

# MOHAMMAD SHAMIM AHSAN

+880 1765 102 940 | [shamim19119@gmail.com](mailto:shamim19119@gmail.com) | [ahsan@cse.uiu.ac.bd](mailto:ahsan@cse.uiu.ac.bd)

[PersonalWebpage](#) | [ProfessionalProfile](#) | [GitHub](#) | [LinkedIn](#)

## EDUCATION

### Bangladesh University of Engineering & Technology (BUET)

B.Sc in Computer Science and Engineering (CSE)

Thesis Title: "Detecting Smart Home Device Activities Using Packet-level Signatures from Encrypted Traffic"

March 2018 - May 2023

CGPA: 3.64/4.00

### St. Joseph Higher Secondary School, Dhaka

Higher Secondary Certificate (HSC), Division of Science

July 2015 - July 2017

GPA: 5.00/5.00 (90.3%)

### Bangladesh Navy School and College, Chittagong

Secondary School Certificate (SSC), Division of Science

January 2013 - April 2015

GPA: 5.00/5.00

## RESEARCH INTEREST

**Cybersecurity and Privacy**, focusing on developing machine learning (ML) and deep learning (DL) methods in

- Computer security
- IoT security
- Network security
- Web security
- Mobile and Browser security

## WORK EXPERIENCE

### United International University, Dhaka, Bangladesh

Lecturer

Department of Computer Science and Engineering (CSE)

September 2023 - Present

### Presidency University, Dhaka, Bangladesh

Lecturer

Department of Electrical and Computer Engineering (ECE)

July 2023 - September 2023

### Bangladesh University of Engineering & Technology

Undergraduate Research Assistant

Department of Computer Science and Engineering

2022 - 2023

## WORK UNDER REVIEW

- ★ **Mohammad Shamim Ahsan**, Md. Shariful Islam, Md. Shohrab Hossain, Anupam Das, "Detecting Smart Home Device Activities Using Packet-level Signatures from Encrypted Traffic," *IEEE Transactions on Dependable and Secure Computing (IEEE TDSC)*.

## PUBLICATION

- ★ **Mohammad Shamim Ahsan**, Abu Reyan Ahmed, Md. Saidur Rahman, "Randomization in Double Coverage Algorithm on a Line for Online  $k$ -Server problem," Symposium Digest, *IEEE Computer Society Bangladesh Chapter Summer Symposium (IEEE CS BDC SS) 2023*.

## RESEARCH EXPERIENCE

### Bangladesh University of Engineering & Technology (BUET)

Title: Detecting Smart Home Device Activities Using Packet-level Signatures from Encrypted Traffic

Undergraduate Research Assistant

Supervisor: Dr. Md. Shohrab Hossain (BUET)

Collaborator: Dr. Anupam Das (NC State University, USA)

May 2022 - August 2023

- Developed a "packet-based signature generation & detection system" capable of identifying specific events associated with IoT devices by extracting features from raw encrypted network traffic.
- The significance of this work lies in determining the extent to which smart home IoT devices are vulnerable to active and passive network attacks, where even knowledge of the devices in a household can enable targeted attacks.
- The existing state-of-the-art technique for packet-level signatures relies on packet inter-arrival time, leading to inaccuracies when the traffic rate fluctuates significantly. It treats multi-type events as separate binary events during training, resulting in suboptimal detection.
- Overcame these limitations by developing a non-interval-dependent approach that automatically identified the optimal packet threshold for generating unique signatures. This ensured resilience to network jitters and efficient handling of both binary and multi-type events.
- Evaluated our signatures' effectiveness, uniqueness, and correctness using four well-known public datasets (PINGPONG, UNSW, YourThings, Mon(IoT)r), verifying known signatures and discovering new ones.
- Achieved an average recall and precision of 98-99% and 98-100%, respectively, demonstrating the effectiveness of our approach in detecting user activities of IoT devices at the packet level.

