Sagnik Ghatak

Robotics & AI Researcher

Aspiring AI and Robotics Engineer with a strong foundation in autonomous systems and advanced AI methods. Passionate about applying cutting-edge technologies to solve real-world challenges.

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EDUCATION

Master's Degree - AI Engineering of Autonomous Systems

Technische Hochschule Ingolstadt

10/2023 - Present *Ingolstadt, Bavaria, Deutschland*

Bachelor's Degree - Electrical Engineering

St. Thomas' College of Engineering & Technology

08/2017 - 06/2021 *Kolkata, West Bengal, India.*

Thesis

- Speed Control of DC Motor using Fuzzy Logic

EXPERIENCE

Student Research Assistant

AI Motion, Technische Hochschule Ingolstadt

03/2025 - Present *Ingolstadt, Bavaria*

Tasks

- Analyze and evaluate various Deep-Reinforcement Learning (DRL) methods for mobile robot control, focusing on convergence rate, stability, and real-time performance.
- Implement an RL-based control policy in Gazebo using ROS2 and the Stable Baselines package, enabling autonomous navigation and behavior optimization in dynamic environments.

Team Member - Driverless

Schanzer Racing Electric e.V

10/2023 - 08/2024 *Ingolstadt, Bavaria*

Achievements/Tasks

- Designed and implemented Camera Perception Stack using Yolov8 and RansacPnP.
- Designed a dual Extended Kalman Filter (EKF) system for robust sensor fusion, integrating steering angle sensors, wheel odometry, and GPS data to enhance vehicle state estimation.
- Designed a path planning algorithm for autonomous driving in dynamic environments to generate optimized paths for acceleration and maneuvering, ensuring precise and adaptive navigation.
- Simulated and validated the autonomous system components within a ROS2 workspace, ensuring seamless inter-node communication and real-time performance in a production-like environment.

Programmer Analyst

Cognizant

01/2021 - 09/2023 *Kolkata, India*

Achievements/Tasks

- Engineered ETL processes with Informatica PowerCenter, cutting data processing time by 30%.
- Automated tasks with UNIX and Python scripts, reducing manual intervention by 60%

SKILLS

Python | C++ | ROS2 | Gazebo | Reinforcement Learning | Deep Learning | PyTorch | Gym | Docker | Github | Sensor Fusion | Perception | Localization | Path Planning

PERSONAL PROJECTS

EKF Sensor Fusion for Localization

- Simulated px4vision drone in Gazebo using PX4 Autopilot and ROS2 using MicroXRCEAgent as communication protocol.
- Implemented multi-modal sensor fusion approach integrating IMU and GPS data using EKF, enhancing the robustness and reliability of localization system.

Echo-bot

- Developed an autonomous bot with SLAM capabilities using ROS2 and simulate it in Gazebo.
- Integrated sensor plugins like Depth Camera, LiDAR and control plugins like ros2control.
- Implemented Nav2 module to integrate autonomous capacities.

Reinforcement Learning: Tower of Hanoi

- Designed and implemented a custom environment for the Tower of Hanoi using the Gymnasium framework.
- Developed a Q-learning agent to solve the Tower of Hanoi problem.

Local Path Plannar of Autonomous Vehicle

- Developed a local path planner for executing robust evasive maneuvers around obstacles, utilizing a bicycle model and PID controller.
- Achieved improved navigation accuracy and enhanced obstacle avoidance in dynamic environments.

CERTIFICATES

Deeplearning.AI - Advanced Learning Algorithms

LANGUAGES

English

Full Professional Proficiency

German

Elementary Proficiency