# Sagnik Ghatak

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## Portfolio

- **Github:** click here.
- **LinkedIn:** click here.

## Projects

**UAV-bot**

*On-going*

- Developing a UAV simulation system to navigate through custom objects and autonomously land on a designated pad using PX4 and Gazebo in SITL
- Integrating YOLOv8 for object detection and combining its outputs with camera and GPS data using an Extended Kalman Filter for precise localization.
- Implementing a search-based path planning algorithm optimized with reinforcement learning to enhance navigation efficiency.
- Leveraging ROS2 for seamless communication between perception, localization, and control modules in a modular framework.

**Echo-bot**

Github

- Developed an autonomous bot with SLAM capabilities using ROS2 and simulate it in Gazebo

**Local-Path-Planner-for-Evasive-Maneuvors-of-Automated-Vehicle**

Github

- 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.

**Reinforcement Learning: Tower of Hanoi**

Github

- 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.
- Trained the agent with various parameters and visualized the learning process and results.
- Utilized reinforcement learning techniques to optimize the agent's performance in solving the puzzle efficiently.
- Built a reinforcement learning agent to adapt in the tower of hanoi environment using Deep Q-Network(DQN)

## Relevant Experience

**Schanzer Racing Electric e.V. - THI Racing Team (Voluntary)** — **Ingolstadt, Deutschland**

*Team Member - Driverless* — *Oct 2023 – August 2024*

- Designed and implemented Camera Perception Stack using ROS2 Environment
- 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.

## Education

**M.Eng - AI Engineering of Autonomus Systems** — **Ingolstadt, Deutschland**

*Technische Hochschule Ingolstadt,* 2.3 GPA — *October 2023 – Present*

**B.Tech - Electrical Engineering** — **Kolkata, India**

*St. Thomas' College of Engineering and Technology,* 1.8 GPA — *August 2017 – June 2021*

## Certificates

Azure Data Fundamentals (Microsoft)
Supervised Machine Learning: Regression and Classification (DeepLearning.AI)
Advanced Learning Algorithms (DeepLearning.AI)