
Education

Master of Science in Robotics and Autonomous Systems - Artificial Intelligence

August 2022 – May 2024

Arizona State University

3.81/4.00

- Courses: Perception in Robotics, Integrating Robot-Learning with Human-Robot Collaboration, AI, Multi-Robot Systems, Statistical Machine Learning, Modelling and Control of Robots, Linear Algebra, Expressive Robotics.

Bachelor of Engineering in Computer Engineering

August 2016 – November 2020

Savitribai Phule Pune University, India

3.64/4.00

- Courses: Artificial Intelligence & Robotics, Advanced Data Structures, Embedded Systems & Internet of Things.

Experience

Programmer Analyst – Full Stack Developer

February 2021 – April 2022

Cognizant Technology Solutions

- Developed **back-end** features throughout the **software development lifecycle** for a pharmaceutical mobile app using Java and JavaScript, employing Agile/ methodologies to ensure alignment with industry standards.
- Utilized Spring Boot and Node to develop and maintain 12+ scalable microservices, ensuring efficient communication between front-end and back-end systems through RESTful APIs, using **CI/CD** practices cloud services.

Team Lead

July 2017 – June 2019

MITCOE Robotics

- Mentored a team of 7 in development of autonomous quadruped and wheeled robots for Robocon'19 and implemented three distinct autonomous gait patterns and achieved quadruped robot motion in under 6 months.
- Programmed remote-controlled 3- and 4-wheeled holonomic drives using **PID** and Odometry for precise motion and positioning, leveraging **C++** with 32-bit Arduino boards, resulting in a 50% reduction in robot travel time.
- Automated locomotion using machine vision and image processing techniques in Python with **OpenCV**. Interfaced Linux with Arduino to ensure fast real-time video processing, enhancing the overall performance of the system.
- Integrated a variety of **sensors**, including **LiDAR**, cameras and IMU, using communication protocols such as **I2C** and **SPI**, conducting thorough comparisons and analyses to drive improvements in system performance.

Academic Projects

Real-time Monocular Depth Perception

January 2023 – May 2023

- Proposed and executed a geometric approach for **real-time depth estimation** using a monocular camera.
- Achieved distance measurements with $\pm 3\%$ precision for a novel algorithm incorporating an object detection pipeline.
- Compared and evaluated RESNET, YOLO, and MobileNet object detection models using a curated image dataset to assess processing time and efficiency.

Path Planning and Reinforcement Learning

January 2023 – May 2023

- Implemented Q-learning for reinforcement learning using **Gazebo** and **ROS** in two distinct robotic environments, enabling the system to optimize its decision-making processes and maximize cumulative rewards in 500 episodes.
- Optimized various search algorithms, including Greedy Breadth-First Search and **A-star** with a custom heuristic, to execute high-level search-based path planning with customized low-level actions for TurtleBot simulation.

Explainable AI

September 2019 – April 2020

- Illustrated the underlying decisions taken by neural networks to increase **user trust** and comprehension of AI.
- Developed a new model, 'Layer-wise Activation Clustering Insights' and explored impact using a handwriting dataset with 70,000 samples, gaining insight into **image classification**, and functioning of AI models.

Technical Skills

- **Robotics:** Computer Vision, SLAM, Path planning and Navigation, Controls, Image Processing
- **Tools:** Simulink, OpenCV, Arduino, ROS, ROS2, Git, Gazebo, Azure, Docker, Kubernetes, AWS, Bash Scripting
- **Programming languages:** C, C++, Python, Java, JavaScript, TypeScript, MATLAB, SQL, NoSQL
- **Libraries and Frameworks:** TensorFlow, Pandas, NumPy, Keras, PyTorch, Spring, AngularJS, NodeJS, ReactJS