

ACHYUTHAN UNNI KRISHNAN

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Career Objective

Passionate and dedicated engineer looking to contribute in the field of robotics and human-robot interaction.

Education

Worcester Polytechnic Institute (WPI) Aug 2020 – Present

PhD, Robotics Engineering, GPA: 4.0/4.0

Worcester Polytechnic Institute (WPI) Aug 2018 – Aug 2020

Master of Science, Mechanical Engineering, GPA: 3.93/4.0

Amrita University, Coimbatore, India Aug 2012 – Aug 2016

Bachelor of Technology, Mechanical Engineering, GPA: 8.52/10.00

Skills

System and Software: ROS, Unity, OpenCV, Tensorflow, Pytorch

Programming Languages: Python, Matlab, C#, C++

Experience

Robor Bosch Engineering And Business Services Sept 2016– May 2018

Associate Design Engineer

Coimbatore, India

- Designed and developed heating solutions for diesel exhaust treatment systems
- Worked on sensor integration for level sensing applications in coolant pumping systems.

Research Topics

Action and Perception Assistance for Remote Manipulation Interfaces Aug 2021– Present

- Developed a motion mapping control interface for robot arms (Kinova Gen3) using a Virtual Reality controller.
- Developed and evaluated various Human-Robot control paradigms for task completion and obstacle avoidance.
- Improved operator awareness of robot autonomy, task states, and environmental obstacles using Augmented Reality cues.

Assisted Bi-manual Control Interfaces for Free-form Teleoperation Aug 2022– Present

- Implemented motion-based intent inference to activate action support for orientation control while teleoperating.
- Designed a motion scaling system for precise robot arm control based on environmental and robot states.
- Developed an action-support system where task state and real-time operator workload optimized assistance availability.

Projects

Gaze Based Intent Inference and Workload Estimation Jan 2022– May 2023

- Identified operator intent using gaze allocation during teleoperation to optimize perception assistance.
- Developed a real-time cognitive workload index using gaze motion, gaze allocation and pupil-based stress inference.

Object Localization and Grasping for Robotic Manipulation Aug 2021– Dec 2021

- Implemented an object detection and localization system using a Mask-RCNN model for a Realsense RGB-D camera.
- Developed grasp point candidates for 2-finger grippers for household items using Nvidia Graspnet architecture.
- Created a grasp-angle based filter to refine results and eliminate difficult robotic arm-postures.

Reward Engineering for Autonomous Pick and Place Actions Aug 2019– Dec 2019

- Engineered autonomous pick and place actions for a robotic arm using a DDPG based model in OpenAI Gym.
- Implemented several reward designs using distance and motion heuristics to optimize robot motion efficiency.
- Achieved a 40% improvement on baseline performance in terms of time of convergence for optimal solution.

Selected Publications

- Achyuthan Unni Krishnan, Tsung-Chi Lin and Zhi Li, “Human Preferred Augmented Reality Visual Cues for Remote Robot Manipulation Assistance: from Direct to Supervisory Control.”, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2023.
- Achyuthan Unni Krishnan, Tsung-Chi Lin, and Zhi Li, “Design interface mapping for efficient free-form telemanipulation.”, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2022.