Soumya Swagata Biswas

ssbiswas987@gmail.com +8801784410939 Portfolio LinkedIn github Leetcode

About Me

I am a Lecturer and a recent graduate of Bangladesh University of Engineering and Technology. My primary interests are research in Security and Systems, with growing work in Large Language Models. I enjoy teaching and mentoring students, designing course materials, and supervising projects. Outside the classroom and lab I love solving challenging problems and communicating ideas clearly through public speaking.

Work Experience

Lecturer — BRAC University June,2025–Present

- Courses taught: Computer Graphics, Software Engineering
- Responsible for lecturing, lab supervision, assignment design, and student mentoring.
- Developed course materials and assessments; supervised undergraduate projects and tutorials.

Lecturer — United International University(UIU) April,2025–June,2025

- Courses taught: System Design and Analysis, Data Structure
- Assisted in curriculum revision and student evaluation; held weekly office hours and consultations.
- Supervised project teams and contributed to departmental academic events.

Education

BSc **Bangladesh University of Engineering and Technology** Feb 2020 – March 2025
Computer Science and Engineering
- GPA: 3.81/4.0

HSC **Chittagong College** July 2017 – June 2019
- GPA: 5.0/5.0 *(Chittaogng Board 10th place)*

SSC **Chittagong Govt High School** July 2015 – June 2017
- GPA: 5.0/5.0 *(Chittaogng Board 8th place)*

Notable Course-works

Computer Security, Bio-informatics Algorithms, Computer Graphics, Artificial Intelligence, Operating Systems, Computer Networks, Data Structures and Algorithms, Database Systems, Software Engineering, Information System Design, Numerical Methods, Discrete Mathematics, Object Oriented Programming, Linear Algebra, Probability and Statistics

Research Experience

Sparse-P-VFL: A Dynamic Gradient Sparsification Scheme Leveraging PCA in Vertical Federated Learning *(Undergraduate Thesis)* 2024-Present

Supervisor Dr. Muhammad Abdullah Adnan

- Gradient Leakage during training is a major concern in machine learning systems, more so on Federated Learning Systems. This can be mitigated through gradient trimming/sparsification
- Due to each training round gradients having different impact, constant top-k trimming reduces baseline model accuracy. Hence we develop the novel idea of top-k gradient selection by leveraging Principal Component Analysis

XFed: Generalized Attack Framework for Non-Collusive Mode Poisoning on Byzantine-Robust Federated Classifiers 2024-Present

*In collaboration with Ms. Israt Jahan Mouri (Currently under review at **CVPR 2026**)*

- Federated Learning Malicious Clients often attack in coordination, which is useful to simulate in research fields but

practically attackers often try to launch attacks alone to avoid detection

- To simulate this attack genre, developed Xfed which is a non-collaborative attack scheme capable of matching collaborative attacks in all settings

Privacy-Preserving Federated Learning for Medical Imaging : Mitigating Data Leakage Risks Through Partial Homomorphic Encryption 2025-Present

In collaboration with MD Shahedul Haque from Virginia Tech

- Real-world medical data is both scarce and highly privacy-sensitive, limiting large-scale model training. Federated Learning addresses this but remains vulnerable to adversarial attacks and data leakage.
- Partial homomorphic encryption enhances privacy while maintaining a lightweight model, ensuring security without excessive computational overhead.

SEIRV: A novel approach to estimate the after effect of COVID-19 with respect to the vaccinated population 2021

Under Supervision of Khondokar Nazmoon Nabi

- Existing SEIR model was able to predict the effect of COVID but was misaligned when vaccinated population were taken into account
- Incorporated Vaccinated Population to develop SEIRV model, which aimed to predict the afterw-aves of COVID variants

Notable Academic Projects

Predictive Diagnosis System and Patient Profiling using Bio-Bert || Python, Bash | Github 2025

Machine Learning Project

- Built personalized predictive diagnostic profiles based on medical history, current symptoms, age, sex, etc
- Using the pre-trained BioBERT model, fine-tuned on a preprocessed dataset (ddxplus), the system generates a list of possible diagnoses with their respective probabilities.
- Achieved an accuracy of **98.01%** by using just **2% of the whole dataset**, while the baseline accuracy was 98.83%.

