Ayesha Binte Mostofa

Location : Amherst, MA

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Research Interest

Systems, Network and Software Security, Natural Language Processing, Machine Learning

Education

University of Massachusetts Amherst (UMass Amherst) Sep 2025 – Present
Ph.D. in Computer Science and Engineering *Amherst, MA, USA*

- **Advisor** : Prof. Pubali Datta

Bangladesh University of Engineering and Technology (BUET) April 2019 – July 2024
B.Sc.Engg. in Computer Science and Engineering *Dhaka, Bangladesh*

Work Experience

Graduate Teaching Assistant Amherst, MA
Department of CSE, UMass Amherst *Fall 2025*

Full-time Lecturer Dhaka, Bangladesh
Department of CSE, Presidency University; [Profile] *January 2025 – July 2025*
Department of CSE, Canadian University of Bangladesh; [Profile] *July 2024 – January 2025*

Machine Learning Intern (Part-time) May 2023 – June 2023
Red.Digital Limited *Remote*

Publication & Research Experience

Advancing Code Review and Code Refinement Automation Using LLMs July 2023 - Nov 2024
Undergraduate Thesis, NLP Group, CSE-BUET | Grant @ RISE-BUET ***ArXiv*** *(Co-First Author)*

- Designing prompts augmenting static program metadata (function call graph) and natural language summary, and qlora fine-tuning to improve code review comment and code refinement generation tasks
- **Tools and Technology:** Python (Pytorch), TreeSitter, OpenAI GPT API, CodeT5, CodeLlama, Llama 3.1, Llama 2, GPT-3.5, GPT-4o, Gemini-1.0
- **Supervisor :** Dr. Anindya Iqbal, Professor, CSE, BUET, Dr. Toufique Ahmed, IBM Research (Past : PostDoc, UC Davis)

Provenance graph based system logs detection using RAG Feb 2024 - Present
Ongoing Research Project, Security X NLP *Credited as a Researcher*

- Working on detecting attack behaviors whether benign or malicious, analyzing raw log data from the DARPA OPTC and DARPA TC E3 datasets using postgresql sql files, with the help of provenance graphs. We are trying to augment RAG techniques in LLM models to guide in this task.
- **Supervisor :** Dr. Md. Shohrab Hossain, Professor, CSE, BUET, Dr. Shahrear Iqbal, National Research Council, Canada

Low Resource 2D Image Style Transfer Jan 2024 - Present
Research Project, Computer Vision *Credited as a Researcher*

- Generating a new image by combining the content of one image with the style of another image with minimal computational resource usage. Now, We are trying to transfer artistic style of calligraphy to an image.
- **Tools & Technology: Python, VGG16, CycleGAN, ResNet-50**
- **Supervisor** : Sheikh Azizul Hakim, Lecturer, CSE, BUET

Competitions & Awards

RISE-BUET Internal Student Research Grant for Undergraduate Thesis, 2023-2024 : 81,518 BDT; Grant pdf

10th NSysS Research Poster Presentation, 2023 [Poster]

Dean's list award in Level 3 and Level 4: received university merit scholarship for excellent grades. [Details]

DEEP LEARNING ENIGMA 1.0 Finalists, 2024 : Object Detection Contest for Autonomous Vehicles [LearderBoard]

Merit Scholarships [2014-2024] : granted for outstanding performance in University, HSC, SSC, JSC level

Technical Skills

Languages	:	C/C++, Python, Java, Javascript, Assembly, Bison/Flex, Bash, MySQL, LaTeX
Frameworks	:	React.js, Node.js, SpringBoot, Oracle, PostgreSQL, Docker, NS2, xv6, Git, Wireshark
Libraries	:	NumPy, Keras, Matplotlib, OpenCV, OpenGL, Pandas, Scikit Learn
Platform	:	Linux, Windows

Academic Projects

Vehicle Object Detection in the Context of BD Road Traffic | 2024 Source Code

Computer Vision Project, DEEP LEARNING ENIGMA FINALIST

- Finetuned vision transformer based modern deep learning models (YoloV6L6, YoloV8, Faster-rcnn, CoDETR) .
- Tools & Technology used : Python (PyTorch), Ultralytics YOLO, Pandas, MMDetection

Forecasting Ground level water System | 2024 Source Code

HCI X Machine Learning Project

- We used Data Preprocessing, Regression Models, Arima models, LSTM in this project to predict ground water level.

Machine Learning Algorithms and Neural Network | 2024 *Python* Source Code

- Implemented FNN from Scratch, Adaboost algorithm with Logistic Regression
- Implemented PCA & clustering with EM algorithm on gaussian mixture models from scratch.

Hardware : ALU, FPA, MIPS Implementation | 2022 *C++, Logisim, Assembly* Source Code

- Implemented 4-bit Arithmetic logic unit, Floating Point Adder, and 8 Bit MIPS Processor with ATmega32, Logisim

Hardware Project : Health Monitoring System | 2022 *C++* Source Code | Youtube Demo

- Monitors heart rate, body temperature and blood oxygen saturation level of a patient body, room humidity and room temperature of the patient room.
- Tools : Arduino Uno, Max 30102, LCD 1602, I2C Adapter, GSM Module 900A, DHT11, Buzzer, Power Bank - 5V 2A

MISP Tool, Cryptography and Malware Analysis | 2023 *Python, Docker, Azure Cloud* Source Code | Youtube Demo

- Implemented cryptography (AES, Diffie Hellman, RSA) algorithms, and pedagogical malware functionalities
- Documented the functionalities of Open Source Tool, MISP in a report.

C Compiler | 2022 *Lex, Yacc, Assembly, C* Source Code

- Built a simple compiler from scratch in compiler sessional using yacc, c, assembly etc.

Implementing functionalities of OS | 2023 *C, Bash* Source Code

- Implemented bash scripting and Inter Process Communication
- Implemented System Calls, Lottery Scheduling, Copy on write and Paging with xv6

TCP CUBIC-FIT, Packet Tracer and Network Simulator | 2022 *Java, NS2* Source Code

- Implemented server-client socket programming, designed LANs, and simulated wireless networks
- Modified TCP Cubic-Fit algorithm in NS2 and documented improvement in a report.

Ray Tracing & Raster Based Pipelines | 2023 *C++, OpenGL* Source Code | Youtube Demo

- 3D Transformation with OpenGL, Raster Based Graphics Pipeline with Z-buffer Algorithm, Ray Casting and Ray Tracing using Illumination Techniques

E-pathshala : An Online School | 2022 *Spring Boot, BootStrap, JavaScript, JSTL, Oracle* Source Code | Youtube Demo

- Developed an MVC web application with raw SQL queries as database sessional project.

Leadership Activities

IEEE Computer Society BUET Student Branch Chapter 2021 - 2023

Publicity Committee Co-ordinator (2022-2023) ; Media Committee Executive (2021-2022)

Helped organizing competitions, career talks, research seminars and software development workshops; [Details]

Standardized Test

TOEFL	*103/120 (Reading: 28, Listening: 27, Speaking: 23, Writing: 25)*	November 3, 2024
GRE	*311/340 (Quant: 161/170, Verbal: 150/170); AWA: 3.5/6*	November 6, 2024