Uthiralakshmi Sivaraman

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Objective

A curious and enthusiastic master's student, looking for Summer 2023 internships in the area of visual perception and learning applications in robotics

Education

Worcester Polytechnic Institute (WPI) Worcester, MA
Master of Science, Robotics Engineering, ; CGPA 4.0 *Aug 2022 - May 2024*
Courses: Foundation of Robotics, Human Robot Interaction, Reinforcement Learning, Classical and Deep Learning Approaches for Geometric Computer Vision, Robot Control**

SASTRA Deemed University Thanjavur, India
Bachelor of Technology, Electrical and Electronics Engineering ; CGPA 7.79 *June 2015 - May 2019*

Skills

Languages: Python, C++, C#, KRL, MATLAB
Platforms/ Software : Linux, ROS/ROS2, Latex, GIT, PyTorch, Unity, OpenCV, Gazebo, Vrep, Mathematica, TensorFlow

Experience

Manipulation and Environmental lab, WPI Worcester, MA
Graduate Student Researcher *Jan 2023- present*

- Working on active vision for grasp synthesis using imitation learning and testing on 7 DOF Franka Emika Panda robot

HealthCare Technology Innovation Centre, IIT Madras Research Park Chennai, INDIA
Project Associate *Nov 2020- April 2022*

- Worked on communication and software integration of robots:UR5e, Hans Elfin, KUKA KR6R700-2, KUKA LBR Med
- Contributed to development, testing, and software integration of motion planning for SSR (Spine Surgery Robot) Phase 1
- Improved mathematical modelling, kinematics, calibration metrics, and accuracy testing protocol of 6 DOF serial manipulators

University of Lincoln Lincoln, UK
Research Intern Reference Letter - Prof. Gerhad Neumann *Jan 2019- June 2019*

- Focused on simulation of robots and deep learning-based computer vision algorithm for intelligent robot manipulation

Projects

Lite version of Probability based Edge Detection Ongoing

- Estimating Oriented Derivative of Gaussian (DOG), Leung- Malik, Gabor filter banks
- Computing the Texture, Brightness and Color gradients for the filter bank outputs to obtain a weighted edge detection with Canny and Sobel baselines

- **Surgical Environment Enhancement using Human Robot Interaction, HIRO Lab, WPI GitHub** Dec 2022
  - Implemented gaze tracking using Tobii Eye Tracker 5 to autonomously position the camera within surgical framework
  - Identified surgical region of interest using semantic segmentation
  - Conducted a subjective user study based on manual and gaze based endoscope camera movement control
- **Deep Reinforcement learning based Continuous Control of Mobile Robot Navigation Report** Dec 2022
  - Compared deep reinforcement learning methods based on policy gradients (Deep Deterministic Policy Gradient and Soft Actor Critic) for implementing a learning-based mapless motion planning task of Turtlebot3 robot navigation
- **Deep Reinforcement Learning for Value Function Estimation** Nov 2022
  - Experimented versions of Deep Q Learning (Double DQN, Dueling DQN) for Atari Breakout game from Open Gym AI
- **Monte Carlo and Temporal Difference for Model Free Reinforcement Learning** Oct 2022
  - Tried out various Model-free Policy Evaluation and Control for BlackJack and CliffWalking games from Open Gym AI
- **Dynamic Programming for Model Based Reinforcement Learning** Sept 2022
  - Applied Policy iteration, Value iteration for Frozen Lake game from Open Gym AI

Motion Planning for Open and MIS Spine Surgery Robot April 2022

- Developed and tested a 3D geometry-based collision detection algorithm to perform motion planning for robot assisted spine surgery on two 6 DOF serial manipulators: UR5e and KUKA KR6R700-2

A Precursor to Autonomous Object Manipulation June 2019

- Simulated a 7 DOF Franka Emika Panda arm in GAZEBO/VREP simulation to perform push and grasp actions
- Experimented on prediction of future dynamics of objects present on scene by training a custom neural network architecture using LSTM

Simulation of Self-Balancing Robot Nov 2018

- Simulated a 2 wheeled self-balancing robot in MATLAB for controlling the angle of tilt and position of wheels using PID controller