Mohannad Alhanahnah

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RESEARCH INTERESTS

I am enthusiastic in the intersection between software engineering and cybersecurity. My research leverages static analysis, dynamic analysis, symbolic execution, and formal verification to evaluate the security, privacy, and safety of applications in emergent domains such as IoT and Android. My research focuses on tackling cutting-edge practical research problems.

EDUCATION

University of Nebraska-Lincoln *Aug 2016 - Dec 2019*
PhD in Computer Engineering

University of Kent *Sept 2012 - Sept 2013*
MSc in Computer Security

Al-Balqa'a Applied University *Sept 2003 - July 2007*
BSc in Computer Systems Engineering

EXPERIENCE

FitStack Startup Sept 2022 - ongoing
Co-founder & CTO

- Leading product development to commercialize intellectual property resulted from my academic collaboration with Prof. Somseh Jha in the software debloating area.

University of Wisconsin-Madison Jan 2020 - Sept 2022
Research Associate

- Software debloating and Adversarial Machine Learning with Professors Somesh Jha and Thomas Reps

University of Nebraska-Lincoln Aug 2016 - Dec 2019
Graduate Research Assistant

- Security analysis and design of emergent software platforms that involve feature interaction.
- Guest lecturer in CSCE 461/866: Advance Software Engineering (Fall 2019)

Singapore University of Technology and Design Jan 2016 - June 2016
Research Assistant

- Security analysis for IoT devices by applying dynamic analysis and honeypot techniques.

Eindhoven University of Technology Aug 2015 - Nov 2015
Research Assistant

- Evaluate the trustworthiness of cloud computing providers.

Birmingham City University Oct 2014 - July 2015
Teaching Assistant

- Network Fundamentals (CMP4269): Instructor of Cisco lab which introduces graduate and undergraduate students to switching and routing.
- Review and update the curriculum of graduate courses specifically in computer security and network.
- Conducting a research in the area of Insider Threats.

PUBLICATIONS

Conference/Workshop Papers

1. H. Zhang, F. Ahmed, **M. Alhanahnah**, P. Leitner, and A. Hassan. Mmlb: A framework for measuring machine learning container bloat. In *MLSys'23*, **Under review**
2. **M. Alhanahnah**, P. Schubert, N. Gupta, T. Reps, S. Jha, and E. Bodden. Slash: Static configuration-logic identification. In *OSDI'23*, **Under submission**
3. Y. Wang, **M. Alhanahnah**, X. Meng, K. Wang, M. Christodorescu, and S. Jha. Robust learning against relational adversaries. In *Advances in Neural Information Processing Systems (NeurIPS)*, 2022
4. **M. Alhanahnah**, R. Jain, V. Rastogi, S. Jha, and T. Reps. Lightweight, multi-stage, compiler-assisted application specialization. In *2022 IEEE 7th European Symposium on Security and Privacy (EuroS&P)*, pages 251–269. IEEE, 2022
5. Y. Chen, **M. Alhanahnah**, A. Sabelfeld, R. Chatterjee, and E. Fernandes. Practical data access minimization in Trigger-Action platforms. In *31st USENIX Security Symposium (USENIX Security 22)*, Boston, MA, August 2022. USENIX Association
6. C. Stevens, **M. Alhanahnah**, Q. Yan, and H. Bagheri. Comparing Formal Models of IoT App Coordination Analysis. In *Proceedings of the 3rd ACM SIGSOFT International Workshop on Software Security from Design to Deployment*, page 3–10, New York, NY, USA, 2020. Association for Computing Machinery
7. **M. Alhanahnah**, C. Stevens, and H. Bagheri. Scalable Analysis of Interaction Threats in IoT Systems. In *ISSTA 2020*, 2020 (**ACM SIGSOFT Distinguished Paper Award**)
8. **M. Alhanahnah**, Q. Yan, H. Bagheri, H. Zhou, Y. Tsutano, W. Srisa-an, and X. Luo. Detecting Vulnerable Android Inter-App Communication in Dynamically Loaded Code. In *IEEE INFOCOM 2019 - IEEE Conference on Computer Communications*, pages 550–558, April 2019
9. **M. Alhanahnah**, Q. Lin, Q. Yan, N. Zhang, and Z. Chen. Efficient Signature Generation for Classifying Cross-Architecture IoT Malware. In *2018 IEEE Conference on Communications and Network Security (CNS)*, pages 1–9, May 2018
10. **M. Alhanahnah** and Q. Yan. Towards best secure coding practice for implementing SSL/TLS. In *IEEE INFOCOM 2018 - IEEE Conference on Computer Communications Workshops (INFOCOM WKSHPS)*, pages 1–6, April 2018
11. **M. Alhanahnah** and D. Chadwick. Boosting Usability for Protecting Online Banking Applications Against APTs. In *2016 Cybersecurity and Cyberforensics Conference (CCC)*, pages 70–76, Aug 2016
12. M. R. Al-Hadidi, A. Alarabeyyat, and **M. Alhanahnah**. Breast Cancer Detection Using K-Nearest Neighbor Machine Learning Algorithm. In *2016 9th International Conference on Developments in eSystems Engineering (DeSE)*, pages 35–39, Aug 2016

