

# AKOND RAHMAN

akond.rahman.buet@gmail.com  
<https://akondrahman.github.io/>

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## RESEARCH INTERESTS

Software engineering focused in DevOps and Secure Software Development

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## PROFESSIONAL EXPERIENCE

- **Assistant Professor** Aug 2019 - Present
  - Tennessee Tech University, Cookeville, TN, USA
  - Tenure track assistant professor at the Department of Computer Science
- **Research Intern** May 2018 - Aug 2018
  - IBM Research, IBM TJ Watson Research Center, Yorktown Heights, NY, USA
  - Integrating AI Marketplace protocol with Hyperledger Composer and Hyperledger Fabric.
- **Data Science Intern** May 2017 - Aug 2017
  - IBM, Research Triangle Park (RTP), NC, USA
  - Mining open source and industry software repositories to assess the merits of continuous integration, identify temporal patterns in defects, and analyze the effect of team size on software project success.
- **Systems Infrastructure Intern** May 2016 - Aug 2016
  - Redhat, Raleigh, NC, USA
  - Developed monitoring facilities for the OpenShift infrastructure to facilitate continuous deployment of internal Redhat applications.
- **Software Research Intern** May 2015 - Aug 2015
  - ABB Corporate Research, Raleigh, NC, USA
  - Designed, and developed a software framework to detect similar software applications in ABB using SrcML.NET and Natural Language Toolkit (NLTK).
- **Research Assistant** Jan 2016 - July 2019
  - Science of Security Lablet, National Security Agency (NSA), USA
  - Investigated attack surface modeling to find vulnerabilities.
- **Teaching Assistant** Aug 2014 - Dec 2015
  - North Carolina State University, Raleigh, NC, USA
  - Conducted class lectures for the graduate-level course ‘Software Security’
- **Graduate Assistant** Jan 2012 - May 2014
  - University of Connecticut, Storrs, CT, USA
  - Graduate assistant for ‘Engineering Computing Services’ office. Involved in computer and network troubleshooting
- **Software Engineer** Jan 2010 - Dec 2011
  - Dohatec New Media, Dhaka, Bangladesh
  - Developed and tested an online procurement system for the Ministry of Planning of the People’s Republic of Bangladesh using ASP.NET with C# and Microsoft SQL Server.

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## AWARDS & HONORS

- **Distinguished Reviewer**  
Technical Track, 2021 Mining Software Repositories Conference (MSR). Link: <https://twitter.com/msrconf/status/1390444181655539716>.
- **2020 COE Distinguished Dissertation Award, NC State University**  
For my PhD dissertation ‘Anti-patterns in Infrastructure as Code’. Link: <https://tinyurl.com/akond-coe>.
- **2020 CSC Outstanding Dissertation Award, NC State University**  
For my PhD dissertation ‘Anti-patterns in Infrastructure as Code’. Link: <https://tinyurl.com/akond-csc>.
- **NC State Nominee for the Council of Graduate Schools/ProQuest Distinguished Dissertation Award, 2020**  
For my PhD dissertation ‘Anti-patterns in Infrastructure as Code’.
- **ACM SIGSOFT Distinguished Paper Award**  
For the paper ‘*The Seven Sins: Security Smells in Infrastructure as Code Scripts*’ at ICSE 2019, Montreal, Canada. Link: <https://www.sigsoft.org/awards/distinguishedPaperAward.html>
- **ACM SIGSOFT Doctoral Symposium Award**  
Dissertation proposal related to DevOps and Infrastructure as Code won the ACM SIGSOFT Best Doctoral Symposium Award at ICSE 2018, Gothenburg, Sweden.
- **Microsoft Open Source Challenge**  
Won the **Grand Prize** of the 2016 Microsoft Open Source Challenge. I used Microsoft Research’s Deep Semantic Similarity Model (DSSM) tool to quantify the semantic similarity of software repositories. Link: <http://tiny.cc/unp1by>.
- **University Scholarship for Merit**  
Received this award for maintaining  $\geq 3.75$  CGPA in 4 semesters from 2007 to 2009 during my B.Sc. at the Bangladesh University of Engineering and Technology (BUET).

