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

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

Structure from Motion and NeRF — Ongoing
- Reconstructing a Building's 3D structure from different views using epipolar geometry calculations, Non-linear Triangulation, PnP and Bundle Adjustment
- Synthesizing novel views of complex scenes by optimizing an underlying continuous volumetric scene using NeRF

AutoCalib - Camera Calibration — Feb 2023
- Calibrated Camera by estimating camera intrinsic and extrinsic and modelling the distortion caused in images by using a radial-tangential model based on Zhang's Camera Calibration paper

AutoPano - Panorama Stitching — Feb 2023
- Using classical and deep learning methods (supervised and unsupervised Homography Network) to estimate Homography between different images in a scene and stitch them together

CIFAR 10 Data Classification — Jan 2023
- Compared multiple neural network architectures- Deep Convolutional Neural Network with Dropouts, ResNet- 18 layers, ResNet - 34 layers, Dense Net, ResNeXt to do classification based on CIFAR-10 data-set

Lite version of Probability based Edge Detection — Jan 2023
- Estimated Oriented Derivative of Gaussian (DOG), Leung- Malik, Gabor filter banks
- Computed 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 — 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 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