Ananya Agarwal

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EDUCATION

Northwestern University | Evanston, IL, USA — Sept 2023 – Dec 2024
M.S. Robotics

Indian Institute of Information Technology, Allahabad | Prayagraj, India — Aug 2019 – May 2023
B.Tech. Electronics and Communication Engineering

SKILLS

Robotics – Robot Operating System (ROS/ROS 2), MoveIt, Filters (Kalman, Particle), Gazebo, Mujoco
Machine Learning – Computer Vision, Deep Learning, PyTorch, CUDA Toolkit, Convolutional Neural Networks
Software Development – Python, C, C++, Linux, Git, Unit Testing, CI/CD, Docker, Firebase, CSS, HTML
Electronics – Verilog, LTspice, PCB design, IoT, Arduino, Raspberry Pi

Work EXPERIENCE

Boston Dynamics AI Institute | Boston, US — June 2024 – Sept 2024
Robotics Software Intern

- Developed a Python library and CLI for converting ROS bags to Parquet with advanced data features.
- Created Docker tools, CI/CD pipelines, and Spot demos for the outreach center.

Center of Intelligent Robotics | IIITA, India — May 2022 – May 2023
Research Intern

- Researched machine learning perception algorithms for grasping using Pytorch and Cudatoolkit.
- Instructed robotics workshops for 100 students and aided in organizing two national-level robotics workshops.

Neuroinformatics Group | Bielefeld University, Germany — Jan 2023 – May 2023
Research Intern

- Conducted a literature review on reinforcement learning solutions for simulated autonomous vehicles.

PROJECTS

High-Speed Optimal Drone Trajectories (ongoing) — Mar 2024 – Present

- Optimizing low-level control for drone/ quadrotor with minimum snap trajectories for fast, precise flight.

Deep Learning for Dexterous Grasping — Jan 2024 – Mar 2024

- Joining Franka Emika Panda Robot to 4-finger Allegro Hand at the wrist using Pytorch and Mujoco.
- Used Reinforcement Learning to learn the best grasp of an object and implemented sim2real.

Simultaneous Localization and Mapping (SLAM) from Scratch — Jan 2024 – Mar 2024

- Programming a feature-based Extended Kalman Filter (EKF) SLAM pipeline.
- Using C++ and ROS 2 for both simulation and real turtlebot3 robot.

7-DOF Franka Robot Arm for Autonomous Hangman Assistant — Sept 2023 – Dec 2023

- Collaborated in a team on GitHub to create python ROS2 package for robot arm to play Hangman autonomously.
- Made Python ROS2 wrapper to plan and execute trajectories using MoveIt2 with inverse kinematics.
- Conducted eye-in-hand camera calibration using RGB-D camera and April tags for localization and designed tf.
- Created API to localize the letter position on the board to the robot and did unit testing for all the functions.

Reactive Path Planning — Sept 2023 – Dec 2023

- Developed reactive path planning with Online A* and grid discretization for obstacle avoidance.
- Designed a P-controller for precise robot navigation using Inverse Kinematics.

RESEARCH

Voice Assisted Pick and Place using a Mobile Manipulator — Oct 2022 – Jan 2023

- Used CUDA, PyTorch, and ROS to enable a Kinova arm on a Jackal mobile robot for pick-and-place tasks.
- Used YOLOv5 on monocular images for object classification, and integrated Google API for voice recognition.

Selective Table Top Grasping with Convolutional Neural Networks — Jan 2021 – May 2021

- Achieved 96.25% accuracy in selective grasping with a CNN on the Baxter robot in cluttered environments.
- Integrated YOLOv5 with GR-ConvNet to get selective grasp prediction. Published in a peer-review conference.