

Meraj Hossain Promit

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Dhaka, Bangladesh

RESEARCH INTERESTS

Final-year Robotics & Mechatronics undergraduate working on **reinforcement learning for locomotion, optimization-based control of dynamical systems, and Sim2Real robot learning**. My current research builds adaptive neural controllers that restore robot mobility under uncertain, deformable contact dynamics (Mars granular terrain), using reward shaping with safety-gated constraints. I am especially drawn to **safe and preference-driven reinforcement learning, learning-based control, and neuro-robotics for movement**, and to carrying simulation-trained policies onto real hardware. Seeking a **PhD / MS / research position** in robot learning and interactive, physically grounded RL.

EDUCATION

University of Dhaka B.Sc. in Robotics and Mechatronics Engineering; Fourth Year, Second Semester (8th of 8), Ongoing	Dhaka, Bangladesh August 2022 – August 2026 (Expected) CGPA: 3.50 / 4.00
Sylhet MC College Higher Secondary Certificate (HSC);	Sylhet, Bangladesh July 2019 – December 2021

PUBLICATIONS

Meraj Hossain Promit, Chandak Chakma, Sejuti Rahman, and Md. Jubair Ahmed Sourov. “Adaptive Neural Control for Mars Rover Wheel Entrapment Recovery in Granular Terrain.” 2026. **Manuscript in preparation**.

Motivation: Wheel entrapment in loose regolith has crippled real planetary missions (e.g., NASA’s Spirit rover). We cast recovery as a reinforcement-learning control problem in deformable granular dynamics, learning policies that exploit terrain feedback to regain mobility, bridging RL, locomotion, and safe control under uncertainty.

RESEARCH EXPERIENCE

MARVEL Lab, University of Dhaka Undergraduate Researcher, Lab Page ↗	Dhaka, Bangladesh April 2025 – Present
Supervisor: Dr. Sejuti Rahman, Associate Professor (on leave), University of Dhaka; Professor of CS, New Uzbekistan University.	
• Lead author on DRL controllers that recover rover mobility in deformable Mars regolith, learning locomotion policies where classical control fails under granular slip. • Designed yaw-projected reward shaping with entrapment-gated slip penalties (a safety-style constraint) and built large-scale, multi-GPU training and evaluation pipelines.	
University of Texas Rio Grande Valley Research Assistant	Rio Grande Valley, TX, USA (Remote) August 2025 – Present
• Building a digital-twin warehouse benchmark to evaluate Deep RL navigation policies (PPO, SAC, TD3) under realistic perception and localization noise. [GitHub ↗]	
North South University Undergraduate Research Student	Dhaka, Bangladesh January 2024 – December 2024
• Studied melanoma segmentation from pseudo-annotations under limited labels (weakly-supervised computer vision). Supervised by Dr. Mahdy Rahman Chowdhury, Associate Professor, ECE, NSU.	

PROJECTS

WarehouseBenchmark Deep RL, NVIDIA Isaac Lab, ROS2	[GitHub ↗]
• Engineered a 31.8×54 m digital-twin warehouse benchmarking PPO, SAC, and TD3 for autonomous navigation on a Clearpath Jackal with realistic LiDAR perception and localization noise. • Applied curriculum learning and domain randomization to close the sim-to-real gap, surfacing how reward design and sensor noise drive policy robustness.	

6-DOF Robotic Arm: Sim2Real Manipulation | ROS2, MoveIt, Gazebo, OpenCV

- Transferred a vision-guided pick-and-place pipeline from simulation to physical hardware, with color and shape recognition driving grasp selection.
- Implemented inverse-kinematics solvers and collision-aware trajectory optimization for real-time, closed-loop manipulation.

Custom Quadcopter Flight Controller | STM32, Embedded C, Control Theory

- Built a from-scratch STM32 flight controller with **cascaded PID attitude and rate loops** and IMU sensor fusion, achieving stable autonomous flight.
- Wrote low-level firmware for motor mixing, failsafe protocols, and real-time telemetry.

Autonomous Navigation Stack | ROS2, Nav2, SLAM

- Deployed SLAM mapping, AMCL localization, and hybrid A*/DWA planning for dynamic obstacle avoidance on a real differential-drive robot.

TECHNICAL SKILLS

Reinforcement & Robot Learning: PyTorch, NVIDIA Isaac Lab, PPO / SAC / TD3, reward shaping, domain randomization, curriculum learning, Sim2Real

Robotics & Simulation: ROS2, Gazebo, Nav2, MoveIt, SLAM, OpenCV

Programming & Systems: Python, C / C++ (learning CUDA), Bash; Linux (Ubuntu, Arch, Kali); Git

Hardware & CAD: STM32, Raspberry Pi, Fusion 360, ANSYS, PCB design

LEADERSHIP & ENGINEERING EXPERIENCE

Intelis Solution Ltd.

Dhaka, Bangladesh

Embedded Engineer (Part-time)

July 2026 – Present

- Building STM32-based autonomous drone platforms for maritime monitoring, with robust firmware, hardened telemetry links, and weather-resistant sensing for harsh sea conditions.

Karthikesh Robotics Pvt. Ltd.

Chennai, India (Remote)

ROS Development Intern

June 2025 – Present

- Developing autonomous robots for industrial and educational use with ROS2 navigation and perception stacks.

Mohakashchhari, Dhaka University Rover Team

Dhaka, Bangladesh

Project Lead

May 2025 – Present

- Proposed the concept at IEEE SB DU; now leading design, frame integration, and fundraising for a competition-ready rover platform.

IEEE Robotics & Automation Society, University of Dhaka

Dhaka, Bangladesh

Chair (2025–Present); previously Student Activity Secretary (2023–2024)

- Lead chapter activities, events, and research collaborations promoting robotics and automation among students.

AWARDS & ACHIEVEMENTS

8th Place, DU AI Challenge (2025): computer-vision competition among university teams.

4th Place, Bangladesh Olympiad on Astronomy & Astrophysics (2021): national winner and training-camp participant.

Rank 62, HSC 2021 (Sylhet Board): top 100 across all examinees in the board.

RELEVANT COURSEWORK

Robotics & AI: Artificial Intelligence, Intelligent Systems & Robotics, Advanced Robotics, Control Systems Design, Digital Image Processing & Robot Vision, Digital Signal Processing, Mechatronics (Intro & Advanced)

Math & CS: Linear Algebra, Multivariable & Vector Calculus, Differential Equations, Numerical Analysis, Probability & Statistics, Data Structures & Algorithms, Object-Oriented Programming