

ATHARVA MAKARAND PRADHAN

📍 Philadelphia, PA | 📞 +12672664865 | ✉ atharvap@seas.upenn.edu | **in** LinkedIn | **o** Github | **o** Portfolio

EDUCATION

University of Pennsylvania, Philadelphia, USA

Master of Science - Mechanical Engineering and Applied Mechanics with a specialization in Robotics

May 2024

GPA : 3.70 / 4.00

Relevant Coursework: Modern Robot Control, Advanced Robotics, Feedback Control, Machine Learning, Brain-Computer Interface (BCI), Design of Mechatronic Systems, Machine Perception,

K.J. Somaiya College of Engineering, Mumbai University, India

Bachelor of Technology - Mechanical Engineering

May 2022

GPA : 9.33 / 10.00

SKILLS

Programming Languages & Libraries: Python (Pytorch, Numpy, Scipy, OpenCV), MATLAB, C, C++, L^AT_EX, Drake
Software Tools: Robot Operating System (ROS), Solidworks, AutoCAD, Simulink, RViz, Linux
Hardware Tools: Arduino, RaspberryPi, ESP32
Rapid Prototyping: Laser Cutting, 3D Printing, 3D Scanning

EXPERIENCE

Robotics Research Assistant at Figueroa Robotics Lab (GRASP Lab)

University of Pennsylvania

May 2023 - Present

Philadelphia, PA, USA

- Design and implement a real-time motion control system utilizing the MANUS Meta Optitrack glove and Optitrack motion capture for pose tracking to enable tele-operation of QB-softhand 2 on a 7-DOF KUKA robot arm.
- Developed and deployed of a machine learning model leveraging a custom dataset to learn hand joint poses, reducing the dimension of the dataset (hand poses) from 48 to 2 using principle component analysis (PCA).
- Map the pose data after PCA to control input for control of the QB-softhand 2 and end-effector of the KUKA Arm.

Graduate Teaching Assistant for Introduction to Robotics

University of Pennsylvania

January 2023 - Present

Philadelphia, PA, USA

- Guide a cohort of 70+ students on topics including serial-arm robot kinematics, velocity kinematics and path planning.
- Provide operational assistance in robot lab sessions by facilitating hands-on experience with the 7-DOF Franka Panda Arm.

Graduate Teaching Assistant for Computer Vision and Computational Photography

University of Pennsylvania

August 2023 - December 2023

Philadelphia, PA, USA

- Conducted office hours, recitation sessions, and aided assignment grading for a group of 40 students, covering diverse course topics including edge detection, homographies, image morphing.

3D Scanning Engineer

University of Pennsylvania

September 2022 – August 2023

Philadelphia, PA, USA

- Incorporated Artec 3D Scanners for capturing and Artec Studio for post-processing and delivering more than 60 high-quality 3D models.
- Planned, managed, and facilitated educational [workshops](#) on 3D scanning technology.

TECHNICAL PROJECTS

Autonomous VIO-based Quadcopter

January 2023 - May 2023

- Employed a geometric nonlinear controller for stable control of CrazyFlie 2.0 quad rotor. Integrated A* motion planning algorithm and minimum-snap trajectory generation for obstacle avoidance, Visual Inertial Odometry (VIO) for state estimation, and Error State Kalman Filter (ESKF).
- Resulted in reducing the average flight time by 25% across 6 maps thus improving the system performance.

Grand Theft Autonomous Competition - Runner Up (Team of 4)

August 2022 - December 2022

- Developed and prototyped a ESP32-S2-based autonomous robot with pushing capabilities.
- Employed HTC Vive for localization, IR frequency detection for target tracking and ultrasonic sensors along with time-of-flight for wall following.

Robot Arm Pick and Place Challenge (Team of 4)

August 2022 - December 2022

- Implemented path planning techniques to the 7 DOF Franka Panda Arm by employing forward and inverse kinematics where ROS was used as framework and Gazebo as visualization tool.
- Applied the gradient descent algorithm on angle axis representation to estimate joint angles for obtaining required final pose to solve the inverse kinematics problem.
- Achieved efficient stacking of 4 static blocks in under 2 minutes while utilizing the ROS framework and Gazebo for simulation.

Design of Rover (Capstone Project, Team of 4)

January 2022 - May 2022

- Designed and manufactured a 6-wheeled robot with the capabilities of semi-autonomous navigation using IMU, collision prevention using stereo vision, remote sensing (GPS location, temperature and humidity), and data transmission through Radio Frequency (RF).
- Performed seamless system integration of mechanical, electrical, and software components for a unified mechatronic system. One of the three teams from the department to receive INR 10000 scholarship.

SAE Aero Design East

April 2019 - May 2022

- Led structural design of H-tail configuration for RC aircraft, conducted FEA analysis and achieved a 10% weight reduction in tail assembly. Performed optimization in MATLAB to maximize scoring for the Advanced class of the competition (May 2022).
- Executed CAD modeling, 2D drafting, and laser-cutting for aircraft wing and tail fabrication at the Regular Class event in Florida, USA (March 2020). Achieved 13th worldwide and 2nd in Asia among 30 teams.