Mazharul Islam

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Website: https://islamazhar.github.io
[Google Scholar], [GitHub]

Research Interests

Areas Cryptography, Machine Learning, Measurement.

Topics User Authentication, Fuzzy Cryptography, Privacy Preserving Machine Learning.

Education

Aug '20 – Present **University of Wisconsin-Madison**, *Madison, Wisconsin*
Ph.D. student, Department of Computer Science.

Aug '20 – May '22 **University of Wisconsin-Madison**, *Madison, Wisconsin*
Masters in Computer Science, CGPA: 3.75/4.00.

Aug '19 – May '20 **Virginia Tech**, *Blacksburg, VA*
Ph.D. student in Computer Science, CGPA: 3.94/4.00 *Transferred to University of Wisconsin-Madison in 2020, .

Jul '12 – Feb '17 **Bangladesh University of Engineering & Technology (BUET)**, *Dhaka, Bangladesh*
BSc. in Computer Science and Engineering, CGPA: 3.73/4.00, .

Selected Publications (Full list of publications here)

USENIX Security 2023 [1] **M. Islam***, M. S. Bohuk*, P. Chung, T. Ristenpart, R. Chatterjee ***"Arana: Discovering and Characterizing Password Guessing Attacks in Practice"***, [Acceptance rate = TBD], *co-first authors.

USENIX Security 2022 [2] M. S. Bohuk, **M. Islam**, S Ahmad, M. Swif, T. Ristenpart, R. Chatterjee *"**Gossamer: Securely Measuring Password-based Logins"***, [Acceptance rate: 17.2%] [PDF] [Source Code] [Media Coverage]

USENIX Security 2022 [3] B. Pal, **M. Islam**, M. S. Bohuk, N. Sullivan, T. C. Wood, T. Ristenpart, R. Chatterjee ***"Might I Get Pwned: A Second Generation Compromised Credential Checking Service"***. [Acceptance rate: 17.2%] [PDF] [Source code][Media Coverage]

PoPETs 2023 [4] M. Almansoori, **M. Islam**, S. Ghosh, M. Mondal, R. Chatterjee *(Title changed to preserve anonymity)* ***"Search Bias in Tech-Enabled Intimate Partner Surveillance"***. [Under Submission]

IEEE Sec-Dev 2020 [5] **M. Islam**, S. Rahaman, N. Meng, B. Hassanshahi, P. Krishnan, D. Yao, "***Coding Practices and Recommendations with Spring Security for Enterprise Applications***", [Acceptance rate = 39%] [PDF] [Presentation Video]

BMC Genomics 2020 [6] **M. Islam**, K. Sarker, T. Das, R. Reaz, Md S. Bayzid ***"STELAR: A statistically consistent coalescent-based species tree estimation method by maximizing triplet consistency"***, BMC Genomics **21**, 136 (2020). [Impact factor: 3.9] [PDF] [Source Code]

Bioinformatics 2022 [7] S. Tarafder, **M. Islam**, S. Shatabda, A. Rahman, ***"Figbird: A probabilistic method for filling gaps in genome assemblies"***, Bioinformatics, Volume 38, Issue 15, [Impact factor: 6.9] [PDF] [Source code]

MobiQuitous 2019 [8] **M. Islam**, N. Naurin, M. Kaykobad, S. Chellappan, and A. B. M. A. A. Islam, ***"HEliOS: Huffman Coding Based Lightweight Encryption Scheme for Data Transmission"*** *16th EAI International Conference on Mobile and Ubiquitous Systems: Computing, Networking and Services* (ACM, Houston, TX, USA) [h-index 40, Acceptance rate: 30%] [PDF].

NSysS 2018 [9] **M. Islam**, Md. N. Ansary, N. Nurain, S. P. Shams and A. B. M. A. A. Islam, ***"Attacking a Live Website by Harnessing a Killer Combination of Vulnerabilities for Greater Harm"***, *5th International Conference on Networking, Systems and Security 2018 , Dhaka, Bangladesh* [Acceptance rate: 29%]

Research Impact

Might I Get Pwned (MIGP) [3] is deployed at `Cloudflare` (a major CDN provider) to warn users from selecting passwords similar (and same) to a breached password in a secure way (official blog link)

My proposed changes of Spring security framework in [5] have improved its documentation (`Link`) and contributed a new fix (`Link`) on 6.0.x release.

Work Experience

Aug '20 — Present **Graduate Research Assistant**, *University of Wisconsin-Madison*, Madison, WI.
Working on enhancing security and usability of password based authentication using techniques from applied cryptography and machine learning.

