UTHIRALAKSHMI SIVARAMAN

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Education

Worcester Polytechnic Institute (WPI) — Worcester, USA
Master's in Robotics Engineering | GPA: 3.62/4 — Aug 2022 –May 2024

SASTRA Deemed University — Thanjavur, INDIA
Bachelor's in Electrical and Electronics Engineering | GPA: 7.79/10 — Jun 2015 – Jun 2019

Technical Skills

Programming: Python, Modern C++, Linux, Bash/Shell Scripting, Version control with Git, GNU debugger, MATLAB
Deep-learning: PyTorch, TensorFlow, Keras, CUDA, SLURM Cluster Environment, Jupyter Notebook
DL Architectures: CNN, RNN, LSTM, Transformers, ResNet-34, DenseNet, and ResNeXt

Experience

Graduate Researcher - Machine Learning & Robotics — Worcester, USA
Manipulation & Environmental Robotics Lab, WPI — May 2023 – April 2024

- Advanced camera viewpoint automation on the Franka emika panda robot through dataset aggregation and epsilon-optimal **imitation learning** policy evaluation.
- Streamlined **3D object recognition and reconstruction** and performance enhancement in real-world scenarios by testing several Global RGB-D point cloud descriptors from Intel Real-Sense data.
- Boosted system efficiency and reliability by 30% through critical ROS bug fixes, PCL viewer enhancements with C++, inverse kinematics solver integration, and code-base refactoring and debugging with improved logging and class structures.

Project Associate — Chennai, India
Healthcare Technology Innovation Center, IIT Madras Research Park — Nov 2020 - Apr 2022

- Engineered a python-based vector collision system algorithm development and implemented using UR5e, integrating with advanced motion planning and 3D visualization software platform for spine surgery applications.
- Led precision testing for minimally invasive spine surgery with UR5e and calibration and testing of spine-like phantom models, automated the software framework for enhanced user engagement and feedback for proof of concept.
- Championed the development of innovative Java-based communication solutions for successful integration of KUKA LBR Med software, propelling the cross-functional team to secure finalist status in the highly competitive KUKA Innovation Award 2022.

Software Developer — Chennai, India
Rajasri Systems Pvt. Ltd. — Dec 2019 - Apr 2020

- Developed and enhanced a Xamarin Forms-based mobile app designed to teach basic numerals to kindergarteners.
- Led the refactoring of the existing codebase, integrating new features to enhance educational impact and user experience.

Featured Projects

MicroGPT using OpenWebText Dataset
Python, NumPy, SciPy, PyTorch, CUDA, Transformers, Scikit-learn

- Orchestrated an exploratory project utilizing **NVIDIA H100 Turing cluste**r to deploy **MicroGPT**, enhancing natural language processing capabilities.
- Achieved rapid, high-quality text generation using the **OpenWebText** dataset, building the model training process from scratch.

CIFAR 10 Data Classification
Python, PyTorch, CNN, CUDA

- Evaluated various neural network architectures, including Deep Convolutional Neural Networks with **Dropouts**, **ResNet-18**, **ResNet-34**, **DenseNet**, and **ResNeXt**, for classification on the CIFAR-10 dataset

Reinforcement learning based Atari Game
Python, PyTorch, CNN

- Investigated an innovative AI agent utilizing the OpenAI Gym environment to simulate Atari's Breakout game.
- Conducted rigorous training and comprehensive performance analysis on four **Deep Q-learning** algorithms; achieved an exceptional cumulative reward of **42** on 100 episodes test data, surpassing previous models by a significant **20%**.

3D View synthesis and rendering: Neural Radiance Fields and Gaussian Splatting
Python, NumPy, SciPy, PyTorch, CUDA, MLP, COLMAP

- Implemented and enhanced **Neural Radiance Fields (NeRF) and Gaussian Splatting** for 3D view synthesis, utilizing **COLMAP** for accurate camera pose estimation and a **Multi-Layer Perceptron (MLP)** for predicting density and RGB values.
- Successfully reconstructed scenes and generated photorealistic images from new perspectives, achieving an impressive **PSNR of 32.4%**, advancing realistic 3D visualizations.

Auto Calibration of Cameras
Python, NumPy, OpenCV, SciPy, Matplotlib

- Calibrated a camera using Zhang's method, modeling radial-tangential distortion, and applied Levenberg-Marquardt optimization to reduce the re-projection error by **0.02**.

Classical NLP for Sentiment Analysis
NLP, Python, NLTK, and Scikit-learn

- Implemented sentiment analysis using Python and NLTK, focusing on rule-based techniques to classify text sentiments in user reviews.

Certifications

- **Deploying a Model for Inference at Production Scale**: NVIDIA DLI.
- **Fundamentals of Accelerated Computing with CUDA C/C++**: NVIDIA DLI.