

Rajiv Bharadwaj

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EDUCATION

ETH Zürich, Switzerland

Sep 2024 - Present

Master of Science in Robotics, Systems, and Control

Coursework: Dynamic Programming & Optimal Control, Robot Dynamics, Planning & Decision Making for Autonomous Robots, Vision Algorithms for Mobile Robots

Projects: [Real World Robotics](#): Designing a Robot Hand to perform Grasping with Reinforcement Learning (*In-Progress*)

University of Michigan, Ann Arbor

Sep 2018 - May 2022

Bachelor of Science in Engineering, Computer Engineering; Minor in Music

summa cum laude

Honors: Dean's List for 7 semesters, James B. Angell Scholar 2020, 2021

GPA: 3.9/4.0

Coursework: Algorithmic Robotics, Embedded Control Systems, Operating Systems, Machine Learning, Computer Vision

Projects: [Fast-Converging Depth Estimation using Transfer Learning](#), [Comparing Kalman and Particle Filters for Localization](#)

Clubs and Societies: Men's Glee Club, Michigan Student AI Lab, UM Autonomous Robotic Vehicle, Michigan Sahana

WORK EXPERIENCE

Amazon.com

Seattle, WA

Software Development Engineer - Social Marketing

Oct 2022 - Oct 2024

- Designed and implemented an automated system to improve the quality of Amazon products advertised on Social Media using Spark, Alster Deequ, AWS Lambda.
- Designed and Led a system wide migration of legacy Apache Spark jobs to a fully managed, CI/CD platform to process \approx 50 Million records every day and improved the efficiency of long running jobs by over 90%.
- Mentored a summer intern, leading to substantial improvements in backend system reliability. Oversaw project ideation, strategic planning, and performance evaluation to ensure an impactful outcome.
- Subject Matter Expert for design and coding practices for Apache Spark based ETL jobs within the team.
- Leading Operational Excellence efforts within the team, including task grooming, incoming ticket management, and sharing best practices.

Software Development Engineer Intern

May 2021 - Aug 2021

- Migrated several legacy big data ETL jobs to a new framework based on Apache Spark for long term operational excellence.
- Yielded faster job runtimes and reduced costs by optimizing and parallelizing queries based in Apache Spark.

Analog Garage - Analog Devices Inc.

Boston, MA

Systems & Applications Engineering Intern

May 2020 - Sep 2020

- Utilized chest-mounted Inertial Measurement Unit (IMU) to capture and analyze lung sounds, applying signal filtering for real-time auditory representation; contributing to advancements in non-invasive health monitoring technology.
- Assessed compatibility issues of various sensor drivers associated with autonomous vehicle technologies with the latest robot operating system (ROS) release – ROS Noetic.
- Architected an Azure NoSQL database to store ML datasets and built a Python API for teams to query and train their models.

University of Michigan Information and Technology Services

Ann Arbor, MI

Application Development Intern

May 2019 - May 2021

- Implemented and deployed various web APIs and plugins using the Django framework for Python to create robust and maintainable tools for the ITS Networking service.

RESEARCH

Wire Harnessing using Reachability based Trajectory Design

Ann Arbor, MI

University of Michigan ROAHM Lab, Advisor: Dr. Ram Vasudevan

Jan 2022 - July 2022

- Implemented an RRT planner for Kinova Gen3 within Robosuite for high level planning.
- Implemented a Recursive Newton-Euler Algorithm low level controller to used to evaluate the performance of a novel robust controller approach.
- Performed System Identification tasks to bridge the Sim2Real gap when performing tasks on the robot.

High-Level Lane Changing Algorithms for Autonomous Trucks

Ann Arbor, MI

Isuzu Technical Center of America - Multidisciplinary Design Team, Advisor: Prof. Grant Kruger

Jan 2021 - Dec 2021

- Implemented a birds-eye view occupancy grid in CARLA to detect neighboring vehicles and reachable lanes.
- Utilized Deep Reinforcement Learning in PyTorch along with OpenAI Gym and CARLA for simulation.
- Formulated a concrete project plan with specific goals, technical requirements, risks, and contingencies to tackle over the course of the project and presented it along with the team to our sponsors, Prof. Kruger, and the MDP staff.

Applications of Passive Dynamic Walking Mechanisms

Ann Arbor, MI

Michigan Undergraduate Research Program, Advisor: Prof. Lauro Ojeda

Sep 2018 - May 2019

- Designed and prototyped a printed circuit board that incorporated various sensors communicating over the I2C protocol including an inertial measurement unit to improve sensing capabilities.
- Worked on enhancing the pre-existing state machine software to reduce latency and lower memory consumption.

PROJECTS

University of Michigan Autonomous Robotic Vehicle

Ann Arbor, MI

Computer Vision Team Engineer

Sep 2021 - Jul 2022

- Implemented white-line detection algorithms using a stereo camera as a part of the perception stack of the vehicle.
- Simplified the perception stack into a deployable unit of ROS nodes for easy setup.

Michigan Electric Racing

Ann Arbor, MI

Controls Team Engineer

Sep 2019 - Dec 2020

- Programmed a Custom STM32 PCB to read CAN messages from various sensors and systems and show data to the driver's dashboard
- Interfaced various sensors on a testbench using the CAN protocol to evaluate and program the systems before integrating them on the car.

SKILLS

Programming: C++; Python: PyTorch, MuJoCo, OpenRAVE, OpenCV, Django; Java, Scala, Apache Spark; Lua, Embedded C, Verilog

Tools: Robot Operating System (ROS), AWS, AWS CDK, Linux, Git, FPGAs, STM32, Arduino, Raspberry Pi, Autodesk Eagle, Bash