Salman Ahmed

Homepage: https://salmanyam.github.io Email: ahmedms@vt.edu

Education

Virginia Tech Blacksburg, VA
Ph.D. Candidate, Computer Science Blacksburg, VA Aug. 2017 – Dec. 2021 (Expected)
Advisor: Prof. Daphne Yao
Thesis: Quantitative Metrics and Measurement Methodologies for System Security Assurance (tentative)

Ph.D. Committee Members
1. Danfeng (Daphne) Yao (Chair), Professor, Turner Fellow, and CACI Fellow, Computer Science, Virginia Tech
2. Gang Wang, Assistant Professor (Ext. Member), Computer Science, University of Illinois at Urbana-Champaign
3. Matthew Hicks, Assistant Professor (Member), Computer Science, Virginia Tech
4. Patrick R. Schaumont (Ext. Member), Professor, Electrical & Computer Engineering, Worcester Polytechnic Institute
5. Fabian Monrose (Ext. Member), Kenan Distinguished Professor, Computer Science, UNC at Chapel Hill

East Tennessee State University Johnson City, TN
Master of Science (MS) in Computer Science Aug. 2015 – May 2017
Advisor: Prof. Asadul Hoque
Thesis: An Investigation into the Performance Evaluation of Connected Vehicle Applications: From Real-World Experiment to Parallel Simulation Paradigm

Bangladesh University of Engineering and Technology Dhaka, Bangladesh
Bachelor of Science (BS) in Computer Science and Engineering Jan 2008 – Feb 2013
Thesis: Audio Steganography with Quantum Key Cryptography
Advisor: Prof. Mohammad Kaykobad

Research Interest

Security Metrics & Methodologies for Security Assurance and Attack Surface Quantification, Measurable Cloud Security, Threat Intelligence Analysis, Insider Threat Detection, and Program Analysis.

Professional Appointments

Virginia Tech Blacksburg, VA
Research Assistant Jan 2018 - present
Developing methodologies and metrics for large-scale security assurance and attack surface quantification

IBM Research IBM T. J. Watson Research Center, Yorktown Heights, NY
Research Intern June 2020 – August 2020
Developed a workload scheduling/placement algorithm for cloud platforms using quantifiable attack surface metrics to improve cloud security through specialization

Banc Intranets Johnson City, TN
Software Developer Intern May 2017 – August 2017
Developed document and ticket management modules in the Banc Intranets' core products

East Tennessee State University Johnson City, TN
Research Assistant Aug. 2015 – May 2017
Developed a smart connected vehicle application that assists drivers for freeway merging

Samsung R&D Suwon, South Korea & Dhaka, Bangladesh
Software Engineer Mar 2013 – Aug 2015
Developed the rotary UI & platform tools such as 15-test, HW-test, Pretest, & Keystring for Samsung smartwatches

Patents

1. Danfeng Yao, Salman Ahmed, and Ya Xiao. Probabilistic Evidence Based Insider Threat Detection and Reasoning. Patent Application No. PCT/US21/37240, Filed June 14, 2021.
2. Michael Vu Le, Salman Ahmed, and Hani Talal Jamjoom. Security Risk-Aware Scheduling on Container-Based Clouds. Patent Reference No. P202007082US01.

Press Coverage and Leadership Activities

- Alumnus Salman Ahmed receives outstanding thesis award, ETSU News (2018). Link
- Team leader for IEEEXtreme Programming Contest 9.0 and 10.0 (2016 & 2017)

Honors and Awards

- Nominated for the IBM PhD Fellowship Award from CS@VT (2019)
- ETSU School of Graduate Studies Outstanding Thesis Award (2018)
- Tennessee Conference of Graduate Schools Outstanding Master's Thesis (2018)
- Outstanding Computing Graduate Student Award, Department of Computing, ETSU (2017)
- Best Paper Award (3rd Place), Graduate Student Competition of the ACM-Mid Southeast Conference, TN (2016)
- Samsung R&D Icon of the Month Award, Samsung R&D Institute Bangladesh (2015)
- IEEEXtreme Programming Contest 10.0 (18th Place in the USA) (2016)
- Dean's List for outstanding result in the 4th year at BUET (2012)

Publications

Refereed Conference Proceedings

1. Salman Ahmed, Hans Liljestrand, N. Asokan, and Danfeng (Daphne) Yao. Data Pointer Prioritization. To be submitted in the 31st USENIX Security Symposium (USENIX Security 2022).
2. Salman Ahmed, Michael Le, Dan Williams, Hani Jamjoom, and Danfeng (Daphne) Yao. Scheduling for Security. To be submitted in The European Conference on Computer Systems (EuroSys 2022).
3. Ya Xiao, Salman Ahmed, Xinyang Ge, Bimal Viswanath, Na Meng, and Danfeng (Daphne) Yao. Comprehensive Comparisons of Embedding Approaches for API Completion Tasks. Submitted to 44th International Conference on Software Engineering (ICSE 2022).
4. Salman Ahmed, Ya Xiao, Gang Tan, Kevin Snow, Fabian Monrose, and Danfeng (Daphne) Yao. Methodologies for Quantifying (Re-)randomization Security and Timing under JIT-ROP. In Proceedings of the 2020 ACM SIGSAC Conference on Computer and Communications Security (CCS'20), October 2020, Pages 1803–1820, https://doi.org/10.1145/3372297.
5. Long Cheng, Hans Liljestrand, Salman Ahmed, Thomas Nyman, Trent Jaeger, N. Asokan, and Danfeng (Daphne) Yao. "Exploitation Techniques and Defenses for Data-Oriented Attacks." IEEE Secure Development Conference (SecDev). McLean, VA. Sept. 2019.
6. Salman Ahmed and Mohammad A. Hoque. "Partitioning of Urban Transportation Networks Utilizing Real-world Traffic Parameters for Distributed Simulation in SUMO." In Proceedings of IEEE Vehicular Network Conference (VNC), Columbus, OH, USA, 2016.
7. Salman Ahmed, Mohammad A. Hoque, and Phil Pfeiffer. "Comparative Study of Connected Vehicle Simulator." In Proceedings of IEEE Southeast Conference (SoutheastCon), pp. 1-7, Norfolk, VA, 2016.