PawCare || React, Nodejs, PostgreSQL | Frontend | Backend 2024

Software Development Project

- Collaborated with **BUET Animal Welfare Society** to develop a website addressing pet adoption challenges in university halls.
- Integrated innovative features such as fund collection via Bkash, vet appointment bookings, discussion forums, and a verified emergency responder directory.

Re-Man || ExpressJS, Nodejs, PostgreSQL | Github 2023

Information and System Design Project

- Collaborated with **Intelligent Machines** to develop a website tackling price hikes caused by intermediaries in the supply chain.
- Enabled direct connections between producers, distributors, and retailers, removing the need for dealers.
- Implemented dynamic inventory management, inventory renting for seasonal demand, and freshness tracking for products.

C Compiler || C, Bison, Flex, Assembly | Github 2022

Operating System Sessional Project

- Developed a fully functional C compiler which is capable of tokenizing, parsing and generating assembly

Home Secuirty Alert System || C++, Arduino, Assembly | Github 2022

Microcontroller Project

- Built a home security alert system with the integration of ESP32 module, which incorporated RFID, laser and numpad integration along with real life break in alert

E-Bookopolis || ExpressJS, OracleDB | Github 2022

Database Project

- Designed and developed an e-commerce platform for book enthusiasts to read, order books, and manage wish lists for unavailable titles.
- Integrated features such as creative discussion forums and user profiles to facilitate personal interactions and community building.

Football League Manager || Java, JavaFX | Github 2021

Java Project

- Developed a program to simulate a football league consisting of multiple clubs and many players
- Incorporated Socket programming and networking to allow multiple clubs to simultaneously engage in player auctions and update availability in real time

PacMan || C, igraphics | Github 2020

C Igraphics Project

- Made the classic game Pacman with all functionalities and features of the original game
- Incorporated custom level building systems and different animations to further enhance user engagement

Skills

Programming Languages: C, C++, Java, Python JavaScript, Flex/BISON, CSS, HTML, BASH, Assembly

Tools and Softwares: Node.js, Express.js, React.js, p5.js, OpenGL, Gymnasium, Numpy, Matplotlib, MinkowskiEngine, Pytorch, Scikit-learn, Pygame, Figma

Database: Oracle, Postgresql

Awards and Achievements

- **SUST CSE Carnival** : Became 2nd runners-up in Hackathon 2022
- **C1 Terminal Games** : Achieved 27th place in Asia region for most strategic algorithm 2022
- **Orange Corners Idea Competition** : Achieved 4th Place National Finish 2022
- **Dean's List Award** : Received for Academic Excellence 2020,2021
- **National Debating Competition** : Achieved 2nd Runners-up nationally 2018
- **BD Math Olympiad** : Multiple top 10 regional finishes and 2018 national 7th finish 2015-2018
- **BD Physics Olympiad** : 4th spot in 2016 regionally, 10th nationally in 2017 2016,2017
- **English Olympiad** : Selected for National Round 2017
- **Kennedy-Lugar Youth Exchange Program** : Selected for final round 2017

Organizations and Affiliations

IEEE Computer Society BUET Student Branch Chapter | Outreach and Networking Committee Chair 2022-Present

BUET Career Club | Executive Member 2022-Present

Chittagong College Extra Curricular Activities Club | Founder and Executive Chair 2017-2019

Chittagong Math Circle | Instructor 2017-Present

Icche-Puron(Non-Profit Organization) | Founder and Executive Chair 2016-Present

References

Dr. Muhammad Abdullah Adnan
Professor
Department of Computer Science and Engineering
Bangladesh University of Engineering and Technology
Email: abdullah.adnan@gmail.com
Phone: +8801552336926

Md Toufikuzzaman Pranto
Assistant Professor(On Leave)
Department of Computer Science and Engineeting
Bangladesh University of Engineering and Technology
Graduate Research Assistant, Pen State University
Email: mpt5763@psu.edu
Phone: +18142803157