

# Fahmid Al Rifat

Bangladesh University of Engineering and Technology

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[GitHub](#) | [Hacker Rank](#) | [Behance](#)

## EDUCATION

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### **Bangladesh University of Engineering and Technology**

March, 2017 - Present

Bachelor of Science in Computer Science and Engineering

Department of Computer Science and Engineering

CGPA: 3.60/4.00

### **Residential Model Collage**

February, 2015 - February, 2017

Higher Secondary Certificate (HSC)

Graduated with High Honor in Science

CGPA: 5.00/5.00

### **Rangpur Zilla School**

February, 2013 - February, 2015

Secondary School Certificate (SSC)

Graduated with High Honor in Science

CGPA: 5.00/5.00

## RESEARCH PROJECTS

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### **An Empirical Study of Automated Unit Test Generation using GitHub Copilot**

*Cyber-Security , Automated unit test generation , GitHub Copilot*

September, 2022

I am currently engaged in a research project under the guidance of **Professor Joanna C. S. Santos** of the Department of Computer Science and Engineering at the University of Notre Dame, USA. The project aims to conduct an empirical study of automated unit test generation using GitHub Copilot. The main focus of the research is to evaluate the effectiveness and efficiency of using GitHub Copilot for unit test generation and to identify any limitations of the tool. Through this research, I anticipate making significant contributions to the field of software engineering and improving the understanding of automated unit test generation.

### **Find the Best Cover Photos for Image Steganography Using a Genetic Algorithm**

*Cybersecurity , Image steganography Genetic algorithm , Optimal method*

March, 2022

I am currently pursuing a research project under the guidance of **Dr. M. Sohel Rahman**, Professor of Computer Science and Engineering at Bangladesh University of Engineering and Technology (BUET). The project aims to develop an optimal method for selecting cover photos for image steganography using a genetic algorithm. The main focus of the research is to enhance the security of the image steganography technique and create a secure method for hiding information within images. Through this research, I anticipate making significant contributions to the field of cybersecurity and advancing the state-of-the-art in the area of secure information hiding.

### **Static analysis in the context of the container domain**

*Cybersecurity , Static analysis , Containerized environments , Security vulnerabilities*

March, 2022

I am currently participating in a collaborative research endeavor, in conjunction with

**Dr. Md. Shohrab Hossain** of the Department of Computer Science and Engineering at Bangladesh University of Engineering and Technology, and **Suryadipta Majumdar**, Assistant Professor at the Concordia Institute for Information Systems Engineering (CIISE), aimed at developing a methodology for static analysis in the context of containerized environments. The research evaluates the efficacy and limitations of static analysis tools and approaches for discovering security vulnerabilities in containerized settings. This research will advance cybersecurity and static analysis in the container domain.

## PROFESSIONAL PROJECTS

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**Icece Buet Website** | - *Laravel, CSS, PHP*

May, 2022  
[Website](#)

Led the development and maintenance of a full-stack web application for the International Conference on Electrical and Computer Engineering, serving as the primary developer responsible for implementing new modules, integrating a payment gateway, and overseeing ongoing maintenance and updates of the website. The website provided a platform for paper submissions and provided detailed information about the conference to users. As a member of the Electrical and Computer Engineering Department at Bangladesh University of Engineering and Technology (BUET), I was responsible for ensuring the website's functionality and accessibility for conference attendees and organizers.

**Raven-claws E-commerce Website Development** | - *Word press, CSS, Photo-shop, PHP*

November, 2020  
[Website](#)

- Developed a full-stack e-commerce web app for client, incorporating features such as subscription-based reviews, sales, and admin recommendations. - Utilized professional skills in WordPress, CSS, Photo-shop, and PHP to design and implement the website, including graphical elements to enhance user experience. - Successfully completed the project for Raven-claws Company, a well-known multi-purpose online shop.

## ACADEMIC PROJECTS

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**Dormitory management system** | *Node.js, React, MongoDB*

May, 2022  
[GitHub-Hidden](#)

- Utilized Node.JS, JavaScript, HTML, and CSS to design and implement the system, which is aimed to be implemented in our varsity. - Developed a web application for managing dormitory processes, including dining management, room allocation, certificate automation, and service request management. - The application helps students, provost, and service personnel to efficiently complete dormitory-related tasks, improves dining management for the dining manager, and includes features such as warning for defaulters and room application automation.

**Hall management system** | *Django, MongoDB*

January, 2022  
[GitHub](#)

A web application for managing dormitory built under Dr. Md. Mostofa Akbar, Computer Science and Engineering, Bangladesh University of Engineering and Technology (BUET). This application helps the student, provost and service man to efficiently complete dormitory related processes.

