

Harin Kumar Nallaguntla

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EDUCATION

Northeastern University

Boston, MA

Master of Science in Robotics; **GPA: 3.92/4.0**

Sep 2022 - Apr 2024

Coursework - Legged Robotics, Reinforcement Learning and Sequential Decision Making, Robot Mechanics and Control, Robotics Sensing and Navigation, Mobile Robotics

Sardar Vallabhbhai National Institute of Technology

Surat, India

Bachelor of Technology in Mechanical Engineering; **GPA: 8.49/10.0**

Apr 2018 - May 2022

Coursework - Control Systems Engineering, Computer-Aided Design and Manufacturing, Computer Programming, Theory of Machines, Optimization Techniques

TECHNICAL SKILLS

Programming Languages: MATLAB, Python, C, C++.

Operating Systems: Ubuntu, Windows, Kali Linux, MacOS.

Technologies: Git, Simscape, ROS/ROS2, Gym, NumPy, OpenCV, PyTorch, Mujoco, IsaacSim, Pybullet.

Design and Manufacturing: SolidWorks, CATIA, Ultimaker S3/S5 3D printers, ULTRA R9000 Laser Cutter.

EXPERIENCE

SiliconSynapse Lab

Apr 2023 – Present

Research Assistant | Python, MATLAB, Simscape, C/C++, Git, Ubuntu, PyTorch, Gazebo

Boston, MA, USA

- Led the development and maintenance of simulation software for COBRA, an innovative morpho-functional snake robot. Secured \$1M funding from NASA to support lunar surface exploration initiatives.
- Designed a seamless and intuitive API for Webots and MuJoCo simulators, ensuring effective fine-tuning of simulation parameters using Reinforcement Learning (RL) techniques.
- Developed an accelerated Reinforcement Learning model training pipeline, resulting in 4x increase in model training capacity, thereby substantially expediting prototyping and deployment processes.
- Implemented an innovative RL-based optimization algorithm in Webots simulator, reducing simulation-to-reality gap by over 150%, significantly enhancing accuracy and fidelity of COBRA's locomotion simulations.
- Designed novel RL-guided locomotion patterns tailored for seamless object manipulation, leveraging COBRA's unique body design to enhance dexterity and precision.
- Pioneered the implementation of energy-efficient trajectory planning using RL for Harpy, a thruster-assisted bipedal robot built in collaboration with CalTech, enhancing performance while prioritizing sustainability.

Lycan Automotive

May 2021 – Jan 2022

Computer Vision Research Intern | Python, C/C++, Git

Bangalore, India

- Implemented and fine-tuned single-stage and multi-stage monocular 3D Object Detection algorithms using PyTorch, and Numba, achieving a remarkable mean average precision of 87%.
- Utilized OpenCV and TensorFlow to deploy robust Lane Detection systems capable of accurately identifying and distinguishing between all lanes on the road, achieving impressive accuracy rate of 84%.
- Created a sophisticated Collision Avoidance algorithm adept at preventing collisions with both vehicles and pedestrians, achieving success rate of 95%.

PROJECTS

Energy-Optimized Gait Design for A Humanoid Robot | *Simulink*

Feb 2023 – Apr 2023

- Performed comprehensive modeling of kinematics, dynamics, and vector fields for a sophisticated humanoid robot, ensuring thorough understanding of its intricate mechanics and behavior.
- Engineered energy-efficient gait patterns for the humanoid robot through optimization techniques, achieving 70% reduction in power consumption during locomotion.

i-SLAM: Wireless Sensor Fusion and Navigation System for Mobile Platforms | *MATLAB*

Nov 2022 – Dec 2022

- Developed a seamless wireless data streaming pipeline to transmit real-time sensor data, including Lidar, Camera, and IMU data, from an iPhone to a computer system.
- Innovated an iPhone sensor-based approach integrating LiDAR-based SLAM, visual SLAM, and dead reckoning methods, delivering impressive accuracy rates of 92%, 90%, and 80% respectively.

HAL_9000: Implementation Of A GPU-Accelerated Deep Learning Framework | *Jax*

Jul 2020 – Aug 2020

- Implemented Fully Connected, CNN, RNN, LSTM, and DQN models from scratch, encapsulated into a Python library, while harnessing accelerated GPU programming framework to enhance training speeds by 60%.
- Conducted training and evaluation of CNNs and RNNs using HAL_9000 framework on CIFAR10 and IMDB datasets, attaining impressive test accuracies of 94% and 95% respectively.