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RESEARCH INTERESTS

• Autonomous Navigation • Hybrid Control • Human-Centered Learning • Multi-Sensor Fusion • Sim2Real

EDUCATION

Khulna University of Engineering & Technology Khulna, Bangladesh

- *Bachelor of Science in Mechanical Engineering (B.Sc. in ME)* January, 2019 — March, 2024
  Project Title: Design and Development of a Mechanized Wastewater Cleaning System **Cumulative GPA:** 3.01/4.00
  - Investigated and tested different mechanical drive trains and gear configurations.
  - Implemented a modular design that allows for height adjustment and easy maintenance.
  - Developed and tested a conveyor system with corrosion-resistant materials to enhance durability in harsh drainage environments.

RELEVANT PROJECTS

- **Development of a 1/10 Scale Ackermann Steering Robot with Autonomous Navigation Using ROS 2 and Nav2** (2025)
  Full-stack development of a 1/10 scale Ackermann-steering ground robot, featuring complete in-house mechanical fabrication, custom veroboard-based electronics, and multi-sensor integration (RPLIDAR, 9-DOF IMU, wheel encoders) for localization and navigation. Autonomous operation achieved using ROS 2 Nav2, with real-time sensor fusion and path planning. [Project Link]
- **Designing a Robust Model Predictive Controller for UAVs: Implementation and Simulation in ROS/Gazebo** 2024
  Developed the state-space model of a UAV using the Newton-Euler formulation, and designed a Robust Model Predictive Controller (MPC) for attitude control along with a Feedback Linearization Controller for position control, implemented and simulated using ROS and Gazebo. [Project Link]
- **Custom Sensor Fusion Pipeline Using EKF for Mobile Robot Localization** 2024
  Complete from-scratch implementation of an Extended Kalman Filter (EKF) for real-time localization, fusing nonlinear Lidar measurements (range and bearing), gyroscope orientation data, and linear GPS position data to estimate the full state of a mobile robot. [Project Link]
- **IoT and UAV-Based Precision Agriculture** 2022
  Developed a smart farming solution with a team integrating IoT sensors and UAV technology for real-time crop monitoring, disease detection, and precision spraying, with farmers accessing live data via a mobile app. [Project Link]
- **LEO Rover Navigation Simulation** 2022
  Simulated the navigation of a LEO Rover using a stereo depth camera and a UR3 robot arm in ROS and Gazebo. [Project Link]

RESEARCH EXPERIENCE

- **Development of a Multi-Sensor System for Agricultural Land and Crop Monitoring in Bangladesh using Remote Sensing and UAV Technology.**
  UGC funded project (Cat 2, Serial No. 17, 2023-2024)
  Project Director: Assistant Prof. Fahim Islam Anik
  Role: Research Assistant

SUBMITTED/ UNDER PEER-REVIEW

- Anik, F. I., **Momit, M. A.**, Ahmed, S., Islam, M. T. & Khabir, L. (2024). Development of an Automated Solid Waste Collection Device for Water Bodies: A Mathematical Approach. (Accepted in a Q1 journal with revision)

RESEARCH IN PROGRESS

- **Development of an automated water quality measurement system with electrochemical sensors and IoT**
  - *Developing an intelligent system to analyze water quality in real-time using data from 7 electrochemical sensor-measured properties.*
  - *Designing a user-friendly mobile app to display water quality insights and recommendations.*

PROFESSIONAL AND LEADERSHIP EXPERIENCE

Self Start-ups 2020 — Present

- *AimReach: Utilized data scraping and natural language processing (NLP) to transform raw online data into actionable scores for quick marketing decisions. Pre-trained large language models (LLMs) were used to process vectorized proprietary company data for optimized decision-making.*

Team Kilo Flight (A formula student racing car team) 2019 — 2024

- *Deputy Captain: Co-lead the team in Formula Student Japan 2023, becoming the first ever team from Bangladesh to pass technical inspection.*
- *Electrical & Safety System Lead: Designed and constructed the BSPD (Brake System Plausibility device) and integrated all electrical components and sensors for an ECU-controlled fuel injection (FI) engine, ensuring compliance with FSUK and FSAE regulations through necessary adjustments.*
- *Workshop: Conducted a 15-day long workshop on Formula Student Vehicle design.*

Team Phoenix (A mars rover team) 2021

- *Simulation: Simulated navigation of a LEO Rover using a stereo depth camera and a UR3 robot arm in ROS and Gazebo for ERC 2021 Remote.*

Team Durbar (A mars rover team) 2020

- *AI Sub Team: Developed the rover URDF for ROS simulation.*
- *Mechanical Sub Team: Designed a MOXIE like device with Science Sub Team.*

SKILL SUMMARY

- **Programming Languages:** Python, C++, Java Script, Solidity
- **Robotics Tools:** ROS, Gazebo
- **LLM Tools & Techniques:** LoRA, LangChain, ReAct, Chroma, Prompt Engineering
- **CAD & 3D Printing Tools:** SolidWorks, AutoCAD, Ultimaker Cura
- **CAE Tools:** Ansys (Mechanical APDL, Fluent), Abaqus CAE
- **Circuit & PCB Design:** Protius, EasyEDA
- **Hands-on Skills:** Soldering, Welding, 3D Printing, Lathe, Milling and other hand tool operations
- **Web & App Development:** React JS, Next JS, Flask, PyQT
- **Database Software:** PostgreSQL, SQLite, Pandas
- **Documentation & Data Analysis:** Microsoft Office, Python, Latex
- **Soft Skills:** Self Learning, Problem Solving, Leadership, Project Management

STANDARDIZED TEST SCORES

GRE: 312 (Overall score)

Quant: 164 **Verbal:** 148 **AWA:** 2.5

IELTS (Academic): 7 (Overall score)

Listening: 7 **Reading:** 7.5 **Speaking:** 6.5 **Writing:** 6.5

CERTIFICATION

- Introduction to Power Electronics, University of Colorado Boulder (Coursera) 2023
- Ethereum and Solidity: The Complete Developer's Guide, Stephen Grider (Udemy) 2022
- Autonomous Robots: Path Planning, Daniel Stang (Udemy) 2022
- Introduction to Self-Driving Cars, University of Toronto (Coursera) 2020
- Python for Everybody Specialization (4 Courses), University of Michigan (Coursera) 2020

AWARDS AND ACHIEVEMENTS

- Technical Scholarship, Department of Mechanical Engineering, KUET 2020 — 2024
- 30th out of 77 teams, Formula SAE Japan 2023
- 33rd out of 50 teams, Formula Student UK 2021
- 9th out of 27 teams, International Planetary Aerial Systems- IPAS Challenge 2021
- 10th out of 26 teams, Indian Rover Design Challenge 2020