**Defending Black Hole Attack** | *Network Simulator 3(NS3), C, Python, GNU-Plot*

January, 2022  
[GitHub](#)

The black hole attack is an active insider attack where the attacker consumes the intercepted packets without any forwarding. Here AODV protocol is improved to minimize the damage of black hole and simulated in Network Simulator 3 and this project supervised By Dr. Md. Shohrab Hossain

**Smart Cart** | *C, Arduino, ATmega 32, Atmel Studio, Proteus 832*

November, 2021  
[YouTube](#)

Our team developed a functional smart cart prototype with automatic collision detection and handling capability. Implemented through software simulation and small-scale hardware using AT-Mega32 and Arduino, it has potential practical applications

**Travel Agency BD** | *Django, Oracle SQL, HTML, CSS*

November, 2021  
[YouTube](#)

Developed a travel and tourism web application for Travel Agency BD under guidance of Dr. Muhammad Abdullah Adnan, Computer Science and Engineering, BUET. that Provides travel and tourism services, including accommodation and travel packages, to the general public on behalf of company. Various modules and the development of a database were led using SQL, HTML, CSS, and JavaScript

"Under the supervision of Md. Tarikul Islam Papon, a computer science and engineering student at Bangladesh University of Engineering and Technology (BUET), a server-client system-based multiplayer adventure game was developed which enables users to create and join battles rooms with a variety of weapons"

NFS Kill Trone | *C++ , iGraphics Custom Library*November, 2018  
[YouTube](#)

Under the supervision of Md. Shohrab Hossain, a computer science and engineering student at Bangladesh University of Engineering and Technology (BUET), a graphical adventure game was developed utilizing a custom game engine, developed by us

## OTHER PROJECTS

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### Source Code Translation Using Prompt Engineering in GitHub Copilot

*Cybersecurity , Code Translation , GitHub Copilot*

March , 2022

I have worked in a research project under the guidance of Professor Joanna C. S. Santos of the Department of Computer Science and Engineering at the University of Notre Dame, USA. The project aims to conduct an empirical study of source code translation using prompt engineering in GitHub Copilot. The main focus of the research is to evaluate the effectiveness and efficiency of using GitHub Copilot for source code translation and to identify any limitations of the tool. Through this research, I anticipate making significant contributions to the field of software engineering and improving the understanding of automated source code translation." **An Empirical Study of Code Smells in Transformer-based Code Generation Techniques**

*Pylint, Bandit, Copilot* March , 2022

In this study, I investigated the presence of code smells and security flaws in datasets used to train transformer-based language learning models for code generation. Tasks included creating a copy of the testcases insecure code folder, using copilot to translate Python code to Java, running pylint and bandit on bulk files/folders, and creating scripts to automate the process. Results showed that these datasets contain significant amounts of code smells and security flaws, and that these issues are present in generated source code, emphasizing the need for more robust and secure training datasets for code generation.

## MINI PROJECTS

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### Cryptography Hybrid Model | *Python , Socket programming*

May, 2022  
[GitHub](#)

A client server based hybrid model where a sender can share encrypted message and receiver can decrypt them . AES and RSA algorithm applied here .

### File Transfer TCP | *Java , Socket programming*

January, 2022  
[GitHub](#)

A special purpose file server where student/client can upload , download or request for files simultaneously with help of multi threading . TCP chunk by chunk sending concept, timeout and Acknowledgement concept applied here with proper error handling .

### Word-Count-JavaFX | *Java, JavaFX*

January, 2019  
[GitHub](#)

A GUI based JavaFX program where user can select text file and the program will count the duplicate words .

### Text-Sliding-iGraphics | *C++ , iGraphics Custom Library*

November, 2018  
[GitHub](#)

Prototypes a graphical working model that slides given input Text in desire direction which is designed with iGraphics Custom Library and other relevant components.

Prototypes a graphical working model that simulate Analog-Clock with iGraphics Custom Library and other relevant components.

## ACADEMIC WORKS

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**Machine Learning** | *L<sup>A</sup>T<sub>E</sub>X*, *Python* , *C++*

January , 2023  
[GitHub](#)

Eigen Vectors and Values, Logistic Regression model , K-Means model , Gaussian Mixture Models , expectation maximization model , digit recognition using CNN , Code comments classification with NLP (BERT, fastText, Random Forest etc)

**Algorithm Engineering** | *Python* , *C++*

January , 2023  
[GitHub](#)

Parameterized Algorithms , Online Algorithms ,Hamiltonian Cycle problem in depth.

**High Performance Database System**

January , 2023

-High-performance databases, transaction-oriented computing and concurrency control for efficient data management. -Techniques for failure and recovery, replica management and benchmarks for evaluating system performance. -Understanding of NoSQL data models, architecture, transactions and optimizations for scalability.

**Fault tolerance System**

January , 2023

-Techniques for designing and implementing fault-tolerant systems, including circuit fault detection and location. -Methods for circuit testing, diagnostic simulation, and auto-test pattern generation. -Techniques for fault modeling, performance monitoring, and error correction such as memory failures, test pattern, dependability, self-checking circuits, burst error correction, and triple modular redundancy.

