Jumman Hossain

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https://pralgomathic.github.io/

Education

Department of Information Systems, University of Maryland Baltimore County (UMBC) Baltimore, USA

Doctor of Philosophy (PhD) (Candidate) Fall 2021 - Spring 2026 *(expected)*

- Advisor: Prof. Nirmalya Roy
- Research area: Reinforcement Learning, Quasimetric Learning, Autonomous Navigation, and Robotics

Department of Information Systems, University of Maryland Baltimore County (UMBC) Baltimore, USA

Master of Science (MSc) in Artificial Intelligence and Machine Learning 2021 - 2023

Department of Computer Science & Engineering, Shahjalal University of Science & Technology (SUST) Sylhet, Bangladesh

Bachelor of Engineering, specialized in Machine Learning 2009 - 2013

PhD Internships

Stormfish Scientific Corporation | Maryland, USA May 2024 – Aug 2024

- Conducted experimental research and development in XR environments using AuroraXR® (a secure, cross-reality data-sharing framework).
- Designed and implemented reinforcement learning models for autonomous navigation by integrating Unity 3D-simulated data with ROS.

Research Experience

Graduate Research Assistant, CARDS & MPSC Lab | UMBC Fall 2021 – Present

- Conducting robotics research integrating Unity 3D/Nvidia Isaac simulations with physical platforms, focusing on reinforcement learning and quasimetric RL for real-time navigation, decision-making, and seamless simulation-to-reality transfer.

Industry Experience

- **Senior Software Engineer**, BJIT Limited, Bangladesh Oct 2018 – Aug 2021
  - Collaborated in a 40-member team enhancing the AI-powered Translation SDK for PockeTalk IoT device; integrated image translation via Google Cloud Vision.
  - Designed and developed JAJA TV, a scalable tourist-spot finder app tailored for Japan's 2020 Olympics.
- **Software Engineer**, IPvision Canada Inc, Bangladesh Sept 2015 – Sept 2018
  - Conducted research, designed, and implemented a fault-tolerant, highly available, and quickly accessible distributed cloud storage system with OpenStack SWIFT, capable of supporting millions of simultaneous users.
- **Software Engineer**, Eyeball Networks Inc, Bangladesh July 2014 – Aug 2015
  - Designed and developed the uGrow Smart Baby Monitor for Android, which connects with the Philips Avent Smart Baby Monitoring camera and automatically switches between networks while optimizing audio and video quality.

Teaching Experience

- **Teaching Assistant**, UMBC Fall 2021 – Spring 2024
  - TA for IS 420 (Database Application Development) and IS 620 (Advanced Database Projects); led lab sessions for 60+ undergraduate and graduate students.

Skills

- **Languages:** Java, Python, C/C++, MATLAB, Shell Scripting
- **Libraries/Frameworks/Tools:** TensorFlow, Keras, PyTorch, Stable-Baselines3, RLlib, JAX, CUDA, Matplotlib, Gazebo, CARLA, Gym, Mujoco, Unity 3D, Nvidia Isaac Sim/Lab, Pandas, NumPy, Scikit-learn, ROS1, ROS2, Amazon Web Services (AWS).
- **Hardware/Robots:** Clearpath Jackal/Husky, SPOT (Boston Dynamics), Vision 60 (Ghost Robotics), AWS DeepRacer, TurtleBot, RosBot, NVIDIA Jetson Orin.