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## EDUCATION

- **Doctor of Philosophy (Ph.D.) in Computer Science** Aug 2014 - July 2019
  - Dissertation title: “Anti-patterns in Infrastructure as Code”
  - Adviser: Dr. Laurie Williams
  - North Carolina State University, Raleigh, NC, USA
- **Master of Science (M.Sc.) in Computer Science and Engineering** Jan 2012 - May 2014
  - University of Connecticut, Storrs, CT, USA
- **Bachelor of Science (B.Sc.) in Computer Science and Engineering** Dec 2004 - Oct 2009
  - Bangladesh University of Engineering and Technology, Dhaka, Bangladesh

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## FUNDING

4. Co-PI, Tennessee Tech Cybercorps Renewal: An Enhanced and Integrated Scholar Experience in Cybersecurity, National Science Foundation (Aug 2021 - Jul 2026) Amount: 4,359,294 USD. PI: Ambareen Siraj, Co-PI: Denis Ulybychev, Eric Brown, Maanank Gupta (Tennessee Tech University), 4,359,294 USD (Share of Tennessee Tech University)
3. PI, Cybersecurity Mini Grant awarded by the National Science Foundation (NSF) (Dec 2020 - Mar 2021). Amount: 5,000 USD (Total), 5,000 USD (Share of Tennessee Tech University)

2. PI, SaTC: TTP: Small: eSLIC: Enhanced Security Static Analysis for Configuration Scripts awarded by the National Science Foundation (NSF) (Oct 2020 - Sep 2023). Amount: 444,720 USD (Total), 244,742 USD (Share of Tennessee Tech University)
  1. Co-PI, EDGE Curriculum Development Grant provided by Tennessee Tech University (Jan 2020 - May 2020) Amount: 5,000 USD.
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## PUBLICATIONS

50. Mohammad Mehedi Hassan and **Akond Rahman**, “*As Code Testing*: Characterizing Test Quality in Open Source Ansible Development”, to appear in the 15th IEEE International Conference on Software Testing, Verification and Validation (ICST) 2022.
49. **Akond Rahman**, Farhat Lamia Barsha, and Patrick Morrison, “*Shhh!*: 12 Practices for Secret Management in Infrastructure as Code”, to appear in the IEEE Secure Development Conference (SecDev) 2021.
48. **Akond Rahman**, Hossain Shahriar, and Dibyendu Brinto Bose, “Exercise Perceptions: Experience Report From A Secure Software Development Course”, in the 14th International Conference on the Quality of Information and Communications Technology (QUATIC) 2021.
47. Kaitlyn Cottrell, Dibyendu Brinto Bose, Hossain Shahriar, and **Akond Rahman**, “An Empirical Study of Vulnerabilities in Robotics”, in the 45th IEEE Computer Society Computers, Software, and Applications Conference (COMPSAC) 2021.
46. **Akond Rahman** and Laurie Williams, “A Different Kind of Smell: Security Smells in Infrastructure as Code Scripts”, in the IEEE Security and Privacy (S&P) Magazine 2021.
45. Farzana Ahamed Bhuiyan, Justin Murphy, Patrick Morrison, and **Akond Rahman**, “Practitioner Perception of Vulnerability Discovery Strategies”, in the 2nd International Workshop on Engineering and Cybersecurity of Critical Systems (EnCyCriS 2021), co-located with the 43rd International Conference on Software Engineering (ICSE 2021).
44. Dibyendu Brinto Bose, **Akond Rahman** and Shazibul Islam Shamim, “‘Under-reported’ Security Defects in Kubernetes Manifests”, in the 2nd International Workshop on Engineering and Cybersecurity of Critical Systems (EnCyCriS 2021), co-located with the 43rd International Conference on Software Engineering (ICSE 2021).
43. **Akond Rahman** and Effat Farhana, “An Empirical Study of Bugs in COVID-19 Software Projects”, in the Journal of Software Engineering, Research, and Development (JSERD), 2021.
42. Farzana Ahamed Bhuiyan, Md Bulbul Sharif, and **Akond Rahman**, “Security Bug Report Usage for Software Vulnerability Research: A Systematic Mapping Study”, in the journal of IEEE Access, 2021.
41. **Akond Rahman**, Md. Rayhanur Rahman, Chirs Parnin, and Laurie Williams, “Security Smells in Ansible and Chef Scripts: A Replication Study”, in the Journal of ACM Transactions on Software Engineering and Methodology (TOSEM), 2021.
40. Mohammad Mehedi Hasan, Farzana Ahamed Bhuiyan, and **Akond Rahman** “Testing Practices for Infrastructure as Code”, in the Languages and Tools for Next Generation Testing Workshop - LANGETI 2020, co-located with the ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE).
39. Farzana Ahamed Bhuiyan, and **Akond Rahman**, “Characterizing Co-located Insecure Coding Patterns in Infrastructure as Code Scripts”, in the 2020 Workshop on Human Centric Software Engineering and Cyber Security, co-located the 35th IEEE/ACM International Conference on Automated Software Engineering (ASE), September 2020.
38. Farzana Ahamed Bhuiyan, **Akond Rahman**, and Patrick Morrison, “Vulnerability Discovery Strategies Used in Software Projects”, in the 2020 Workshop on Human Centric Software Engineering and Cyber Security, co-located the 35th IEEE/ACM International Conference on Automated Software Engineering (ASE), September 2020.

