MOHAMMAD SHAMIM AHSAN

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Website | GitHub | LinkedIn

EDUCATION

Bangladesh University of Engineering & Technology April, 2018 - May, 2023
Bachelor of Computer Science and Engineering
Department of Computer Science and Engineering CGPA: 3.64/4.00

St. Joseph Higher Secondary School, Dhaka July, 2015 – July, 2017
Higher Secondary Certificate (HSC)
Division of Science GPA: 5.00/5.00 (90.3%)

Bangladesh Navy School and College, Chittagong January, 2013 - April, 2015
Secondary School Certificate (SSC)
Division of Science GPA: 5.00/5.00

RESEARCH INTEREST

Cyber Security and Privacy: Computer security, Web security, Network security, Mobile security (Initially, want to work on detection and prevention of different cyber attacks)

WORK EXPERIENCE

Lecturer July, 2023 - Present
Department of Electrical and Computer Engineering (ECE)
Presidency University, Gulshan-2, Dhaka, Bangladesh

Undergraduate Research Assistant 2022 - 2023
Department of Computer Science and Engineering
Bangladesh University of Engineering & Technology

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 Summer Symposium **(IEEE CS BDC SS)** 2023.

RESEARCH EXPERIENCE

Bangladesh University of Engineering & Technology (BUET) May, 2022 - July, 2023
Title: Detecting User Activity from Encrypted IoT Traffic
Undergraduate Research Assistant
Supervisor: Dr. Md. Shohrab Hossain (BUET) Collaborator: Dr. Anupam Das **(NC State University, USA)**

- Encrypted wireless communications can only hide the payload. The related meta-data (e.g., packet lengths, traffic rate) of the IoT network traffic still leaks information about the messages exchanged. Most of the existing systems depend on the arrival or interval time of the packets which can be easily manipulated by slowing down or speeding up the traffic rate.
- Developed a methodology called "*packet-based signature generation & detection system*" for automatically extracting packet-level *signatures,* consisting of only *packet-length* and *direction,* from IoT devices' network traffic and detecting events of those devices. We devised a threshold on the *number of packets* to consider for the signatures rather than depending on a specific time interval. Thus, our system overcomes the limitations of the existing ones.
- Detected both the binary-type and multi-type events of the devices without prior knowledge about their behavior.
- Checked uniqueness and generalizability of the signatures by testing on various datasets collected from different locations.
- Used 4 well-known datasets: **PINGPONG**, **UNSW**, **YourThings**, **Mon(IoT)r**. Our system outperformed the existing system with the average recall (98−99%) and precision (98−100%).
- Worked as *first author*; contributed significantly in writing and drawing.

Bangladesh University of Engineering & Technology January, 2023 - Present
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 **(Colgate University, 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 exact algorithms, approximate algorithms, randomized algorithms, online algorithms, heuristics and metaheuristics, and low memory algorithms.

ACADEMIC PROJECTS

TCP CERL: congestion control enhancement over wireless networks February, 2022
Network Simulator 3 **(NS3)**, C, Python Github

- Explored the *TCP-CERL* technique for enhancement of congestion control which is a sender-side modification of *TCP-Reno*.
- Whenever 3 duplicate acknowledgements are received, TCP-CERL attempts to distinguish between random loss and congestive loss, and treats both cases differently.
- Implemented this technique in NS3 *which was not done before* (authors used NS2). Tested on two wireless networks: *Wi-Fi* and *LR-WPAN*. Calculated various performance metrics such as throughput, end-to-end delay and packet delivery-ratio.

Image Caption Generator using CNN and LSTM February, 2023
Python, **Flickr_8k** dataset Github

- Recognized the context of an image and annotated it with relevant captions using *deep learning* and *computer vision*.
- *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 *BLEU* and *METEOR* metrics.

Spacey: Online Space Rental Platform August, 2022
MongoDB, **Express.js**, **Rest.js**, **Node.js**, **CSS** Github, Github, Demo

- Developed an online platform with a team of 3 people where property owners can rent their places or free spaces and travelers or business companies can book them to use.
- Designed BPMN, Mock UI (using **Figma**), Class, ER, Sequence, and Collaboration diagrams.
- Main modules of the system were Search, Renting, Hosting, Bookings, Payment, Review-Rate-Complain, Chat, Profile. Used *MERN* stack for development. **Stripe** gateway was used for mobile banking payment method.

***Simple Super Mario* (Microcontroller project)** July, 2021
C, **Atmel Studio**, **Proteus 8** Github

- Developed a Proteus *simulation*-based simple game similar to the super mario using *ATmega32*, *LED green Dot Matrix* and *LCD display*.
- To multiplex two LED matrices, used the same ports for the upper side of both LEDs' and two different ports for the lower sides of them.

***MediSheba* (Database project)** October, 2020
Django, HTML, CSS, **Oracle SQL** Github, YouTube

- Developed an online medical system with *a team of 3 people* where doctor, patient and blood-bank were the main modules.
- Used Django as a framework in Back-end and HTML, CSS as Front-end. The (Oracle-based) database of the project was designed extensively following the relevant ER diagrams.

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
  — Sent messages to and from a target process
  — Set up android device with Frida server
  — Did function tracing on an Android 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.

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.

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 4th year (with average GPA: 3.97/4.00)

Government Scholarship, Bangladesh, 2017- 2022
For outstanding performance in Higher Secondary Certificate Examination (Region position: 83)

Government Scholarship, Bangladesh, 2015- 2017
For outstanding performance in Secondary School Certificate Examination (Region position: 135)

College Final Examination, 2016
Merit position: 1 (in whole college)

HIGHLIGHTED ACADEMIC COURSES

Undergraduate courses**,** Bangladesh University of Engineering and Technology

- CSE-321 Computer Networks
- CSE-405 Computer Security
- CSE-471 Machine Learning
- CSE-461 Algorithm Engineering
- CSE-453 High Performance Database Systems

LANGUAGES

English (Professional) Bangla (Native) Hindi (Listening & Speaking)