Md Abu Sayed

msayed@unr.edu | sayedcseku.github.io | Google Scholar

Education

University of Nevada, Reno — Reno, NV
Doctor of Philosophy in Computer Science and Engineering — *Aug 2021 – Current*

- *Major Courses:* Introduction to Machine Learning, Fundamentals of Deep Learning, Stochastic Deep Learning, Mass Detection in Mammograms, Advanced Bioinformatics, Autonomous Mobile Manipulation, etc.

University of Nevada, Reno — Reno, NV
Master of Science in Computer Science and Engineering — *Aug 2021 – Dec 2023*

- ***Thesis:*** Threatmap: A Framework for Enhancing Security Awareness and Decision-Making for Naval Agents

Khulna University — Khulna, Bangladesh
Bachelor of Science in Computer Science and Engineering — *Dec 2014 – Jan 2019*

- ***Thesis:*** Automated method to segment retinal blood vessels from color fundus photographs.

Experience

Graduate Research Assistant — Aug 2021 – Present
University of Nevada, Reno — *Reno, NV*

- Created NavySim, a Unity-based naval simulation engine for advanced naval research, enabling analysis and modeling of multiple vessels in complex scenarios.
- Designed and implemented a real-time framework to enhance situational awareness and threat prediction for naval agents using machine learning algorithms.
- Designed realistic agent models that include systems for sensing and defense and their structured coverage areas.
- Utilized HMMs, LSTMs, Threatmap, and other intent recognition algorithms to provide real-time prediction of vessel intent in the presence of coordinated groups/swarms of adversarial ships/boats

Graduate Teaching Assistant — Aug 2021 – Present
University of Nevada, Reno — *Reno, NV*

- CS 477/677: Analysis of Algorithms [Fall 2021, Spring 2022, Fall 2024, Spring 2025]
- Grading and Assisting with homework, exams, and/or written assignments

Lecturer — Jun 2019 – Jul 2021
The Millennium University, Department of Computer Science and Engineering — *Dhaka, Bangladesh*

- *Instructed courses:* Structured Programming, Data Structure, Artificial Intelligence & Neural Networks, etc.
- *Responsibilities:* Lecture planning, taught and instructed courses, assessing students, holding office hours, invigilating examinations, supervising application development projects, etc.
- Course Coordinator of the Department since December 2019
- Spokeperson of the Sports Teams in "The Bangabandhu Sports Tournament 2020"

Publications

1. **Md Abu Sayed**, Korben DiArchangel, Mayamin Hamid Raha, Parvaneh Aliniya, Monica Nicolescu, Mircea Nicolescu, and Sushil Louis. Navysim: A multi-vessel simulation and analysis engine for naval domains. In *2024 IEEE Conference on Games (CoG)*, pages 1–8, 2024

2. **Md Abu Sayed**, Mayamin Hamid Raha, Parvaneh Aliniya, Monica Nicolescu, and Mircea Nicolescu. Threatmap: A framework for enhancing security awareness and decision-making for naval agents. In *Proceedings of the 26th International Conference on Harbor, Maritime and Multimodal Logistic Modeling & Simulation (HMS 2024)*. CAL-TEK, 2024

3. **Md Abu Sayed**, Md Azizul Hakim, Ayesh Meepaganithage, Monica Nicolescu, and Mircea Nicolescu. Feature-aware deep learning for maritime intent recognition. In *IEEE International Conference on Future Machine Learning and Data Science (FMLDS 2025)*, 2025. forthcoming

4. **Md Abu Sayed**, Korben DiArchangel, Parvaneh Aliniya, Casey Brenner, Mayamin Hamid Raha, Monica Nicolescu, Mircea Nicolescu, and Sushil Louis. Navysim 2.0: Enhanced multi-vessel simulation and analysis engine for advanced naval research. *IEEE Transactions on Games*, 2025. Submitted

5. **Md Abu Sayed**, Md Azizul Hakim, Ayesh Meepaganithage, Tyler Becker, Monica Nicolescu, and Mircea Nicolescu. Early classification of intentions for maritime domains using deep learning model. In *IEEE International Conference on Automation Science and Engineering (CASE)*, 2025. Forthcoming

6. Ayesh Meepaganithage, **Md Abu Sayed**, Monica Nicolescu, and Mircea Nicolescu. Proactive maritime threat prediction: Vessel intent classification with lstms and transformers using a sliding window approach. In *IEEE International Conference on Automation Science and Engineering (CASE)*, 2025. forthcoming

7. Mayamin Hamid Raha, **Md Abu Sayed**, Monica Nicolescu, Mircea Nicolescu, and Sushil Louis. Ram: Resource allocation for multi-agent maritime environment. In *International Conference on Informatics in Control, Automation and Robotics*. Springer, 2024. forthcoming

8. Mayamin Hamid Raha, **Md Abu Sayed**, Sergiu Dascalu, Monica Nicolescu, and Mircea Nicolescu. Keep sailing: An investigation of effective navigation controls and subconscious learning in simulated maritime environment. In *International Conference on Information Technology-New Generations*, pages 313–322. Springer, 2024

