Vihaan Akshaay Rajendiran

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https://vihaanakshaay.github.io/#/

EDUCATION

Master of Science in Computer Science
University of California, Santa Barbara • 2022-Present • GPA: 4.0

Bachelor of Technology in Mechanical Engineering & Master of Technology in Robotics
Indian Institute of Technology Madras • 2017-2022 • CGPA: 8.62/10

PROJECTS

Scrambler-Resolver-Explorer Deep Q-Network
University of California Santa Barbara • October 2022 - February 2023
• Developed SRE-DQN, a novel internally adversarial exploration to improve sample efficiency in sparse-reward environments.
• Proposed 'Foresight,' an internal reward mechanism similar to hindsight, helps map forward-to-backward trajectories.

Unsupervised Behaviour Recognition in Mice using Deep Reinforcement Learning [Master's Thesis]
Indian Institute of Technology, Madras & The Jackson Laboratory, Maine • September 2021 - June 2022
• The objective of this project was to develop unsupervised techniques for discovering and tracking stereotyped behaviors exhibited by mice.
• Hierarchical behavior modeling and option discovery algorithms identified repeated behaviors in mice from poses obtained from video data.

Edge-Attention U-Net
University of California Santa Barbara • January 2023 -March 2023
• Proposed an Edge-based Attention mechanism integrated with U-Net for Binary Semantic Segmentation for shoreline detection.
• Proposed method performed better than vanilla U-Net and Attention U-Net on RGB bands of the Satellite-2 Water Edge Dataset.

Interactive Traffic Classification using Semi-Supervised Graphical Approaches
University of California Santa Barbara • January 2023 -March 2023
• By leveraging graphical machine learning models (such as GCN and DGCNN) and exploiting the dependencies between bursts, we achieved near State-of-the-Art performance in interactive network traffic classification with smaller models (0.2% the size of a BERT-based model).
• Using the pseudo-labeling approach has improved our model's accuracy in all variants and problem formulations.

Time Estimation for Teleport Print
Teleport • March 2021 - April 2021
Implemented machine learning methods to forecast real-time customer traffic in print shops based on spatial-temporal factors.

Real-time Sign Language Translation
Yet Another Hackathon • September 2019 - September 2019
Developed an end-to-end program for real-time translation of sign language to spoken words, using hand tracking and hand-pose estimation.

ARTEMIS - Railroad Crack Detection Robot
Indian Institute of Technology, Madras • January 2018 - June 2021
Developed and patented a groundbreaking railroad crack detection robot, which was awarded the International James Dyson prize, with the ability to autonomously traverse railway tracks, report faults, and reduce accidents, currently in talks with Indian Railways for deployment.

RESEARCH EXPERIENCE

Summer Research Intern
H.Milton Stewart School of Industrial and Systems Engineering, Georgia Tech, **May 2021 - August 2021, Georgia**
Implemented the original 'Deep Q-Network' algorithm proposed by Deepmind to test the impact of stability factors such as Q-Targets, Experience Replay and Gradient Truncation introduced in the paper under the guidance of Dr. Siva Theja Maguluri.
Conducted numerous experiments on OpenAI environments modeled after control theory problems in classic RL literature by varying stability and neural network hyperparameters.

Graduate Researcher
School of Electrical & Electronic engineering, Nanyang Technological University **October 2020 - September 2022, Singapore**
Implemented a Kernel version of ensemble deep Random Vector Functional Link Neural networks (eD-RVFL) and worked on methods to improve its performance under the guidance of Dr. Ponnuthurai Nagaratnam Suganthan.
Currently testing the efficacy of this algorithm by comparing it with other neural network frameworks and deep learning approaches.

Robotics Engineering Intern
Ramakrishna Mission **May 2019 - July 2019, Chennai**

Contributed to 'Biley Bot', a life-like, interactive humanoid robot of young Swami Vivekananda to be displayed in Vivekananda House Museum. Studied humanoid designing to create the desired form factor for the robot and used 3D Printing methods to build the exterior of the robot.
Integrated different existing core hardware like Qualcomm RB3 and NVIDIA Jetson chips along with sensors like Intel RealSense.

Student Researcher
Robotics Lab, Indian Institute of Technology **May 2020 - June 2020, Madras**

Under Dr. T Asokan's guidance, built a framework for implementing a pipeline to aid custom mobile indoor navigation robots using localization techniques. Researched bug path planning, and mapping algorithms utilizing geometric properties of monocular camera images.

COURSEWORK

Computer Science
Machine Learning, ML on Graphs, Computer Vision, Reinforcement Learning, Multi-Arm Bandits, Convex Optimization

Controls
Linear Dynamical Systems, Allied Topics in Control Systems(Network Control), Process Optimization, Instrumentation & Control

Robotics
Multi Body Dynamics & Applications, Mechanics and Control of Serial Robots, Field & Service Robotics

LEADERSHIP

Team Lead
Madras Chimps, IIT Madras • April 2020 - July 2020
• Started and lead the institute's official team competing in the Robocup 3D simulation league.
• Worked on the dynamics aspect of the Nao Robot (Standard Platform used) which includes using a ZMP-IP based model for bi-pedal walking and active control strategies for stability.

Contingent Lead
DIC Terrace Farming Robot Challenge, IIT Roorkee. • December 2019 - December 2019
• Lead a team of top 10 roboticists from IIT Madras and built an Autonomous agricultural robot that can climb up and down steps in hills and perform terrace farming activities.

Robotics Club Head
IIT Madras • iBot Club - Centre for Innovation • March 2019 - April 2020
• Led a team of 30 students, responsible for motivating and guiding students interested in Robotics.
• Conducted various robotics-oriented sessions with over 200 participants to improve the robotics culture in the institute.
• Mentored and nurtured projects with an allocated fund of 80,000 dollars from the institute

AWARDS

Best Presentation Award: Graduate Machine Learning Course
University of California Santa Barbara

Best Presenter: Mechatronics, Autonomous and Robotics System Design
Student Academic Conference, IIT Bombay

Winners: 54-Hour Tech Hackathon
Techstars Startup Weekend (Chennai Edition)

Runners-up: Coding Hackathon (Public Sector Domain)
Yet Another Hackathon 2k19 (Among 35 Finalist Teams)

Winner: CliqTrix (Emotional Well-Being Chatbot)
Zoho App Building Contest 2022 (Among 14 Finalist Teams)

SKILLS

Python, C++, MATLAB, Mathematica, TensorFlow, Keras, PyTorch, Scikit-Learn, OpenCV, PCL, Blender, ROS, RViz, Gazebo, Git, Jupyter.