ADITYA PATIL

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ROBOTICS ENGINEER

Robotics System Designer specialized in designing control software for **Autonomous Mobile Robots** and **Manipulators** utilizing ROS framework. My expertise lies in Sensor-Integration and Perception for Autonomous Robot and motion control for Manipulators.

EDUCATION

Pune Institute of Computer Technology, Pune **Aug 2020 – July 2024**
Bachelor of Engineering in Electronics and Telecommunication *GPA: 9.04/10*

TECHNICAL SKILLS

Languages : Python, MATLAB
Technologies / Framework : ROS, Sensor integration, Swarm Intelligence, Gazebo, Rviz
Computing Environments : Linux, Raspberry Pi
Design & Manufacturing Tools : KiCAD, Fusion 360

EXPERIENCE

PICT Robotics **Apr 2021 – Aug 2023**
Lead Robotics System Designer *Pune, Maharashtra, India*
- Led a team of 4 to design and develop modular code-base to semi-automate ABU Robocon 2023 Robots using **ROS**.
- Introduction of **custom ROS message** to tackle unacknowledged methodology in transmitting motor parameters in ROS.
- Insertion of sync packets in serial communication between ESP32 and Raspberry Pi for synchronization.
- Utilized **sensor integration** to enable precise robot **localization**, integrating data from an Inertial Measurement Unit and Optical Mouse Sensor for accurate odometry.
- Resolved ESP32 pin count limitations by crafting a **Motor Controller HAT** using Atmega328p micro-controller, communicating via I2C protocol for each Swerve pod.
- Implemented rotary encoder-based PID control on **STM32** micro-controller to evaluate both three-wheel holonomic and four-wheel mecanum drives.

Kanan Park **Apr 2022 – Jun 2022**
Electronics Engineer (Intern) *Pune, Maharashtra, India*
- Designed control software, utilizing **Teensy** micro-controller as the master to interface with the RC transmitter, and employing Arduino Nano as a slave to manage PID systems for individual swerve pods.
- Established communication protocols between Arduino Nano and Teensy using MAX485 (TTL to RS485), implementing an acknowledge symbol for synchronized transmission.

PROJECTS

Mapping and Navigation with TurtleBot3 | *ROS, Mapping, Localization, Navigation, Python* | *GitHub* **Apr – Jul 2023**
- Executed robotics concepts encompassing Mapping, Localization, Path-Planning, and Navigation, further enriching familiarity with the ROS environment.
- Developed a Particle filter from the ground up, employing a random uniform pose distribution for particles. Transformed the robot's LaserScan data based on particle origins, retaining or discarding data within a predefined threshold.
- Conducted a performance analysis and research, comparing **Lidar performance** with 360 samples against 6 samples.

SPARK - A 4DOF Ros based Robotic Arm | *ROS, Inverse and Forward Kinematics, Python* | *GitHub* **Feb – Mar 2023**
- Designed a 4 DOF robotic arm in the **ROS** environment, concurrently advancing robotic mathematical concepts such as Forward Kinematics (FK), Inverse Kinematics (IK), and Trajectory planning algorithms.
- Enhanced expertise in crafting **Gazebo**-based simulation environments for testing and applying robotics mathematical principles.

CERTIFICATIONS

Modern Robotics: Foundations of Robot Motion | *Link* **Aug 2023**
Modern Robotics: Robot Kinematics | *Link* **Sept 2023**
Trees and Graphs | *Link* **Oct 2023**
Python Classes and Inheritance | *Link* **Sept 2023**

OPEN SOURCE

Cytron Motor Driver | *Link* **May 2023**
- A custom library to interface with Cytron Motor Drives which utilizes PWM-DIR and PWM-PWM technique to drive DC motors.
- Optimized codebase for Espressif boards, notably ESP32, addressing **multiplexed PWM channels**.
- Introduced an additional parameter to fulfill ESP32's channel demands, while ensuring seamless **backward compatibility** by setting the parameter to its default state.