UTAUSTINVILLA

- Worked on the Sim-to-Real problem of transferring a walk policy from simulation to a real-world NAO humanoid robot.
- Modelled real-world transitions as a stochastic MDP and used action transformation to modify the SimSpark simulator.
- Successfully transferred a bipedal robot walk policy from simulation to real-world to walk on a bumpy terrain. [\[Video\]](#)

Sep. 2019 - Present

Publications & Patent

SPRINGER, NATURE (MACHINE LEARNING) Areas : *[Reinforcement Learning, Sim-to-Real, Robotics]*

- "Grounded Action Transformation for Sim-to-Real Reinforcement Learning", Josiah Hanna, Haresh Karnan, et al., Springer, Machine Learning, 2021. [\[Paper\]](#)

NEURAL INFORMATION PROCESSING SYSTEMS (NEURIPS) Areas : *[RL, Imitation Learning, Sim-to-Real, Robotics]*

- "An Imitation from Observation Approach to Transfer Learning with Dynamics Mismatch", Haresh Karnan, et al., Neural Information Processing Systems, 2020. [\[Paper\]](#)

INTERNATIONAL CONFERENCE ON INTELLIGENT ROBOTS AND SYSTEMS (IROS) Areas : *[RL, Sim-to-Real, Vision, Robotics]*

- "Stochastic Grounded Action Transformation for Robot Learning in Simulation", Haresh Karnan, Peter Stone, et al., IROS 2020. [\[Paper\]](#)
- "Reinforced Grounded Action Transformation for Sim-to-Real Transfer", Haresh Karnan, Peter Stone, et al., IROS 2020. [\[Paper\]](#)
- "Visual Feedback Control of Tensegrity Robotic Systems", Haresh Karnan, Robert Skelton, et al., IROS 2017. [\[Paper\]](#)

INTERNATIONAL CONFERENCE ON ROBOTICS AND AUTOMATION (ICRA) Areas : *[ML, RL, Autonomous Driving, Computer Vision]*

- "VOILA: Visual Observation-only Imitation Learning for Autonomous navigation", Haresh Karnan, Peter Stone, et al. ICRA 2021. [\[Paper\]](#) [\[Video\]](#)
- "Adversarial Imitation Learning from Video using a State Observer", Haresh Karnan, Peter Stone, et al. ICRA 2021. [\[Paper\]](#) [\[Video\]](#)

PATENT (SUBMITTED)

- Visual feature extraction for delivery robot localization in sidewalks (work done as an intern at Amazon Scout).

Skills

- Languages : C++, Python, Matlab, Arduino Language
- Libraries : OpenCV, PyTorch, Pytorch-Lightning, ROS, scikit-learn
- Software : MuJoCo, Gazebo, Git, COLMAP