Ridwanul Hasan Tanvir

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EDUCATION

Pennsylvania State University 2024 - Present
Ph.D. in Computer Science and Engineering
Department of Computer Science and Engineering

Bangladesh University of Engineering and Technology 2018 - 2023
Bachelor of Science in Computer Science and Engineering
Department of Computer Science and Engineering

Notre Dame College 2015 - 2017
Higher Secondary Certificate (HSC)

PUBLICATIONS

- **Using Large Language Models to Generate JUnit Tests: An Empirical Study**
  28th International Conference on Evaluation and Assessment in Software Engineering (EASE 2024)
- **State Machine Mutation-based Testing Framework for Wireless Communication Protocols**
  2024 ACM SIGSAC Conference on Computer and Communications Security (CCS 2024)
- **In-Device 5G Control-Plane Threat Monitoring**
  2025 IEEE Symposium on Security and Privacy (S&P 2025 Cycle 2) (under review)

RESEARCH EXPERIENCE

Pennsylvania State University, USA August, 2024 - December, 2024

- Sueprvisor: Rui Zhang, Assistant Professor, Department of CSE, Penn State University
- Protocols are described in hundreds of natural language documents.
- We find that these specifications often contain incomplete or ambiguous instructions
- Developers sometimes misunderstand these cases, leading to security issues.

University of Notre Dame, Indiana, USA December, 2022 - December, 2023

- Sueprvisor: Joanna C. S. Santos, Assistant Professor, Department of CSE, University of Notre Dame
- Using large language models to automatically generate JUnit tests for Java, assessing their effectiveness in terms of compilation rates, correctness, coverage, and presence of test smells.

Bangladesh University of Engineering and Technology, Bangladesh May, 2023 - December, 2023

- Sueprvisor: Dr. Anindya Iqbal, Professor, Department of CSE, BUET
- Develop machine learning algorithms that automatically generate test cases for both positive and negative testing.
- Execute test cases from Natural Language Instructions to Actual Mobile Applications using Large Language Model.

Bangladesh University of Engineering and Technology, Bangladesh May, 2022 - June, 2023

- Sueprvisor: Dr. Atif Hasan Rahman, Md. Abul Hassan Samee
- Unsupervised probabilistic clustering method of single-cell RNA-sequencing

PROFESSIONAL EXPERIENCE

Bangladesh University of Engineering and Technology | *Research Assistant* May, 2023 - December, 2023

- Research and Innovation Center for Science and Engineering
- Applied Machine Learning Lab, BUET
- Collaborated with Samsung R&D Institute Bangladesh (SRBD)
- For Mobile Applications (Samsung Contact and Samsung Settings) Manual Test case generation required hundreds of Manual hours. Utilizing Machine Learning and open source Large Language Models, we automated the full pipeline.

NOTABLE PROJECTS

Bangla Named Entity Recognition| *NLP Hackathon Bangladesh*— ***2nd Runner Up*** January, 2023

- Two-day hackathon was conducted by Amazon Alexa Applied Scientist Sudipta Kar and Dr. Farig Yousuf Sadeque.
- Developed two models. Employed the CRF (Conditional Random Field) algorithm for the feature-based model.
- Implemented the BanglaBERT (large) model for the deep learning approach.

Grammatical Error Detection | *Bhashabhrom Hackathon* — ***Champion*** March, 2023

- To detect sub-strings of a Bangla text that contain grammatical, punctuation, or spelling errors.

DealFinder | *Django, JavaScript* February, 2022

- A platform for users to access and stay informed about all the latest technology deals and promotions.
- Automatically applies coupon codes and discounts to online purchases.

ACADEMIC PROJECTS

BUET Photographic Society | *React, Django, Bootstrap* August, 2022

- High-Quality Photography community and marketplace Customizable portfolio to showcase your work. Community engagement through comments, likes, shares, and challenges Opportunities to participate in various photo challenges and contests organized (Quest). Prizes offered for top-performing entries that vary from challenge to challenge. Access to feedback from judges and other photographers which can help improve your photography skills. [Source Code]

- Supervisor: Dr. Anindya Iqbal, Professor, Department of CSE, BUET

Retransmission Timeout Weighted Median | *Network Simulator 3(NS3), C, Python, GNUPlot* February, 2022

- Implemented recursive weighted median (RWM) using NS3 which yields significantly tighter RTT bounds than Jacobson's algorithm over Internet traffic with heavy tailed statistics. The RWM filters are more effective in impulsive signal environments, which is often the case with RTT signals with heavy tailed statistics.[Source Code]

Scheduling and Memory Management in xv6 January, 2022

- Implemented lottery scheduling algorithm and page replacement algorithms: FIFO and LRU. [Source Code]

Drone-based Hardware | *C, AtMega32, Atmel Studio, Proteus 8, Arduino* September, 2021

- Microcontroller project for Drone and Flight Controller

- Designed a fully functional software simulation and later, built a working hardware prototype. [Source Code]

