Shahariar Newaz Taki

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Research Interest

My research focuses on trustworthy and explainable machine learning, specifically on model failure characterization, robustness to distribution shifts, uncertainty quantification, and deep learning interpretability. My research interests include sequence modeling (LSTMs for time-series forecasting) and representation learning (CNNs for genomic sequence classification), with a focus on developing AI systems that fail gracefully, reveal their limitations, and can be audited in real-world deployment scenarios.

Education

B.Sc. in Computer Science and Engineering 2016 – 2020
Uttara University, Dhaka 1230, Bangladesh
- CGPA: **3.33/4.00**

Standardized Test Scores

GRE: Overall 322
- *Verbal:* **157** *Quant:* **165** *Analytical Writing:* **4.5**

TOEFL: (Overall 92)
- Listening: **29** Reading: **29** Writing: **19** Speaking: **15**

Research Experience

AT-PD³MS-DDQN: Attention-Enhanced Prioritized Dueling Multi-Step Double DQN for UCAV Maneuver Decision-Making
- *Designed a Transformer Temporal Encoder processing an 8-step historical 6-DOF state window via multi-head self-attention*
- *Implemented a Dueling network architecture decomposing Q-values into state-value and action-advantage streams*
- *Developed Hybrid Prioritized Experience Replay (PER-H), weighting sampling by TD-error magnitude and episodic outcome*
- *Built an LSTM-based Opponent Intent Prediction module inferring maneuver intent from trajectory history, with an automatic curriculum learning schedule to eliminate cold-start instability*
- *Achieved win rates of 94.1% vs. a maneuvering target and 89.7% vs. an adversarial DQN opponent (+4.1 and +10.7 pp over MS-DDQN baseline), with 37% faster convergence*

Hierarchical Graph-Attention LSTM with MAPPO for Autonomous Dual-UAV Cooperative Air Combat
- *Designed the HGLM framework: a Tactical Role Assigner, LSTM temporal encoder, two-layer Graph Attention Network, and a MAPPO backbone with Centralized-Training-Decentralized-Execution*
- *Developed a four-stage adversarial curriculum self-play training schedule*
- *Improved win rate from 74.8% (P-DQN baseline) to 91.2% vs. straight-line opponents and 82.7% vs. rule-based adversaries (37.5 pp gain), with 3.02× faster convergence*
- *Validated each module via ablation studies across 7 configurations and 5 random seeds ($p < 0.05$, paired t-test) and a 6-hyperparameter sensitivity analysis*
- *Showed interpretable inter-agent attention weights that anticipate tactical role-switch events*

Multi-Agent Reinforcement Learning for Autonomous UAV Swarm Control
- *Built 3 UAV swarm simulation environments from scratch: coverage, tracking, and formation flying*
- *Implemented 3 MARL algorithms in pure NumPy — QMIX, MADDPG, and MAPPO — and a BiLSTM encoder compared against an MLP baseline across all three*
- *Introduced the Non-Stationarity Index (NSI), a KL-divergence-based measure quantifying training instability in multi-agent UAV settings*

- *Derived an evidence-based framework for algorithm and architecture selection from 14 empirical findings across training dynamics*
- *Tools: NumPy, Python*

Stock Market Prediction using RNN-LSTM

- *Developed multi-layer LSTM model for time-series forecasting*
- *Achieved improved RMSE through feature engineering and optimization*
- *Tools: TensorFlow, Keras, PyTorch, Python*

Work Experience

IT Executive 2025 – Present
Seascape Shipping Line Ltd. (Bangladesh)
Banani, Dhaka-1213, Bangladesh

IT Executive 2022 – 2025
Skama Shipping and Projects Ltd. (Bangladesh)
Banani, Dhaka-1213, Bangladesh

Freelance 2021 – 2022
Web development — remote

Publications

2026 **S. N. Taki**, "AT-PD³MS-DDQN: Attention-Enhanced Prioritized Dueling Multi-Step Double Deep Q-Network for Autonomous UCAV Maneuver Decision-Making in Short-Range Aerial Combat." (work in progress)