Journal Articles

1. **M. Alhanahnah**, S. Ma, A. Gehani, G. Ciocarlie, V. Yegneswaran, S. Jha, and X. Zhang. autoMPI: Automated Multiple Perspective Attack Investigation with Semantics Aware Execution Partitioning. *IEEE Transactions on Software Engineering*, 2022

2. **M. Alhanahnah**, C. Stevens, B. Chen, Q. Yan, and H. Bagheri. IoTCOM: Dissecting Interaction Threats in IoT Systems. *IEEE Transactions on Software Engineering*, 2022

3. **M. Alhanahnah**, Q. Yan, H. Bagheri, H. Zhou, Y. Tsutano, W. Srisa-an, and X. Luo. Dina: Detecting hidden android inter-app communication in dynamic loaded code. *IEEE Transactions on Information Forensics and Security*, 15:2782–2797, 2020

4. **M. Alhanahnah**, P. Bertok, Z. Tari, and S. Alouneh. Context-Aware Multifaceted Trust Framework For Evaluating Trustworthiness of Cloud Providers. *Future Generation Computer Systems*, 79:488 – 499, 2018

5. **M. Alhanahnah**, P. Bertok, and Z. Tari. Trusting Cloud Service Providers: Trust Phases and a Taxonomy of Trust Factors. *IEEE Cloud Computing*, 4(1):44–54, Jan 2017

6. **M. Alhanahnah**, A. Jhumka, and S. Alouneh. A Multidimension Taxonomy of Insider Threats in Cloud Computing. *The Computer Journal*, 59(11):1612–1622, 11 2016

Technical Reports/Demos

- Software debloating tutorial at the Second Software Security School (SSSS'21) organized by ONR Total Platform Cyber Protection (TPCP).
- Deliverable D4.3.2 in EU-FP7 project Authentication and Authorization of Entrusted Unions (AU2EU)

PATENTS

1. A METHOD AND APPARATUS FOR IMPROVED SECURITY IN TRIGGER ACTION PLATFORMS. (Filed in June 2021). https://www.warf.org/technologies/summary/P210227US01
2. COMPUTER IMPLEMENTED PROGRAM SIMPLIFICATION. (Filed in May 2021). https://www.warf.org/technologies/summary/P210211US02

INVITED TALKS

1. Safety and Security of Interactions between Applications. *Arab Security Conference 2021.* (Sept 2021)
2. Security Analysis for Application Interactions. *The Information Sciences Institute (ISI).* (Jan 2021).
3. Security Analysis for Application Interactions. *NDS2 group at Northeastern University.* (Dec 2020).
4. Scalable Analysis of Interaction Threats in IoT Systems. *Lancaster University.* (Dec 2020)
5. Scalable Analysis of Interaction Threats in IoT Systems. *King's College London.* (Nov 2020).
6. Security Analysis for Application Interactions. *Software Systems Security group at Penn State University.* (Oct 2020).
7. Security Analysis for Application Interactions. *NEC Laboratories Europe.* (July 2020).

HONORS AND AWARDS

1. LMCAS "our software debloating tool" has been funded by Office of Naval Research (ONR) for technology transfer. *July, 2021. (July, 2019).*
2. ACM SIGSOFT Distinguished Paper Award. *June, 2020.*
3. NSF funding to attend the Ninth Summer School on Formal Techniques. *April, 2019.* ($600).
4. College of Engineering Graduate Student Conference Travel Grant, University of Nebraska-Lincoln. *Feb, 2018.* ($500).
5. Student Grant for attending the 14th Workshop on the Economics of Information Security *May, 2015.* ($567).

6. Student Grant for the 14th International School On Foundations Of Security Analysis And Design (FOSAD 2014), *June, 2014.* ($453).
7. (ISC)2 Graduate Scholarship *July, 2013.* ($1300)
8. Partial tuition fee waiver, University of Kent, *Aug, 2012.*
9. Full tuition fee waiver in the academic years 2005/2006, 2006/2007, from Ministry of Higher Education in Jordan based on academic performance.

INDUSTRY EXPERIENCE

Ministry of ICT (Jordan) Jan 2014 - Sept 2014
Information Security Engineer / E-Government

- Preparing and reviewing security policies, procedures, strategies and guidelines implemented in the e-government.

Al-Baha University (Saudi Arabia) Sept 2011 - Sept 2012
Network Security Engineer

- Planning, designing, managing and maintaining the network infrastructure for Al-Baha University; including switches, routers, firewalls, IPSs, and other solutions.
- Contributing to the implementation and ISO 9001:2008 certification process.