- Supervisor: Dr. A. B. M. Alim Al Islam, Professor, Department of CSE, BUET

Yet-Another-C-Compiler | *Flex , Bison , EMU 8086* July, 2021

- Symbol Table, Lexical Analysis, Syntax and Semantic Analysis and Intermediate Code Generation which as a whole translates computer code written in C into Assembly. [Source Code]

Security Tool: Data Loss Prevention May, 2021

- Support for regular expressions and keyword matching to identify sensitive data. Configurable scanning options for individual computers or entire networks. [Source Code]

Bikroy Maven | *Django, Bootstrap, Python, Oracle SQL* December, 2020

- Sellers can post ads and buyers can contact them directly to make a purchase. Allows employers to create and publish job openings for their organization. Allows candidates to accept job offers from prospective employers. Chat messaging feature for direct communication between buyers and sellers. Location-based search functionality to help users find products or services in particular area. [Source Code]

Skyfall Savior | *C,iGraphics Custom Library* July, 2018

- A simple 2D graphical shooting adventure game with multiple levels.Built using a custom graphics library written in C. Supports system collision,ranking and extra life system.

ReciproCity | *Java,JavaFx,Socket Programming* January, 2019

- Promotes sustainability and collaborative consumption. Peer-to-peer sharing system. Sharing of products including books, jackets, electronics, musical instruments, and sports equipment.Convenient and accessible for university students. [Source Code]

- Supervisor: Dr. Mohammad Saifur Rahman, Associate Professor, Department of CSE, BUET

TEACHING EXPERIENCE

Pennsylvania State University August, 2024 - December, 2024

- CMPSC 131 - Programming and Computation I:
  - basic computational constructs found in imperative, object-oriented, and functional programming languages such as iteration, conditionals, functions, recursion, and datatypes.
  - Project Supervision for simplified social network interface.

CERTIFICATES

TOEFL iBT
Total: 107(Out of 120, 30 Per section)
Reading: 27, Listening: 28, Speaking: 24, Writing: 28

Other Certifications
Deep Learning Specialization (offered by DeepLearning.AI)
CS50W: CS50's Web Programming with Python and JavaScript (offered by HarvardX)
Machine Learning Foundations: A Case Study Approach (offered by University of Washington)
Convolutional Neural Networks (offered by DeepLearning.AI)
SD3x: Algorithm Design and Analysis (offered by PennX, University of Pennsylvania)

Problem Solving
Kaggle Expert
EEE DAY 2023 Datathon Champion

LEADERSHIP EXPERIENCES

- Graduate and Professional Student Association at Penn State (GPSA)
  - Assembly Delegate for College of Engineering
  - Member of Student Engagement Committee
  - Organize programs, initiatives, and service opportunities that promote the sense of community and engagement
  - Bill Proposal for Annual Winter Gala
- PSU Science Policy Society
  - Pitch science policy ideas to policymakers and policy practitioners in Pennsylvania state government.
- Volunteer for AID Penn State
  - Raise money for charities by volunteering at our home football games at Beaver Stadium
  - Last Fall, AIDPSU raised over 10,000$, thanks to the dedicated efforts of its hardworking volunteers.
- High School Debate Team Champion
  - Developed strong public speaking and critical thinking skills.
- Contributed to Promoting Democratic Institutions and Practices (PRODIP)
  - Raised awareness of democratic practices in school.
  - Promoted transparency in governance.

ACHIEVEMENTS AND AWARDS

Bug Bounty Reward:

Samsung
$2,800 for reporting moderate severity vulnerabilities in BLE

Google
$3,000 for reporting high severity vulnerability in LTE implementation

Grants:

Reserarch Grant, 2023
Research and Innovation Center for Science and Engineering Grant of BDT 81,000

Bangladesh Open Source Network - BdOSN
Grant of BDT 20,000

Bengali.AI
Research Grant of BDT 75,000

Awards:

Notre Dame College: 2015, 2016
Perfect Attendance for 2 Years at Notre Dame College

CUET Admission Test, 2017
Acquired merit position 2 in the whole country

Inter University Cyber Drill, 2022
Position: Champion among our University Teams

Bangla Grammatical Error Detection Challenge,2023
Position: **Champion**

Bangladesh's First Natural Language Processing Hackathon, 2023
Position: 2^{nd} **Runner Up**

National Undergrad Math Olympiad, 2021
Position: 7^{th}

Dean's List: 2019, 2023
Faculty of Electrical and Electronic Engineering, BUET

University Merit Scholarship, 2019

Government Scholarship, Bangladesh: 2022, 2017, 2015, 2013

REPORTED VULNERABILITIES

3 Vulnerabilities in BLE devices:

CVE-2024-20890, CVE-2024-20889, CVE-2024-29155.

2 Vulnerabilities in LTE devices:

CVE-2024-32911, CVE-2024-38426

HIGHLIGHTED ACADEMIC COURSES

Graduate Course, Pennsylvania State University

CSE 566: Algorithms and Data Structures in Bioinformatics

CSE 511: Operating Systems Design

Undergraduate Course, Bangladesh University of Engineering and Technology

CSE-463 Introduction to Bioinformatics

CSE-409 Computer Graphics

CSE-421 Basic Graph Theory

CSE-471 Machine Learning

REFERENCES

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