Mainak Mondal

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Portfolio -https://crashxz.github.io/me/

Work Experience

University of Connecticut (Cyber-Physical Systems Laboratory), Connecticut, USA.

Research Assistant 2022 – Present

- Designed and deployed MIND-CAVs, a browser-based CARLA orchestration system with LLM-assisted intent generation, FastAPI backend, React dashboard, and WebRTC streaming; supports real-time telemetry, scenario control, and dataset capture for closed-loop autonomy experiments.
- Developed autonomous driving features on F1Tenth and QCar robotic platforms using ROS on Nvidia Jetson TX2 SBC, implementing Lane Keeping, Obstacle Avoidance, SLAM, and Autonomous Waypoint Following; integrated and deployed open-source 5G stacks (OpenAirInterface and SRSRAN) to enable real-time V2V and V2I communication.
- Developed a Reinforcement Learning-based Charge-Scheduling Agent for Mobile Chargers in Wireless Powered Communication Networks, achieving a approximate 20% higher average sensor survival rate while reducing travel distance by 5%.
- Implemented autonomous driving features on a TurtleBot 3 platform using ROS, implemented Obstacle Avoidance, SLAM, and an Autonomous Waypoint Follower. Additionally, created an end-to-end control agent deployment pipeline using ROS.

NR Tomsk State University (High Performance Reconfigurable Systems Laboratory), Tomsk, Russia.

R&D Engineer 2018 – 2022

- Designed protocols and developed software for intercontinental Unmanned Aerial Vehicle (UAV) control and management, using ROS, Mavlink, Lightbridge and ZeroTier implementing a zero-trust network architecture to enable secure and reliable long-range remote operation.
- Designed an autonomous infrared-guided multirotor UAV landing system for safe landings in GPS-denied environments, improving landing precision by approximately 40% on mobile landing zones.
- Designed a control algorithm for UAVs using Haversine's Great Circle formula and PX4Flow, enabling autonomous Return-to-Home functionality in fail-safe conditions within GPS-denied environments.
- Developed prototype software and assembled multiple drones for automated medical and emergency supply delivery to quarantined areas during the COVID-19 pandemic, ensuring safe and efficient contactless distribution.
- Designed an Autonomous Scout/Attack UAV equipped with obstacle avoidance and autonomous flight routines. Integrated a low-altitude radar-based threat detection system that activates the UAV and initiates a scan upon object detection. Implemented an AlexNet-based CNN for real-time identification & interception of aerial threats, neutralization using a net-gun capture mechanism.
- Engineered a Scout Tank designed for search and rescue operations, capable of navigating rough terrain and radiation-affected areas (Built to transport two humans and carry up to two 50kg payloads, with deployability in hazardous environments).

Spar Up Sports Technologies Limited, Pune, India.

Developer 2017 – 2018

- Developed APIs for web platform features using the MEAN Stack and optimized the Hybrid Ionic App, reducing load times by 300% for improved performance and user experience.
- Collaborated with clients to gather requirements, designed mockups, and developed personalized end-to-end features to enhance user experience and meet business needs.

Tata Technologies Limited, Jamshedpur, India.

Intern: Developer 2016 (Nov – Dec)

- Researched and analyzed the existing paper and desktop-based Plant Complaint Management System to design and transition it into a scalable web-based application, improving accessibility, efficiency, and integration with modern enterprise systems.
- Developed the Plant Complaint Management System with a C# backend and ASP.NET frontend, following SOLID principles for maintainability and scalability. Integrated the system with existing Inventory Management and General Management software to streamline operations and improve efficiency.

Skills

Programming: Python, C++, MEAN Stack (MongoDB, ExpressJS, AngularJS, NodeJS), Ionic Framework, C, Java, JavaScript, HTML, CSS, PHP, JQuery, C#, ASP.NET.

Robotic Stack Proficiency: ROS (Robot Operating System), Gazebo (Robot Simulation), Matlab, Mavlink, PX4, ArduPilot.

Hardware Stack: Flight Controllers (DJI N3, M600 , Pixhawk), Drive Stack (F1Tenth VESCs, Quanser QCar Robot Studio, Turtlebot 3), Single Board Computers (Raspberry Pi, Nvidia Jetson TX2, Xavier and Orion) and various sensors/actuators (including Velodyne VLP-16 LIDAR, FLIR Duo Pro R, Intel Realsense 3D Camera, Luxonis OAK-D 3D Camera etc).

Education

Ph.D. (Pursuing)	2026*
University of Connecticut, USA.	**GPA: 3.96/4.0**
M.S. in Computer Science	2020
Tomsk State University, Russia	**GPA: 5.00/5.0**
Bachelor's in Computer Applications	2018
Velore Institute of Technology, India	**GPA: 9.56/10.0**