37. **Akond Rahman** and Farzana Ahamed Bhuiyan “A Vision to Mitigate Bioinformatics Software Development Challenges”, in the 2020 Workshop on Human Centric Software Engineering and Cyber Security, co-located the 35th IEEE/ACM International Conference on Automated Software Engineering (ASE), September 2020.
36. Md. Shazibul Islam Shamim, Farzana Ahamed Bhuiyan, and **Akond Rahman**, “XI Commandments of Kubernetes Security: A Systematization of Knowledge Related to Kubernetes Security Practices”, in the IEEE Secure Development Conference (SecDev) September 2020.
35. **Akond Rahman**, Effat Farhana, and Laurie Williams, “The ‘as Code’ Activities: Development Anti-patterns for Infrastructure as Code”, in the Journal of Empirical Software Engineering (EMSE) 2020.
34. Farzana Ahamed Bhuiyan, Raunak Shakya, and **Akond Rahman**, “Can We Use Software Bugs to Identify Software Vulnerability Strategies?” in Proceedings of the Symposium and Bootcamp on the Science of Security (HotSoS) 2020, Lawrence, Kansas, April 2020.
33. Justin Murphy, Elias T. Brady, Shazibul Islam Shamim, and **Akond Rahman**, “A Curated Dataset of Security Defects in Scientific Software Projects” in Proceedings of the Symposium and Bootcamp on the Science of Security (HotSoS) 2020, Lawrence, Kansas, April 2020.
32. Raunak Shakya and **Akond Rahman**, “A Preliminary Taxonomy of Techniques Used in Software Fuzzing” in Proceedings of the Symposium and Bootcamp on the Science of Security (HotSoS) 2020, Lawrence, Kansas, April 2020.
31. **Akond Rahman**, Effat Farhana, Chris Parnin, and Laurie Williams, “*Gang of Eight*: A Defect Taxonomy for Infrastructure as Code Scripts”, in Proceedings of the International Conference on Software Engineering (ICSE) 2020, Seoul, South Korea.
30. **Akond Rahman** “Anti-patterns in Infrastructure as Code”, PhD Dissertation, NC State University 2019.
29. Md. Rayhanur Rahman, **Akond Rahman** and Laurie Williams, “*Share, But Be Aware*: Security Smells in Python Gists”, in Proceedings of the International Conference on Software Maintenance and Evolution (ICSME) 2019, Ohio, USA, Oct 2019.
28. Effat Farhana, Nasif Imtiaz, and **Akond Rahman** “Synthesizing Program Execution Time Discrepancies in Julia Used for Scientific Software” in Proceedings of the International Conference on Software Maintenance and Evolution (ICSME) 2019, Ohio, USA, Oct 2019.
27. Nuthan Munaiah, **Akond Rahman**, Justin Pelletier, Laurie Williams, and Andrew Meneely. “Characterizing Attacker Behavior in a Cybersecurity Penetration Testing Competition”, in Proceedings of the International Symposium on Empirical Software Engineering and Measurement (ESEM) 2019, Porto de Galinhas, Brazil, Sep 2019.
26. **Akond Rahman** and Laurie Williams, “Source Code Properties of Defective Infrastructure as Code Scripts”, in the Journal of Information and Software Technology (IST).
25. Kanthi Sarpatwar, Venkata Sitaramagiridharganesh Ganapavarapu, Karthikeyan Shanmugam, **Akond Rahman**, and Roman Vaculin, “Blockchain Enabled AI Marketplace: The Price You Pay For Trust”, in the Proceedings of the International Workshop of Blockchain Meets Computer Vision and Artificial Intelligence 2019, CA, USA 2019.
24. **Akond Rahman**, Effat Farhana, and Nasif Imtiaz, “*Snakes in Paradise?*: Insecure Python-related Coding Practices in Stack Overflow” in Proceedings of the International Conference on Mining Software Repositories (MSR) 2019, Montreal, Canada, May 2019.
23. Nasif Imtiaz, **Akond Rahman**, Effat Farhana, and Laurie Williams, “Challenges with Responding to Static Analysis Tool Alerts”, in Proceedings of the International Conference on Mining Software Repositories (MSR) 2019, Montreal, Canada, May 2019.
22. **Akond Rahman** and Laurie Williams, “A Bird’s Eye View of Knowledge Needs Related to Penetration Testing” in Proceedings of the Symposium and Bootcamp on the Science of Security (HotSoS) 2019, Nashville, Tennessee, April 2019.
21. **Akond Rahman**, Chris Parnin, and Laurie Williams, “*The Seven Sins*: Security Smells in Infrastructure as Code Scripts”, in the International Conference on Software Engineering (ICSE) 2019. (**ACM SIGSOFT Distinguished Paper Award**)

