




KEVIN PAULOSE

 kevinpaulose05.github.io  linkedin.com/in/kevinpaulose  github.com/Kevinpaulose05

Education

University of Pennsylvania

exp. May 2025*Master of Science in Engineering, Mechanical Engineering (Robotics), GPA: 3.9/4.0**Philadelphia, PA**Coursework: Control and Optimization with Applications in Robotics, Linear Systems Theory, Learning in Robotics, F1/10 Autonomous Racing Cars, Machine Perception, Design of Mechatronics Systems*

Indian Institute of Technology, Bhubaneswar

May 2023*Bachelor of Technology, Mechanical Engineering (Robotics), GPA: 3.62/4.0**Bhubaneswar, India*

Technical Experience

The Autware Foundation, TIER IV

May - September 2024*Autonomous Systems Engineer**Philadelphia, PA*

- Led the US deployment of the EVE Autonomy platform, developed with Yamaha and Tier IV, focusing on ROS2-based SLAM and localization, integrating Livox LIDARs, Velodyne VLP-16, and RTK for advanced motion planning.
- Engineered a detailed HD map of the Pennovation site with lanelets using Tier IV tools, implemented and stress-tested multiple behavior planners for robust performance, and advanced navigation accuracy with Visual Inertial Odometry integration.

Modular Robotics Lab, University of Pennsylvania

Dec 2023 - Feb 2024*Researcher under Prof. Mark Yim**Philadelphia, PA*

- Designed an innovative 20-degree-of-freedom hyper-redundant robot arm inspired by a biological snake/elephant trunk, with efficient chained actuation via motor multiplexing and associated control methods for high versatility with precision manipulation.

MITACS Globalink Research

May - Aug 2022*Research Intern at Laboratoire de Robotique et Systèmes Autonomes, Université du Québec en Outaouais**Quebec, Canada*

- Demonstrated precise indoor obstacle avoidance algorithm for an autonomous 6-DOF quadcopter drone in an unknown environment using Nagumo's invariance theorem and Bouligand tangent cones
- Orchestrated seamless integration of this deadlock-free algorithmic approach on a quadcopter drone by employing 3D LiDAR & depth camera, with PixHawk and GPS

Competitions

Bots & Bento Competition, ICRA 2024, Japan | ROS2, Gazebo, AprilTags, KLTs

May 2024

- Led a 3-day robotics hackathon as the sole U.S. team, building an autonomous robot using ROS2, Gazebo, and Olive Robotics' hardware. Developed a custom localization stack, integrating odometry and AprilTags for precise navigation. Achieved 85% accuracy in autonomously locating and stacking bento boxes.

Projects

F1Tenth Autonomous Racing Cars | C++, Python, ROS2 Foxy, LiDAR, Jetson NX, Autonomous Vehicles January 2024- present

- Led the development and coding of high-performance control and motion planning modules. Additionally, Designed a novel bumper for the car 3D printed using Thermoplastic polyurethane.
- Achieved podiums in reactive racing, follow the gap racing and map-based racing, employing pure pursuit strategy

Grand Theft Autonomous- Mobile Robot Competition | ESP32, Arduino, Sensors, Registers, Opamps

Sep - Dec 2023

- Manufactured a 4-wheel autonomous mobile robot using ESP32 S2 as an access point, TB6612FNG motor drivers and ATmega32u4, IR phototransistor-opamp frequency detection circuit
- Enhanced the robot's capabilities by integrating HTC Vive for precise localization, implementing beacon (IR LED emitter) tracking through frequency detection circuit and enabling remote control via UDP, ESP-NOW, I2C, CAN, SPI protocols

Pick and Place with 7-DOF Franka Emika Panda arm | ROS, Gazebo, Inverse Kinematics

Sep - Dec 2023

- Architected an end-to-end pipeline for a 7 DOF robot arm within the ROS and Gazebo frameworks. Engineered advanced motion planning incorporating geometric inverse kinematics and bi-directional Rapidly Exploring Random Trees (RRT) for precise and swift control, enabling efficient picking and placing of both static and dynamic blocks.

Adaptive Control in UAVs & High Performance Aircrafts | MATLAB, Simulink, Control Systems

Jul 2022 - May 2023

- Designed a guidance algorithm with state estimation for reactive collision avoidance for a 6-DOF non-linear model of a Flying Wing UAV using L1 adaptive control with 92% accuracy (PX4 benchmark) in MATLAB simulations
- Streamlined an LQR-based safe landing approach with the guidance algorithm inside a Simulink 3D Animation arena with Gazebo (ROS Melodic) and Robotics Systems Toolbox

Obstacle Avoidance Algorithms for Unmanned Aerial Vehicles | PX4, ROS Melodic, LiDAR

May - Aug 2022

- Engineered a Holybro drone X500 V2 mounted with RPLiDAR A1m8 & Occipital Structure Core camera, CUAV V5+ Autopilot running PX4 and Neo V3 Pro GPS for real-time flight tests
- Optimized a robust obstacle avoidance algorithm for the 6-DOF quadcopter drone achieving 86% success rate, primarily by tuning the formulated Bouligand tangent cones (Safety Velocity Cones)

Technical Skills

Languages: Python, C, C++, MATLAB**Softwares:** ROS/ROS2, RViz, Gazebo, Simulink, PX4, Sckit-learn, PyTorch, SolidWorks, ANSYS, QGroundControl**Technologies/Frameworks:** Linux, Windows, Arduino, ATmega32u4, ESP32, Jetson Xavier NX, LiDAR, Intel Realsense D435i, UAV & Robotics System toolbox, UDP, ESP-NOW, I2C, CAN, SPI, Google Colab, Jupyter Notebook, Microsoft Office