German Jordanian University (Jordan) July 2008 - Sept 2011
Network Engineer

- Leading the help-desk team for providing services to students, academic and administration staff.
- Managing network and security devices.

MENTORING EXPERIENCE

Naman Gupta Sept 2021 - Aug 2022
University of Wisconsin-Madison

- Working on software debloating and specialization.

Rithik Jain May 2021 - Feb 2022
University of Wisconsin-Madison

- Working on software debloating and specialization.

Badiuzzaman Azzarfan Bin Iskhandar Feb 2021 - May 2021
Chalmers University

- Working on software specialization for web applications.

Do-Men Su, Trevor Zachman-Brockmeyer, and Tarun Anand Nov 2020 - Nov 2021
University of Wisconsin-Madison

- Working on generating adversarial malware using software debloating.

Zhicheng Cai Jan 2020 - May 2020
University of Wisconsin-Madison

- Working on static analysis to perform provenance analysis.

Ethan Chuong Vu and Don Cung July 2019 - Dec 2019
University of California, Irvine

- Working on correlation analysis between code smells and vulnerabilities.

Qicheng Lin May 2016 - May 2018
University of Nebraska-Lincoln

- Working on IoT malware and Android malware.

Andrew Snyder June 2017 - Aug 2018
Drury University

- Conducted summer research project at UNL on Android security.
- Received **best poster award** on his project "Malicious Path Analyzer for Android Apps".

ACADEMIC SERVICE

1. Peer-reviewing: EURO-SP'22, USENIX'21, CSF'21, IEEE BigData 2020, TIFS'20, TrustComm'20, ESORICS'20, TSE'20, ICSME'20, IEEE Cloud Computing, IEEE WCNC 2017 and INFOCOMM 2017/2018/2019.
2. Graduate students' representative in the CSE Faculty Committee 2016/2017.
3. Graduate students' representative in the Computer Engineering Committee 2017/2018.
4. Postdoctoral representative on the Advisory Committee to the Office of Postdoctoral Studies 2021/2022.

OTHER ACTIVITIES

- WARF (Wisconsin Alumni Research Foundation) Ambassador. Aims to promote WARF in CS and CE departments and represents WARF at various events. I also participate in licensing, patenting, and commercialization projects executed by WARF.
- Co-founder of a startup called **FitStack**. We received $500*k* **pre-seed** funding from WARF.
- Co-founder of the CTF team at UW-Madison.
- Co-founder of the Security Study Group for the security research group (MadS&P) at UW-Madison.
- Obtained industrial certificates such as: CISSP, CompTIA Security+, CCNP Security, CCDA, and CEH.

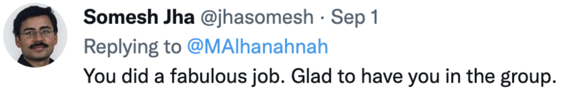
REPRESENTATIVE PUBLICATIONS

1. **M. Alhanahnah**, R. Jain, V. Rastogi, S. Jha, and T. Reps. Lightweight, multi-stage, compiler-assisted application specialization. In *2022 IEEE 7th European Symposium on Security and Privacy (EuroS&P)*, pages 251–269. IEEE, 2022
(https://arxiv.org/abs/2109.02775)
2. Y. Chen, **M. Alhanahnah**, A. Sabelfeld, R. Chatterjee, and E. Fernandes. Practical data access minimization in Trigger-Action platforms. In *31st USENIX Security Symposium (USENIX Security 22)*, Boston, MA, August 2022. USENIX Association
(https://www.usenix.org/system/files/sec22summer_chen-yunang.pdf)
3. **M. Alhanahnah**, C. Stevens, and H. Bagheri. Scalable Analysis of Interaction Threats in IoT Systems. In *ISSTA 2020*, 2020 (**ACM SIGSOFT Distinguished Paper Award**)
(https://dl.acm.org/doi/10.1145/3395363.3397347)

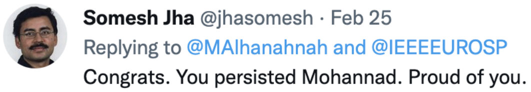
REFERENCES

⚠ **PLEASE send me a notification BEFORE contacting my references. Since they are super busy scholars and high probably unknown emails will be lost. I had this situation previously.**

1. Prof. Somesh Jha, University of Wisconsin-Madison, (jha@cs.wisc.edu)



Somesh Jha @jhasomesh · Sep 1
Replying to @MAlhanahnah
You did a fabulous job. Glad to have you in the group.



Somesh Jha @jhasomesh · Feb 25
Replying to @MAlhanahnah and @IEEEEUROSP
Congrats. You persisted Mohannad. Proud of you.

2. Prof. Thomas Reps, University of Wisconsin-Madison, (reps@cs.wisc.edu)
3. Dr. Hamid Bagheri, University of Nebraska Lincoln, (bagheri@unl.edu)
4. Dr. Qiben Yan, Michigan State University, (qyan@msu.edu)