Title: Randomization in Double Coverage Algorithm on a Line for Online  $k$ -Server problem

Undergraduate Research Assistant

Supervisor: Dr. Md. Saidur Rahman (BUET)

Collaborator: Dr. Abu Reyan Ahmed (University of Arizona, USA)

- *Double Coverage (DC) Line* algorithm is a deterministic algorithm for online  $k$ -server problem which is proved to be  $k$ -competitive. Developed two randomized variants (*RAND*, *SEMI-RAND*) of the DC Line algorithm and analyzed their probabilities of being  $k$ -competitive.
- Used the *Potential Function Method* and *Interleaving Move Style* for competitive analysis of the algorithms.
- Studied diverse exact and approximate algorithms, randomized algorithms, online algorithms, heuristics, metaheuristics, and low-memory algorithms.

## ACADEMIC PROJECTS

**TCP CERN: congestion control enhancement over wireless networks** (Networking project)

February 2022

Network Simulator 3 (NS3), C, Python

[Github](#)

- Explored the *TCP-CERN* technique to enhance congestion control which is a sender-side modification of *TCP-Reno*.
- Implemented this technique in NS3 which was not done before (authors used NS2). Tested on two wireless networks: *Wi-Fi* and *LR-WPAN* using various performance metrics such as throughput, end-to-end delay, and packet delivery ratio.

**Image Caption Generator using CNN and LSTM** (Deep Learning project)

February 2023

Python, Flickr\_8k dataset

[Github](#)

- *CNN* was used to extract features from an image. Then, *LSTM* used these features to help generate a caption of the image.
- Implemented *Greedy* and *Beam* search strategies, and evaluated the accuracy of generated captions using metrics like *BLEU*, *METEOR*.

**Spacey: Online Space Rental Platform** (Software Development project)

August 2022

MongoDB, Express.js, React.js, Node.js, CSS

[Github](#), [Github](#), [Demo](#)

- Developed an online space (both personal and business) rental platform with a team of 3 people.
- Designed BPMN, Mock UI (using *Figma*), Class, ER, Sequence, and Collaboration diagrams.
- Used *MERN* stack for development and *Stripe* gateway for mobile banking payment methods.

**MediSheba** (Database project)

October 2020

Django, HTML, CSS, Oracle SQL

[Github](#), [YouTube](#)

- Developed an online medical system with a team of 3 people, where Django was used as a framework in the Backend and HTML, CSS as Frontend with an Oracle-based database.

## MAJOR ASSIGNMENTS

→ **SEED-LABS Attacks**

[Github](#), [Demo\(CSRF\)](#), [Demo\(XSS\)](#), [Demo\(SQL Injection\)](#)Implemented some SEED-LABS attacks such as **Buffer overflow**, **CSRF**, **XSS**, **SQL injection**, and **Morris worm** attacks.

→ **Security Tool Presentation — “Frida: A dynamic code instrumentation tool”**

[Demo](#)

- Inspected functions on calling, modified their arguments, and did custom calls to functions inside a target process
- Set up an Android device with Frida server and did function tracing on the device
- Hacked Android app using Frida

→ **Bangla Handwritten Character Recognition using CNN**

[Github](#)Implemented CNN model from scratch using Python and tested on the *NumtaDB* dataset.

## SKILLS

❖ Languages	C, C++, Java, Python, Shell Script, JavaScript, SQL
❖ Frameworks	Django, React.js, Express, Node.js
❖ Databases	Oracle, MongoDB
❖ Web Technologies	HTML, CSS, Bootstrap
❖ Operating Systems	Windows, Ubuntu, WSL
❖ Technical Writing	LaTeX, Beamer, Overleaf
❖ Others	Git (GitHub), NS3, XV6, Docker, OpenGL, MS Word, MS Excel, MS PowerPoint

## AWARDS

★ **Dean's List Award**, Bangladesh University of Engineering & Technology, 2022- 2023

For outstanding academic performance in 4<sup>th</sup> year (with average GPA: 3.97/4.00)

★ **National High School Merit Scholarship**, by the Government of Bangladesh, 2017- 2022 (Region position: 83)

★ **National Elementary School Merit Scholarship**, by the Government of Bangladesh, 2015- 2017 (Region position: 135)

## PRESENTATION

- Conference presentation in IEEE Computer Society Bangladesh Chapter Summer Symposium (IEEE CS BDC SS) 2023, Topic: Randomization in Double Coverage Algorithm on a Line for Online  $k$ -Server problem. [\[Certificate\]](#)