2026 **S. N. Taki**, "Hierarchical Graph-Attention LSTM with Multi-Agent Proximal Policy Optimization for Autonomous Dual-UAV Cooperative Air Combat: An Adversarial Curriculum Self-Play Approach." (manuscript in preparation)

2026 **S. N. Taki**, "Multi-Agent Reinforcement Learning for Autonomous UAV Swarm Control: Implementation, Deep Empirical Analysis, BiLSTM Comparison, and a Novel Research Agenda," Engineering Applications of Artificial Intelligence (Elsevier). (manuscript submitted)

2023 S. Chaki, **S. N. Taki**, G. H. Siyam, and J. Hasan, "Stock Market Prediction: An Approach Based on Multi-Layer Long Short-Term Memory Network". (under review)

Technical Skills

Programming Languages:

- More than two years of experience in Python:
- Scikit-learn — machine learning library with a wide range of supervised and unsupervised algorithms
- OpenCV — library for computer vision and machine learning applications
- TensorFlow and Keras — libraries for building deep neural networks
- PyTorch — library for building deep neural networks
- Matplotlib — library for data visualization
- NumPy — array-processing package
- Pandas — data structures and data analysis tools
- Familiar with C, C++, MySQL, Unix Shell Scripting

Software: NVivo, IBM SPSS, LaTeX, Microsoft Office, Android Studio, VS Code, CodeBlocks, Google Colab, PyCharm, Jupyter Notebook
Hardware & Instruments: Arduino, Oscilloscope, Trainer Boards

Oral Presentations

- "Machine Learning: Concepts and Applications," Uttara University, Dhaka, Bangladesh, 2021
- "Stock Market Prediction Using Recurrent Neural Network," Uttara University, Dhaka, Bangladesh, 2020

- “Unmanned Aerial Vehicle (UAV) for Transport of Items such as Packages, Medicines, Foods, Postal Mails, and Other Light Goods,” Uttara University, Dhaka, Bangladesh, 2019

Participation

- Workshop on “Machine Learning and Human-Computer Interaction,” Uttara University, Dhaka, Bangladesh, 2019
- Workshop on “Django and Oracle Based Applications,” Uttara University, Dhaka, Bangladesh, 2019
- Workshop on “Research Methodology and Thesis Writing,” Uttara University, Dhaka, Bangladesh, 2018
- Workshop on “LaTeX,” Uttara University, Dhaka, Bangladesh, 2017
- Workshop on “Object Oriented Programming,” Uttara University, Dhaka, Bangladesh, 2016
- Workshop on “Microsoft Word,” Uttara University, Dhaka, Bangladesh, 2016

Extra-curricular Activities

- Volunteer, IEEE Student Branch Opening Ceremony, Department of Engineering, Uttara University, 2019, Dhaka, Bangladesh
- Volunteer, ACM International Collegiate Programming Contest (ACM-ICPC), 2019, Dhaka, Bangladesh
- Volunteer, ACM International Collegiate Programming Contest (ACM-ICPC), 2017, Dhaka, Bangladesh
- Voluntary Blood Donor since 2018, Quantum Method

Certifications

- Research Methodology: Basic to Advanced, Research Help Bangladesh
- Developing AI Applications with Python
- Introduction to DevOps
- DevOps, Cloud, and Agile Foundations
- Hands-on Introduction to Linux Commands and Shell Scripting
- Getting Started with Git and GitHub
- Sequences, Time Series and Prediction
- Skill Development for Mobile Game and Application Project, ICT Division (Advanced)
- Skill Development for Mobile Game and Application Project, ICT Division

Leadership Experience

Ex-Vice President, Uttara University CSE Student Association. Served for the welfare of students at Uttara University.

Professional Memberships

Member, IEEE Student Branch at Uttara University

References

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