

Syed Raful Hussain

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AREA OF INTERESTS	Network Security, and IoT Security.	
EDUCATION	Purdue University <i>Ph.D. in Computer Science</i> Thesis: <i>A Systematic Framework for Analyzing the Security and Privacy of Cellular Networks.</i> Supervisor: Prof. Elisa Bertino	Fall 2018
	North Carolina State University <i>Master in Computer Science</i>	Spring 2013
	Bangladesh University of Engineering and Technology (BUET) <i>B.Sc. in Computer Science and Engineering (CSE)</i>	Spring 2009
HONORS AND AWARDS	2019 Best paper award honorable mention, NDSS'19. 2018 Travel grant award for Qualcomm Mobile Security Summit. 2017 Intel Security RAship award. 2016 IEEE S&P travel grant award. 2015 CERIAS Symposium best poster award (runner up). 2005-2009 University merit scholarship. 2005-2009 Dean's list award. 2003 Award for being one of the 20 students who obtained GPA 5.0/5.0 at 12th grade out of 1 million students.	
RESEARCH POSITIONS	Postdoctoral Researcher, Purdue University <i>Hosts: Prof. Elisa Bertino and Prof. Ninghui Li</i> <ul style="list-style-type: none">• Developing principled and practical frameworks for analyzing the protocol standards and implementations of 4G and 5G cellular networks and ZigBee protocol for IoT ecosystems.	January 2019 - Present
	Research Assistant, Purdue University <i>Supervisor: Prof. Elisa Bertino</i> <ul style="list-style-type: none">• Developed systematic approaches for analyzing the 4G LTE protocol standard and designing countermeasures to mitigate vulnerabilities and attacks.• Developed a secure Bluetooth-Low-Energy connection migration system for IoT devices.• Developed a data exfiltration detection mechanism using a dynamic program analysis technique to prevent insiders from changing the SQL queries and the application level logic through modifying the application's source code maliciously .• Designed dictionary and arithmetic coding based data provenance compression schemes for wireless sensor networks.	August 2013 - November 2018
	Research Associate Intern, Hewlett-Packard Labs <i>Mentors: Dr. Shahriar Nirjon, Dr. Shruti Sanadhya, Manager: Dr. Kyu-Han Kim</i> <ul style="list-style-type: none">• Worked on security and privacy issues of mobile virtual network operators (MVNO).• Worked on mobile virtual private network (mVPN).	May 2015 - May 2017
	Graduate Research Assistant, NC State University <ul style="list-style-type: none">• Developed an integrity measurement technique for smartphones by leveraging the TrustZone technology of ARM processor to identify rootkits that launch DKOM and kernel relocation attacks. (<i>Supervisor: Dr. Peng Ning, Co-supervisor: Dr. Xuxian Jiang, and Dr. Ahmed M. Azab</i>)• Designed a solution for real-time traffic congestion management and deadlock avoidance for vehicular ad hoc networks. (<i>Supervisor: Dr. Khaled Harfoush</i>)	May 2012 - May 2013

Supervisor: Dr. Ashikur Rahman

- Developed a distributed IP address autoconfiguration protocol to configure a large scale Mobile Ad Hoc Network (MANET).

PATENTS

1. S.R. HUSSAIN, AND K. KIM, “Mobile Virtual Private Network Configuration”, *US Patent App. 16/070,948*, 2019.
2. S.R. HUSSAIN, S. SANADHYA, AND K. KIM, “Deterrence of user equipment device location tracking”, *US Patent App. 15/369,508 and 10/154,369*, 2018

JOURNAL PUBLICATIONS

3. S.R. HUSSAIN, S. MEHNAZ, S. NIRJON, AND E. BERTINO, “Secure Seamless Bluetooth Low Energy Connection Migration for Unmodified IoT Devices”, *IEEE Transaction on Mobile Computing*, 2018.
4. L. BOSSI, E. BERTINO, S. R. HUSSAIN, “A System for Profiling and Monitoring Database Access Patterns by Application Programs for Anomaly Detection”, *IEEE Transaction on Software Engineering*, 2017.
5. A. SALLAM, E. BERTINO, S.R. HUSSAIN, D. LANDERS, R. LEFLER, AND D. STEINER, “DB-SAFE - An Anomaly Detection System to Protect Databases from Exfiltration Attempts”, *IEEE Systems Journal*, 2015.
6. S.R. HUSSAIN^{*}, C. WANG^{*}, AND E. BERTINO, “Dictionary Based Secure Provenance Compression for Wireless Sensor Networks”, *IEEE Transaction on Parallel and Distributed Systems*, 2014. (^{*} equal contribution)
7. S.R. HUSSAIN, S. SAHA, AND A. RAHMAN, “SAAMAN: Scalable Address Autoconfiguration in Mobile Ad Hoc Networks”, *Journal of Network and System Management, Springer*, 2011.

