

Narendhiran Saravanane

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Summary

Results-driven graduate student with a proven ability to tackle complex challenges and drive innovation. Demonstrated success in delivering impactful projects, optimizing algorithms, and leading teams. Passionate graduate student with expertise in AI, neural networks, sensor fusion, perception, UAVs, navigation, and robotic manipulation, driving innovation and real-world solutions in robotics using cutting-edge technologies.

Areas of Interest: AI | Neural Networks | Sensor Fusion | Perception | Unmanned Vehicles | Navigation | Robotic Manipulation

Education

4.0/4.0 **MS in Robotics and Autonomous Systems**, Arizona State University, Arizona 2022-24
3.0/4.0 **BTech in Mechanical Engineering**, Indian Institute of Technology Patna 2018-22

Relevant Coursework: Advance Linear Algebra | Robot Controls | Sequential Decision Making | RL | ML | UAVs | Perception | Design Optimization

Technical Skills

Programming Languages	Python, C++, Catkin, embedded C, Matlab, Shell (Bash), LaTeX
Designing and Modeling Tools	ROS, V-Rep, Solidworks, Ansys, CorelDraw, Microsoft Office, Git
Tools and OS	Windows, Linux, Tensorflow, Pytorch, OpenCV, ZeroMQ, B0RemoteAPI
Certifications	Robotics Software Engineer, Udacity Nanodegree – (Jan-April 2023)

Work Experience

Brainchip, California, USA : Solutions Architect Intern - Reinforcement Learning & Robotics 06/2023 - Present

- Developed & Deployed ML models for real-world problem-solving, showcased expertise in reinforcement learning and **physics engines**.
- Collaborated within cross-functional teams to integrate **RL** algorithms into robotic systems.
- Drove advanced solutions, optimizing robotic platform performance and stability through **ML-driven control systems**.

Indian Institute of Technology Bombay, India : Software Engineer Intern - Computer Vision 05/2020 - 07/2020

- Led an 8-person team to develop a **fiducial-marker-based localization** model for an unstable camera feed.
- Optimized the localization model using **V-rep** for real-time camera feeds, achieving a calibration error of $\leq 0.5\%$.
- Designed a rule-based visual scripting framework for configuring **auto-evaluators** through **B0RemoteAPI** for evaluation.
- Incorporated a **unit testing** framework with automated test cases to validate the auto-evaluator model.

Projects

Home-Delivery Bot Dec 2022 - April 2023

Service bot, Personal Project

- Developed a dynamic environment utilizing **Gazebo** and implemented a mobile robot integration with ROS node to chase a dynamic target.
- Utilized **Adaptive Monte Carlo localization** algorithms in ROS and deployed a optimized **RTAB-Map** to create 2D environment.
- Designed and implemented **C++ ROS** packages to autonomously navigate using **Dijkstra's** algorithm and to perform robotic manipulation.

IEEE Transactions on Automatic Control (Paper Submitted) Jan 2023 - May 2023

Distributed Differentially Control Synthesis for Multi-Agent Systems with Metric Temporal Logic Specifications

- A distributed RHC approach for multi-agent systems with privacy protection by adding noise to their outputs, maintaining MTL specifications.
- Utilized **Kalman filter** equations and MILP to encode MTL specifications as constraints.

Visual Tracking Unmanned Vehicle - Mambo Drone Jan 2023 - April 2023

EGR 598 - Robotics Systems II (Course Project)

- Developed a high-performance, **low-level flight control** algorithm with integrated **Kalman Filter** for autonomous navigation of the Mambo Drone.
- Successfully integrated an advanced image processing module for various capabilities in a real-world Mambo drone.

Object Goal Navigation using Goal-Oriented Semantic Exploration Jan 2023 - April 2023

CSE 598-Perception in Robots (Course Project)

- Integrated **YOLOv7** and performance enhancements led to a 7% success rate boost in object navigation per path length.
- Collaborated on a deep RL model, leveraging **On Policy** and Deterministic Local Policy, Integrated **RRT** to path planning replacing **Fast Marching**.

Deep Convolutional-GAN using Fashion MNIST Nov 2022 - Dec 2022

EGR598-Machine Learning and Artificial Intelligence(Final Project)

- Developed a Deep Convolution Generative Adversarial Network **DC-GANs** architecture and successfully trained within 50 epochs.
- Attained an impressive DCGAN loss rate of 0.014 for the generator model, demonstrating the ability to generate realistic synthetic images.

Singularity Analysis of a Robotic Arm Nov 2022 - Dec 2022

Modeling and Control of Robots

- Observed a behavior of the **6-DoF robotic arm** in the singularity space. A drastic change of 10^{-4} to 10^{-6} over 0.005 seconds.
- An swift behavior in the Jacobian matrix was noticed to set a safe boundary avoiding singularity space.

Autonomous Robot | Virtual & Real-life Simulations (Won Competition Finalists) Oct 2019 - Feb 2020

e-Yantra, International Robotics Competition, Indian Institute of Technology Bombay.

- Built a robot from scratch possessing vision, picking, placing, and autonomous decision-making capabilities.
- Worked with **2D Path Planning**(A* & Dijkstra) algorithms to take the shortest path during natural emergencies.