Rajiv Bharadwaj

Zurich, Switzerland | +41 77 954 08 13 | rbharadwaj@ethz.ch | rajivbharadwaj | rbharadwaj9

Education

ETH Zurich, Master of Science in Robotics, Systems, and Control — Sep 2024 – Present

- Interests: Reinforcement Learning for Controls, Optimization Methods, Vision Algorithms, Simulation, Aerial Robots
- Courses: Model Predictive Control, Computational Models of Motion, Convex Optimization, Robot Dynamics, Motion Planning, Vision Algorithms, Probabilistic AI

University of Michigan, Ann Arbor, BSc. in Engineering - Computer Engineering; Music Minor — Sep 2018 - May 2022
summa cum laude — GPA: 3.9/4.0

- Honors: Dean's List for 7 semesters, James B. Angell Scholar 2020, 2021
- Clubs and Societies: Men's Glee Club, Michigan Student AI Lab, UM Autonomous Robotic Vehicle, Michigan Sahana

Work Experience

Amazon.com — Seattle, WA, USA
Software Development Engineer - II — Oct '22 - Sep '24

- Designed an implemented various fully managed systems to improve the quality of Amazon products advertised on social media using Spark, Alster Deequ, AWS Lambda; processing 50+ million records every day and improving long running job efficiencies 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.
- Lead operational excellence and learning efforts within the team to improve best practices and manage technical debt.
- Subject Matter Expert for design and coding practices for Apache Spark based ETL jobs within the team.

Software Development Engineer Intern — May '21 – Aug '21

- Migrated several legacy big data ETL jobs to a new framework based on Apache Spark for long term operational excellence.

Analog Garage - Analog Devices Inc. — Boston, MA, USA
Systems & Applications Engineering Intern — May '20 - Sep '20

- Designed and Implemented a NoSQL based ML data storage and a add/retrieve API in Python

University of Michigan IT Services — Ann Arbor, MI, USA
Application Development Intern — May '19 - May '21

- Delivered various web and backend tools to support the university wide networking infrastructure using Python, Django, and PostgresQL

Research

Multi-task Reinforcement Learning for Multi-Contact Plans — May '25 - Sep '25
Semester Thesis, Robotic Systems Lab - Prof. Dr Marco Hutter

- Designed and trained various multi-task learning policies in Isaac Lab simulation environments, applying PPO and student teacher distillation methods.
- Defined various research directions and evaluation metrics based on literature review on multi-task reinforcement learning.
- Implemented new features on Isaac Lab for training multi-task policies to potentially release publicly.
- Authored and presented a thesis to the faculty, showing multi-task distillation as a promising research direction for multi-contact plans.

Wire Harnessing using Reachability based Trajectory Design — Jan '22 - Jul 22
Undergraduate Research Assistant, ROAHM Lab - Prof. Dr. Ram Vasudevan

- 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 sim-to-real gap when performing tasks on the robot.

Projects

Project CRATER - Mars Rover Project, ETH Zurich — Oct '25 - Present
Systems Architect — [website]

- Leading overall system architecture and cross-team integrations, collaborating with subteam leads.
- Driving requirements gathering, interface definition, and design review processes.

Camera based RL Drone Control — Sep '25
For Vision Based Drone Flight, ETH Zurich

- Trained a reinforcement learning control policy for a drone to follow another drone using vision using PPO
- Performed reward design based on tracking, bounding box estimation, smoothness, and safety constraints to achieve

reliable tracking with camera input
– Technology: ROS C++ and Python based software stack for training, simulation, and deployment

Imitation Learning using a Tendon Actuated Hand — Fall '24
For Real World Robotics, ETH Zurich

– Spearheaded the high-level architecture of a ROS 2 software stack for a tendon-actuated hand, including hardware communication, joint kinematics, teleoperation, and data collection. Awarded "Most Intuitive Software Design" for usability.
– Modeled the custom rolling-contact joint based hand in MuJoCo to enable software verification before hardware deployment
– Developed a UI with fail-safes, debugging tools, and visualizations to speed up data collection rate by 15 times and reduce hardware accidents.
– Trained an Action Chunking Transformer to grasp and sort objects by color, achieving accurate grasps but facing challenges in color-based sorting due to model limitations.

Vision Odometry Pipeline — Fall '24
For Vision Algorithms for Mobile Robotics, ETH Zurich — [code]

– Implemented a monocular visual odometry pipeline which uses 2D $\leftrightarrow$ 3D correspondences between frames to estimate the pose of the camera.
– Responsible for populating the main pipeline with new and high quality 2D keypoint and 3D landmark correspondences to ensure indefinite operation.
– Achieved locally accurate pose estimation, with scale ambiguity due to the limitations presented by purely camera based odometry methods.

Robotics Summer School — Summer '25
RobotX Initiative, ETH Zurich — [website]

– Attended the Robotics Summer School, with 50 students from around the world. Deploying autonomous software on wheeled robots for search and rescue missions. Hands-on tutorials on key robot planning modules including state estimation, SLAM, exploratory path planning, motion planning, and object detection.

Skills

Programming:	C++; Python, Java, Scala (Apache Spark); Typescript, Javascript, Lua, Embedded C, Verilog
Robotics Tools:	Robot Operating System (ROS 1/2), NVIDIA Isaac Lab, MuJoCo, OpenCV, PyTorch, Linux
Other Technical:	AWS, Git, Slurm, FPGAs, STM32, Arduino, Raspberry Pi, Autodesk Eagle
Languages:	English (native), German (conversational - B1), Hindi (native), Tamil (native), Gujarati (conversational)