Journal Articles and Magazines

1. Salman Ahmed, Ya Xiao, Taejoong (Tijay) Chung, Carol Fung, Moti Yung, and Danfeng (Daphne) Yao. Privacy Guarantees of Bluetooth Low Energy (BLE)Contact Tracing: A Case Study on COVIDWISE. Submitted as a Computer Magazine to IEEE Computer Society.

2. Long Cheng, Salman Ahmed, Hans Liljestrand, Thomas Nyman, Haipeng Cai, Trent Jaeger, N. Asokan, and Danfeng (Daphne) Yao. Exploitation Techniques for Data-Oriented Attacks with Existing and Potential Defense Approaches. In ACM Transactions on Privacy and Security.
3. Mohammad A. Hoque, Xiaoyan Hong, and Salman Ahmed. "Parallel Closed-loop Connected Vehicle Simulator for Large-scale Management of Transportation Networks: Challenges, Issues, and Solution Approaches," In IEEE Intelligent Transportation Systems Magazine (Impact Factor: 3.65).

4. Salman Ahmed, Jennifer Houser, Mohammad A. Hoque, Rezaul Raju, Phil Pfeiffer. "Reducing Inter-process Communication Overhead in Parallel Sparse Matrix-Matrix Multiplication." In International Journal of Grid and High-Performance Computing, Vol. 9, No. 3, 2017. (Impact Factor: 0.57).

Refereed Conference Posters, Tutorials, and Demos

1. Salman Ahmed, Long Cheng, Hans Liljestrand, N. Asokan, Danfeng (Daphne) Yao. Tutorial: Investigating Advanced Exploits for System Security Assurance. In IEEE Secure Development Conference (SecDev'21), October 18 - 20, 2021.
2. Salman Ahmed, Ya Xiao, Gang Tan, Kevin Snow, Fabian Monrose, & Danfeng (Daphne) Yao. "Poster: Methodologies for Quantifying (Re-) Randomization Security and Timing under JIT-ROP. In Network and Distributed Systems Security (NDSS) Symposium 2020, San Diego, CA, USA.
3. Salman Ahmed, Ya Xiao, Gang Tan, Kevin Snow, Fabian Monrose, & Danfeng (Daphne) Yao. "POSTER: Quantifying the Impact of Fine-grained Code Randomization on Attack Surface Reduction." IEEE Secure Development Conference (SecDev). McLean, VA. Sept. 2019.
4. Salman Ahmed, Danfeng (Daphne) Yao, and Haipeng Cai. "POSTER: Extracting Anti-specifications from Vulnerabilities for Program Hardening." In IEEE Secure Development Conf. (SecDev). Cambridge, MA. Sept. 2018.
5. Salman Ahmed, Mohammad A. Hoque, Jackeline Rios-Torres, and Asad Khattak. "Demo: Freeway Merge Assistance System using DSRC." In Proceedings of the 2nd ACM International Workshop on Smart, Autonomous, and Connected Vehicular Systems and Services, pp. 83-84, Snowbird, Utah, USA, October 2017.
6. Salman Ahmed and Mohammad A. Hoque. "Demo: Real-time Vehicle Movement Tracking on Android Devices Through Bluetooth Communication with DSRC Devices." In Proceedings of IEEE Vehicular Network Conference (VNC), Columbus, OH, USA, 2016.

Presentation

1. Methodologies for Quantifying (Re-)randomization Security and Timing under JIT-ROP. ACM CCS'20. November 2020, Talk is available at https://youtu.be/VjI4wChFQ5M.
2. Importance of Information Leakage to Bypass ASLR. DARPA Cyber Assured Systems Engineering (CASE) program. Final report meeting. August 31, 2018.

Selected Academic Projects

1. **Automatic Commit Generator:** A commit message generator from source code differences between two versions of a software. The source code differences are described using natural language and then the natural language description is translated into commit messages using a pre-trained neural machine translation model.
2. **Compiler:** A compiler capable of generating intermediate code (assembly x86) from a Pascal program.

3. **Blinds' Eye:** A navigation tool for blind people using an Ultrasonic sensor, MicroSD card, and Micro-controller. The interfacing language was C.
4. **4-bit CPU:** A 4-bit MIPS architecture-based Computer capable of executing 28 instructions using at most 8 clock cycles. The system was capable of executing basic instructions like add, multiply, push, pop, jump, call, halt, move, and, or, etc.

References

Available upon request.