CONFERENCE PUBLICATIONS

8. S.R. HUSSAIN, M. ECHEVERRIA, O. CHOWDHURY, N. LI, AND E. BERTINO, “Privacy Attacks to the 4G and 5G Cellular Paging Protocols Using Side Channel Information”, *The 26th Network and Distributed Systems Security (NDSS)*, 2019. (**Best paper award honorable mention**)
9. S.R. HUSSAIN, M. ECHEVERRIA, A. SINGLA, O. CHOWDHURY, AND E. BERTINO, “Insecure Connection Bootstrapping in Cellular Networks: The Root of All Evil”, *The 12th ACM Conference on Security and Privacy in Wireless and Mobile Networks (WiSec)*, 2019.
10. S.R. HUSSAIN, S. NIRJON, AND E. BERTINO, “Securing the Insecure Link of Internet-of-Things Using Next-Generation Smart Gateways”, *The 15th IEEE International Conference on Distributed Computing in Sensor Systems (DCOSS)*, 2019.
11. S.R. HUSSAIN, O. CHOWDHURY, S. MEHNAZ, AND E. BERTINO, “LTEInspector: A Systematic Approach for Adversarial Testing of 4G LTE”. *The 25th Network and Distributed Systems Security (NDSS)*, 2018.
12. S.R. HUSSAIN, S. MEHNAZ, S. NIRJON, AND E. BERTINO, “SeamBlue : Seamless Bluetooth Low Energy Connection Migration for Unmodified IoT Devices”, *The 14th ACM International Conference on Embedded Wireless Systems and Networks (EWSN)* , 2017. (**Nominated for the best paper award**)
13. S.R. HUSSAIN, A. SALLAM, AND E. BERTINO, “DetAnom: Detecting Anomalous Database Transactions by Insiders”, *The 5th ACM Conference on Data and Application Security and Privacy (CODASPY)*, 2015.
14. S.R. HUSSAIN, C. WANG, S. SULTANA, AND E. BERTINO, “Secure Data Provenance Compression Using Arithmetic Coding in Wireless Sensor Networks”. *The 33rd IEEE International Performance Computing and Communications Conference (IPCCC)*, 2014.
15. S.R. HUSSAIN, A. ODEH, A. SHIVAKUMAR, S. CHAUHAN, AND K. HARFOUSH, “Real-time Traffic Congestion Management and Deadlock Avoidance for Vehicular Ad Hoc Networks”, *The 10th IEEE High Capacity Optical Networks and Emerging/Enabling Technologies (HONET-CNS)*, 2013.

16. S. SAHA, S.R. HUSSAIN, AND A. RAHMAN, “RBP: Reliable Broadcasting Protocol in Large Scale Mobile Ad Hoc Networks”, *The 24th IEEE International Conference on Advanced Information Networking and Applications (AINA)*, 2010.

17. S.R. HUSSAIN, S. SAHA, AND A. RAHMAN, “An Efficient and Scalable Address Autoconfiguration in Mobile Ad Hoc Networks”, *The 8th International Conference on Ad Hoc Networks and Wireless (ADHOC-NOW)*, 2009.

POSTERS

18. S.R. HUSSAIN, S. MEHNAZ, S. NIRJON, AND E. BERTINO, “Seamless and secure bluetooth LE connection migration”, *Seventh ACM on Conference on Data and Application Security and Privacy (CODASPY)*, 2017.

19. E. BERTINO, L. BOSSI, S. R. HUSSAIN, A. SALLAM, “Monitoring DBMS Activity for Detecting Data Exfiltration by Insiders”, *The 16th Annual Information Security Symposium*, 2015. **(Second Best Poster Award)**

TEACHING

• Guest Lecture, CS 528 Network Security, Purdue University. Spring 2019

EXPERIENCE

• Guest Lecture, CS 541 Database Management, Purdue University. Spring 2018

• Grad. Teaching Assistant, Purdue University & NCSU. 2011 - 2018

REVIEW

External reviewer of WWW’19, IEEE S&P’19, CODASPY’17, ASIACCS’15, SERE’15, COMP-

EXPERIENCES

SAC’15, RACS’15, TDSC, TOIT, Vehicular Communications, CollaborateCom, and IJCN.

REFERENCES

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