Jumman Hossain

https://pralgomathic.github.io/

Education

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

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

- Advisor: Prof. Nirmalya Roy
- Research area: Reinforcement Learning, Quasimetric Learning, Autonomous Outdoor Navigation, Language-Guided 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®.
- 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 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 with a team of 40 members to implement and improve the Translation SDK for PockeTalk, an AI-powered instant multi-sensory two-way IoT translation device from SourceNext. Added image translation using Google Cloud Vision algorithms.
  - Designed and implemented a large-scale tourist spot finding application, JAJA TV, targeting the 2020 Olympics in Japan.
- **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
  - Courses: IS 420 Database Application Development, IS 620 Advanced Database Projects.
  - Led lab sessions for 60+ undergraduate/graduate students.

Skills

- **Languages:** Java, Python, C/C++, MATLAB, Shell Scripting
- **Libraries/Frameworks/Tools:** TensorFlow, Keras, PyTorch, Stable-Baselines3, RLlib, JAX, CUDA, Matplotlib, Gazebo, Weka, CARLA, Gym, Mujoco, Unity 3D, Pandas, NumPy, Scikit-learn, ROS1, ROS2

Selected Publications

1. **Jumman Hossain**, Nirmalya Roy, Co-Authors et al. Vision-Language Guided Quasimetric Reinforcement Learning for Adaptive Navigation in Adversarial Environments. *(Preprint ArXiv)*, 2025.
2. **Jumman Hossain**, Nirmalya Roy, Co-Authors et al. QPRL: Learning Optimal Policies with Quasi-Potential Functions for Asymmetric Traversal. *(Under Review, **ICML**)*, 2025.
3. **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.
4. **Jumman Hossain**, Nirmalya Roy, Co-Authors et al. QuasiNav: Asymmetric Cost-Aware Navigation Planning with Constrained Quasimetric Reinforcement Learning. ***ICRA***, 2025.
5. **Jumman Hossain**, Nirmalya Roy, Co-Authors et al. TopoNav: Topological Navigation for Efficient Exploration in Sparse Reward Environments. ***IROS***, 2024.
6. **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.
7. **Jumman Hossain**, Nirmalya Roy, Co-Authors et al. CoverNav: Cover Following Navigation Planning in Unstructured Outdoor Environment with Deep Reinforcement Learning. ***ACSOS***, 2023.
8. Emon Dey, **Jumman Hossain**, Nirmalya Roy, Co-Authors et al. SynchroSim: An Integrated Co-simulation Middleware for Heterogeneous Multi-robot System. ***DCOSS***, 2022.

Projects

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

- Working collaboratively with US Army Research Lab 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

- Developed DVPG-based components, deployed lightweight SLAM on Clearpath Jackal robot, remotely monitored robotic agents, and built a Unity 3D simulation environment enabling real-time, bidirectional navigation mapping between simulation and physical platforms.

Awards and Honors

- **Guinness World Record**, Amazon USA, Largest Code Debugging/Bug Fixing Competition (Participant) — 2021
- **UMBC GSA and IS Department Travel Grant** to participate in Conferences — 2022, 2023, 2024
- **IEEE Travel and Diversity Grant** to participate in Conferences — 2023, 2024
- **Udacity Machine Learning Scholarship** — 2021
- **Champion**, Code Warriors' Challenge Bangladesh — 2014

Academic Services

- **Reviewer**, IEEE ICRA, IROS, RSS, AAAI, CVPR, KDD — 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, Baltimore, MD — 2023
- **Reviewer**, IEEE BigData — 2021
- **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