9. Mayamin Raha, **Md Abu Sayed**, Monica Nicolescu, Mircea Nicolescu, and Sushil Louis. Maritime dynamic resource allocation and risk minimization using visual analytics and elitist multi-objective optimization. In *Proceedings of the 20th International Conference on Informatics in Control, Automation and Robotics - Volume 1: ICINCO*, pages 54–63. INSTICC, SciTePress, 2023

10. **Md Abu Sayed**, Sajib Saha, GM Atiqur Rahaman, Tanmai K Ghosh, and Yogesan Kanagasingam. An innovate approach for retinal blood vessel segmentation using mixture of supervised and unsupervised methods. *IET Image Processing*, 15(1):180–190, 2021

11. **Md Abu Sayed**, Sajib Saha, GM Rahaman, Tanmai K Ghosh, and Yogesan Kanagasingam. A semi-supervised approach to segment retinal blood vessels in color fundus photographs. In *Conference on Artificial Intelligence in Medicine in Europe*, pages 347–351. Springer, 2019

12. Tanmai K Ghosh, Sajib Saha, GM Rahaman, **Md Abu Sayed**, and Yogesan Kanagasingam. Retinal blood vessel segmentation: A semi-supervised approach. In *Iberian Conference on Pattern Recognition and Image Analysis*, pages 98–107. Springer, 2019

Presentations

- **Md Abu Sayed**, Korben DiArchangel, Mayamin Hamid Raha, Parvaneh Aliniya, Monica Nicolescu, Mircea Nicolescu, and Sushil Louis. "NavySim: A Multi-Vessel Simulation and Analysis Engine for Naval Domains." Presented at the *2024 IEEE Conference on Games (CoG)*, Milan, Itay.

- **Md Abu Sayed**, Mayamin Hamid Raha, Parvaneh Aliniya, Monica Nicolescu, and Mircea Nicolescu. "ThreatMap: A Framework for Enhancing Security Awareness and Decision-Making for Naval Agents." Presented at the *26th International Conference on Harbor, Maritime and Multimodal Logistic Modeling & Simulation (HMS 2024)*, Tenerife, Spain.

Research Interest

Machine Learning, Deep Learning in Intent Recognition, Human-Robot Interaction, Medical Image Analysis, Computer Vision, etc.

Research & Projects

Navysim: A multi-vessel simulation and analysis engine for naval domains || *Unity, Python* 2022 - Present

- Complex scenario generation following physics dynamics and AI-based obstacle avoidance.
- System for complex scenario generation using scripted descriptions and mouse/keyboard-input control.
- Real-time generation of intuitive and comprehensive heatmap visualization representing vessels' capabilities and vulnerabilities, as well as various levels of potential threats in the simulated environment.
- Hidden Markov Model (HMM) based Intent Recognition Model to predict the intention of the surrounding vessels.
- Real-time visualization of intention predictions from the HMMs in the naval simulator connected via a Transmission Control Protocol (TCP) networking framework with the Unity simulator.

Fusion of Multimodal Mammogram Views to Detect Breast Cancer || *Python, Tensorflow, Pytorch* 2022

- Used graph convolution to learn to reason bilateral and ipsilateral views of the breast and detect mass and added particular data augmentation schemes to improve the graph convolution and learn to reason temporally to localize changes in breast mass, calcification, and architectural distortion.

Deep Learning Projects | *Python, Tensorflow, Keras, Pytorch* Jun 2020 – Present

- Implementing CNN, RNN from Scratch with Python
- Retinal Blood Vessel Segmentation using Pix2Pix
- Brain Tumour auto-segmentation from 3D MRI images using U-Net
- Image Captioning with CNN and Bi-directional LSTM

Local Haar Pattern (LHP): A Feature Descriptor for Biomedical Images | *MATLAB*— Project Page 2018

- Designed to extract features that can act to encode ad-hoc domain knowledge that is difficult to learn otherwise.

Technical Skills

ML, CV, NLP: [Python, OpenCV, Keras] (Proficient), [MATLAB, Tensorflow, Pytorch] (Familiar)
Simulation/Game: Unity, C#, Python
Problem Solving: C/C++ (Proficient), [Java, C#] (Familiar)
Web Development: [PHP, MySQL] (Proficient), [JavaScript, SQL] (Familiar)

Extracurricular Activities

Graduate Student Association | *Council Member* Feb 2024 - Jan 2025

- **Chair** of the *GSA Awards Committee*
- Representing the College of Engineering at GSA as a council member
- Serving in the *Funding and Community Relation (FCRC)*, *Service Committee*

Intenational Students Club | *Vice President* May 2023 - Aug 2024

- Night of All Nations: Arranged one of the biggest multicultural events at UNR facilitating 32 countries and attracting around 600 people
- Monthly Meetup: Arrange monthly fun events for international students to socialize
- GSA Club: Keeping the standard for a Graduate Student Association recognized club

Bangladeshi Student Association | *Treasurer* Aug 2022 - Jul 2023

- Arranged cultural and community events for Bangladeshi students, scholars, faculties, and their families at UNR
- Managed funds from GSA and the community for events and running the club

Google Developer Group Campus | *Co-Lead* Aug 2024 - Jan 2025

- Organized the DevFest in collaboration with GDG Reno in Nov '24.
- Around 30 students and developers signed up for our very first event.