May '22 – Aug '22 **Ph.D. Research Intern**, *Visa Research, Systems Security Team*, Palo Alto, CA.
During the internship, I worked on designing multi-party computation (MPC) friendly complex non-linear functions used in deep neural networks.

Aug '20 — Dec '20 **Graduate Teaching Assistant**, *University of Wisconsin-Madison*, Madison, WI.
Course name: CS 642-Introduction to Information Security. Responsibilities include conducting office hours for students, preparing homework and grading.

Jun '17 – Jul '19 **Lecturer**, *Department of Computer Science*, United International University, Dhaka, Bangladesh.
Designed and instructed undergraduate level courses including CSE-477: Network Security and CSE-315: Data communications

May '17 – Jun '17 **Software Engineer**, *iPay Systems Limited*, Dhaka, Bangladesh.
Worked as a front-end developer and was part of security testing team.

Selected Research Projects

Enhancing security and usability of password based authentication, *[Sep 2020 — Ongoing]*.
Advisors: Prof. Rahul Chatterjee, Prof. Thomas Ristenpart.
Publications: USENIX Security 2022, 2023.
— Help designing and implementing a new breach altering services to warn users for passwords vulnerable to *credential tweaking attacks*. Now deployed at Cloudflare a major CDN service provider.
— Analyze user's password related behaviour from authentication logs of 34 million login requests collected in a privacy preserving way from two large scale universities over 7 months.
— Developed a novel unsupervised clustering approach to discover previously undetected 29 online password guessing attacks campaigns. Through this process discovered 1.1K new compromised usernames and $\approx$ 373 of them have been identified independently as compromised by respective universities' IT analysts.

Approximating complex neural network activation functions for real time multi-party computation, *[May 2020 — Ongoing]*.
Mentors: Dr. Maliheh Shirvanian, Dr. Peter Rindel, Dr. Sunpret Arora
Status: Pending patent approval and preparing mnuscript for ACM CCS '23.
— I am working on designing multi-party computation (MPC) friendly complex non-linear functions such as `SiLU` and `GELU` which are extensively used in deep neural networks (DNN) without sacrificing prediction accuracy of the DNN mode.

Developing statistical tools in Bioinformatics, [May 2017 — Jun 2020] .
Mentors: Prof. Md. Shamsuzzoha Bayzid, Prof. Atif. Rahaman.
Publications: BMC Genomics, Oxford Bioinformationcs.
— Developed and implemented a new statistically consistent dynamic programming based approach to infer species trees from a set of gene trees.
— Helped building a probabilistic method for filling gaps in genome assemblies.

Awards

2022 Travel grant. Privacy Preserving Machnine Learning (PPML) workshop co-located with FOCUS '22, Denver, CO.
2020 Received CS fellowship from University of Wisconsin-Madison (Given to 15-20% top admitting graduate students)
2017 Best Student Poster Award (1/42), NSysS conference
2015 ACM ICPC Programming contest, (17^{th}/170 teams), Dhaka regional, Bangladesh.
2015, 2016 – Dean List Awards for outstanding academic performance, Department of computer science, BUET.
– University Merit List Scholarship for Academic Result, BUET.

Skills

Languages Python, C++, Java, Go, HTML, CSS
Frameworks Pytorch, Django
Tools Git, Docker

Invited Talks

2022 *"Towards usable and secure password based user authentication"*, Visa research, Palo Alto, CA
2020 *"Coding Practices and Recommendations with Spring Security for Enterprise Applications"*, IEEE SecDev '20, ~~Atlanta, GA~~ happened virtually due to COVID-19 pandemic.
2019 *"Huffman coding based encryption scheme"*, MobiQuitous-19, Houston, TX.

Extra Curricular Activities

Reviewer Artifact evaluation PC member USENIX 2022 (2), Externally reviewed papers from USENIX 2022 (1)
Mentor – One undergraduate student at University of Wisconsin-Madison (also have co-authored one paper [1]).
– Welcoming and advising two new incoming graduate students at University of Wisconsin-Madison (2022).
Volunteer – Worked as field volunteer and took sessions on improving health hygiene and mental development of the children of sex-workers at nonprofit organization named Project Pothchola (2017).
– Running the "Madison Tech Clinic" as part of "Domestic Abuse Intervention Services (DAIS)" at Madison to provide services to give consultation to victims of tech-enabled intimate partner violence (2022 — Current)

References

Dr. Rahul Chatterjee
Assistant Professor
Department of Computer Science
University of Wisconsin-Madison
Madison, WI

Dr. Thomas Ristenpart
Associate Professor
Department of Computer Science
Cornell University
Ithaca, NY

Dr. Maliheh Shirvanian
Staff Research Scientist
System Security team
Visa Research
Palo Alto, CA