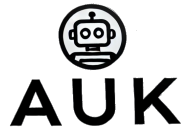


# ACHYUTHAN UNNI KRISHNAN

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## Education

**Doctor of Philosophy** 2020 – current  
*Robotics Engineering*  
Worcester Polytechnic Institute (WPI) MA, USA  
• **Focus:** Human-Robot interaction, User interface design, Augmented Reality  
• **Thesis:** Perception and Action Assistance for the Remote Control of Robotic Manipulation

**Master of Science** 2018 – 2020  
*Mechanical Engineering*  
Worcester Polytechnic Institute (WPI) MA, USA  
• **Focus:** Humanoid robots, Robot teleoperation  
• **Thesis:** Nursing Robot Teleoperation via Motion Mapping Interfaces

**Bachelor of Technology** 2012 – 2016  
*Mechanical Engineering*  
Amrita University, Coimbatore Pune, India  
• **Focus:** Mechanical Design, Machine Learning  
• **Thesis:** Fault Detection in Motorcycle Suspension System using Support Vector Machines

## Work Experience

**Robert Bosch, Coimbatore, India**  
*Associate Design Engineer* 2016 – 2018  
• Designed pumping solutions for diesel exhaust treatment systems in commercial vehicles.  
• Worked on sensor integration for level sensing applications in coolant pumping systems.

## Leadership & Service

**Suspension Design Head**  
*SAE BAJA India, 2016* 2015-2016  
• Led and managed Amrita University's suspension system design team for the SAE BAJA event.

## Skills

**Languages and Development Tools:** Python, Matlab, C++, ROS, OpenCV, Tensorflow, Pytorch  
**Specializations:** Human-Robot interaction, Robot teleoperation, Reinforcement and Deep learning

## Projects

**Assisted bi-manual control interfaces for Teleoperation**  
*Interface Design, Human State Estimation, Python* 2022 – Now  
• Developed bi-manual teleoperation interfaces for two Kinova Gen3 arms to perform nursing tasks such as object manipulation and surveillance.  
• Optimized assistance availability based on operator physical fatigue, reducing task completion times 11% and physical workload by 28%.

**Realtime Human Cognitive Workload Estimation**  
*Human-Computer Interaction, Python, Unity* 2023  
• Created a real-time cognitive workload estimator and intent inference system using gaze motion and pupil tracking.  
• Optimized assistance availability with robot motion intent identified using gaze direction.

**Perception Assistance for Remote Manipulation Interfaces**  
*Augmented Reality, User Interface Design, Python* 2021 – 2022  
• Implemented Augmented Reality cues to notify users of robot state, autonomy intent and workspace information while teleoperating.  
• Reduced control effort by 50% and cognitive workload by 30% during teleoperation.

**Grasp Generation for Object Manipulation using GraspNet**  
*Manipulation, Deep Learning, Tensorflow, Python* 2021  
• Implemented a deep learning-based approach for generating a 6-DOF grasp configurations using Nvidia Graspnet architecture.  
• Enabled object grasping validated with a Franka Panda robot in Gazebo.

**Reward Engineering for Autonomous Pick and Place Actions**  
*Motion Planning, Reinforcement Learning, Tensorflow* 2019  
• Implemented several reward designs using distance and motion heuristics to optimize robot motion efficiency in OpenAI gym pick and place environment.  
• Achieved a 40% improvement on baseline in training efficiency.

## Publications

**Human Preferred Augmented Reality Visual Cues for Remote Robot Manipulation Assistance: from Direct to Supervisory Control.** 2023  
*IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*  
• Presented design methodology to improve teleoperation with AR cues.

**Design interface mapping for efficient free-form telemanipulation.** 2022  
*IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*  
• Discussed designs to improve efficiency and precision of teleoperation.