Selected Publications

1. **Jumman Hossain**, Nirmalya Roy, Co-Authors et al.FiRL : Finslerian Reinforcement Learning for Risk-Aware Anisotropic Locomotion *(Under Review, **NeurIPS**)*, 2025.
2. **Jumman Hossain**, Nirmalya Roy, Co-Authors et al. RAQ: Risk-Aware Quasimetric Policy Optimization with Horizon Generalization. *(Under Review, **CoRL**)*, 2025.
3. **Jumman Hossain**, Nirmalya Roy, Co-Authors et al. QPRL: Learning Optimal Policies with Quasi-Potential Functions for Asymmetric Traversal. ***ICML***, 2025.
4. **Jumman Hossain**, Nirmalya Roy, Co-Authors et al. SERN: Simulation-Enhanced Realistic Navigation for Multi-Agent Robotic Systems in Contested Environments. *(Under Review, **IROS**)*, 2025. [Paper]
5. **Jumman Hossain**, Nirmalya Roy, Co-Authors et al. QuasiNav: Asymmetric Cost-Aware Navigation Planning with Constrained Quasimetric Reinforcement Learning. ***ICRA***, 2025. [Paper]
6. **Jumman Hossain**, Nirmalya Roy, Co-Authors et al. TopoNav: Topological Navigation for Efficient Exploration in Sparse Reward Environments. ***IROS***, 2024. [Paper]
7. **Jumman Hossain**, Nirmalya Roy, Co-Authors et al. EnCoMP: Enhanced Covert Maneuver Planning with Adaptive Target-Aware Visibility Estimation using Offline Reinforcement Learning. ***ACSOS***, 2024. [Paper]
8. **Jumman Hossain**, Nirmalya Roy, Co-Authors et al. CoverNav: Cover Following Navigation Planning in Unstructured Outdoor Environment with Deep Reinforcement Learning. ***ACSOS***, 2023. [Paper]
9. Emon Dey, **Jumman Hossain**, Nirmalya Roy, Co-Authors et al. SynchroSim: An Integrated Co-simulation Middleware for Heterogeneous Multi-robot System. ***DCOSS***, 2022. [Paper]

Projects

Virtual Physical Co-Simulations and Real-Time Collaborative Decision Making | DEVCOM Army Research Lab (ARL), USA — May 2023- Present

- Working collaboratively with ARL and Stormfish Scientific Corporation (ARL Funded ArtIAMAS MIPS Project) to conduct control and feedback loop validation between virtual and physical agents/environments to ascertain the minimal robotic assets needed for terrain sensing and coverage.

Remote Robotic Experimentation using Distributed Virtual Proving Ground (DVPG) | DEVCOM Army Research Lab (ARL), USA — May 2023- Present

- Designed and deployed DVPG-based navigation frameworks on Jackal robots, integrated remote monitoring, and created a Unity 3D simulation environment for seamless real-time synchronization between virtual and physical agents.
- Developing advanced RL strategies for narrow-gap traversal with SPOT robot.

Awards and Honors

- **Honorable Mention**, UMBC COEIT Research Day Student Poster Award — 2025
- UMBC GSA, IS Department, and IEEE **Travel Grant** — 2022, 2023, 2024
- **Guinness World Record**, Amazon USA, Largest Code Debugging/Bug Fixing Competition (Participant) — 2021

Academic Services

- **Reviewer**, IEEE ICRA, IROS, RSS, AAAI, CVPR, KDD, CoRL — 2025
- **Reviewer**, IEEE PerCom — 2022, 2023, 2025
- **Local Organizer**, PerCom — 2025
- **Reviewer**, IEEE / CVF CVPR WAD Workshop, IEEE IE — 2024
- **Reviewer**, IEEE/ACM CHASE, PMC Journal, Elsevier — 2023
- **Local Organizer**, NSF-TIH Principal Investigators' Meeting — 2023
- **Moderator**, RL and Robotics Group, ML Collective (MLC) — Oct 2021-Present

Mentorship

- NSF-funded Research Experiences for Undergraduates(REU):
  - **Wanying Zhu**, Senior, University of Georgia — Summer 2022
  - **Avi Spector**, Sophomore, University of Maryland, College Park — Summer 2022
  - **Vicki Young**, Senior, University of San Francisco — Summer 2023
- **Snehalraj Chugh, Yash Kamble**, MPS (Data Science), UMBC — Fall 2024 – Present