**Computer Security** | *Python* , *C++*

May , 2022  
[GitHub](#)

Cryptography, Buffer Overflow, Malware, Security Tool

**Computer Graphics** | *OpenGL* ,*Python* , *C++*

May , 2022  
[GitHub](#)

3D modeling in OpenGL , Raster Graphics Pipeline, Hidden Surface Removal, Ray Tracing

**Adding Memory Managing , Scheduling feature in Xv6** | *MIT Xv6 code-base* , *C++*

January, 2022  
[GitHub](#)

Xv6 is MIT os codebase . Like many other components of Xv6 OS, the memory management system isn't on par with modern-day standards. My mission was to enhance and improve the memory management system of Xv6

**Information-System-Design** | *Draw.io* , *Power-Point*

January, 2022  
[GitHub](#)

Requirement Analysis , BPMN, MOCK UI, Class Diagram, ERD Diagram, Collaboration Diagram, Sequence Diagram

**Artificial Intelligence** | *C++* , *Java*

January, 2022  
[GitHub](#)

Implenting Ai in Mancala Game , Implenting Hidden Marcov Model , N Puzzle Game with Adeversial Search , Constant Satisfactory Problem with Cocho Solver.

Our basic version compiler have Symbol Table, Lexical Analysis part, Syntax and Semantic Analysis part and Intermediate Code Generation part which as a whole translates computer code written in C into Assembly .

OOP, Creational Design Pattern, Structural Design PatternsFile , Behavioral Design PatternsFile and Test Case generation

Processor Design implementing MIPS Instruction SetFile and Pipelined Datapath

Greedy Algorithms, APSP, Max Flow, Binomial Heap, Red Black Tree , Dynamic programming , Divide and Con quire , Graph Searching Algorithm, Hashing etc

Implementing circuits with basic gates, Truth tables and simplification using Boolean Algebra, K-maps, Arithmetic circuit design, Circuit design using IC 7483, Encoder and Decoder Circuits, Multiplexers, Flip-Flops, Counters .

Constrained and Unconstrained Optimization, Curve fitting, Approximation and Round-off error, Truncation error and Taylor Series, Roots of equation, Linear System, Numerical Differentiation and Integration, Ordinary and partial differential equation.

## ACHIEVEMENTS

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### Achievements in Capture the Flag (CTF) Competitions

- Placed 24th in the National Cyber Drill 2023
- Placed 22th in the National Cyber Drill 2022
- Placed 35th in the Flag Hunt CTF
- Placed Final Round in the Leetcon CTF
- Placed Final Round in the SUST CTF

### Bangladesh University of Engineering and Technology — Architecture Admission Test (2017)

Position: 8<sup>th</sup> all Bangladeshi students

### University of Dhaka — Admission Test (2017) - Position: 215<sup>th</sup> all Bangladeshi students

### Medical Admission Test (2017) -5<sup>th</sup> Choice : Sylhet MAG Osmani Medical College

### College Examination (2016) - Position: 2<sup>th</sup> among all sections

### Secondary School Certificate (2017) - Position: 7<sup>th</sup> among Region

Awarded IST position in victory Day and Independence day Art competition organize by BD National Museum - Position: Top 1

Awarded several times in art and literature competition organize by Shilpachargo joynal avedin sangrohosala, Mymensingh - Position: Top 1

## SCHOLARSHIPS

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### **TECHNICAL SCHOLARSHIP, BANGLADESH, 2017-22**

Complimentary scholarship for regular engineering students.

### **GOVERNMENT SCHOLARSHIP, BANGLADESH, 2015-17**

Awarded For Outstanding Performance in Secondary School Certificate Examination.

## EXTRA-CURRICULAR ACTIVITIES

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### **Cyber-Security Club - Vice President**

- Planning and organizing workshops and Capture the Flag (CTF) competitions, including designing and setting competition questions
- Led a team of members to participate in Cyber-security events, providing mentorship and guidance
- Collaborated with professors and industry professionals to provide resources and opportunities for skill development

**Capture the Flag (CTF) Competitions - Participant** Participated in some CTF competitions, with good placements in several competitions . Developed skills in problem-solving, critical thinking, and teamwork through participation in the competitions

**Attended green brick project organize by UNDP Bangladesh**

**Attended several times in math Olympiad organize by Prothom Alu**

**ESPL Mobile Legend tournament runners-up (2020-21)**

## CERTIFICATES

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### **Informatics Olympiad**

#### **Problem Solving**

Codeforces, Hackerrank, Choco-solver (CSP)

**Digital Marketing , Animation by 10 min school**

**Advance photography , Graphics Design by Ghuri Learning**

## TECHNICAL SKILLS

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**Languages:** Java, C, C++, Python, Matlab, JavaFX , Gnu-Plot, Bash , Assembly

**Database:** Oracle, MySQL, SQLite, MongoDB

**OS:** Windows, Linux(Kali,Ubuntu, Seed-Lab)

**Version Control:** Git(GitHub)

**Frameworks:** JavaFX, Django , Node.js, React

**Web Technology:** HTML, CSS, PHP, Bootstrap, Word-press, JSON, XML

**Graphics Technology:** Auto-Cad, Photoshop, Illustrator, PowerPoint, Premier Pro, Kine-Master

**Compiler IDE:** Flex , Bison , EMO 8086

**Micro-Controller:** Arduino , ATmega 32, Atmel Studio , Proteus 832

**Technical Writing:**  $\text{\LaTeX}$ , Beamer, Overleaf

**Other:** Networking Simulator 3 (NS3), iGraphics , Cisco-Packet-Tracer , PyTorch , open-GL