20. **Akond Rahman**, Rezvan Mahdavi-Hezaveh, and Laurie Williams, “A Systematic Mapping Study of Infrastructure as Code Research”, in the Journal of Information and Software Technology (IST).
19. **Akond Rahman**, Amritanshu Agrawal, Rahul Krishna, and Alexander Sobran, “Characterizing The Influence of Continuous Integration: Empirical Results from 250+ Open Source and Proprietary Projects”, in 4th International Workshop on Software Analytics (SWAN 2018), co-located with European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE) 2018.
18. **Akond Rahman**, Jonathan Stallings, and Laurie Williams “Defect Prediction Metrics for Infrastructure as Code Scripts in DevOps”, in Companion Proceedings of the 40th International Conference on Software Engineering (ICSE ’18), 2018.
17. **Akond Rahman**, Asif Partho, Pat Morrison, and Laurie Williams “What Questions Do Programmers Ask About Configuration As Code?”, in Proceedings of the 4th International Workshop on Rapid Continuous Software Engineering (RCoSE ’18), co-located with International Conference for Software Engineering (ICSE) 2018, Gothenburg, Sweden, May, 2018.
16. **Akond Rahman**, “Comprehension Effort and Programming Activities: Related? Or Not Related?”, in International Conference of Mining Software Repositories (MSR) 2018, Gothenburg, Sweden, May 2018.
15. **Akond Rahman**, “Characteristics of Defective Infrastructure as Code Scripts in DevOps”, in Companion Proceedings of the 40th International Conference on Software Engineering (ICSE ’18), 2018. (**ACM SIGSOFT Best Doctoral Symposium Paper Award**)
14. Rahul Krishna, Amritanshu Agrawal, **Akond Rahman**, Alexander Sobran and Tim Menzies, “What is the Connection Between Issues, Bugs, and Enhancements? (Lessons Learned from 800+ Software Projects)”, in Companion Proceedings of the 40th International Conference on Software Engineering (ICSE ’18), 2018.
13. Amritanshu Agrawal, **Akond Rahman**, Rahul Krishna, Alexander Sobran and Tim Menzies, “We Don’t Need Another Hero? The Impact of ”Heroes” on Software Development”, in Companion Proceedings of the 40th International Conference on Software Engineering (ICSE ’18), 2018.
12. **Akond Rahman**, and Laurie Williams, “Characterizing Defective Configuration Scripts Used for Continuous Deployment”, in Proceedings of the 11th International Conference on Software Testing, Validation, and Verification (ICST ’18), 2018.
11. **Akond Rahman** “Anti-patterns in Infrastructure as Code” in Proceedings of the International Conference of Software Testing, Validation, and Verification (ICST-PhD Symposium) 2018, Vasteras, Sweden, April 2018.
10. **Akond Rahman**, Priysha Pradhan, Asif Partho, and Laurie Williams, “Predicting Android Application Security and Privacy Risk with Static Code Metrics”, in Proceedings of the 4th International Conference on Mobile Software Engineering and Systems (MOBILESoft ’17), 2017. pages: 149-153.
9. **Akond Rahman**, Asif Partho, David Meder, and Laurie Williams, “Which Factors Influence Practitioners’ Usage of Build Automation Tools?”, in Proceedings of the 3rd International Workshop on Rapid Continuous Software Engineering (RCoSE ’17), 2017. pages: 20-26.
8. Morgan Burcham, Mahran Al-Zyoud, Jeffrey Carver, Mohammed Alsaleh, Hongying Du, Fida Gilani, Jun Jiang, **Akond Rahman**, Ozgur Kafali, Ehab Al-Shaer, and Laurie Williams, “Characterizing Scientific Reporting in Security Literature: An analysis of ACM CCS and IEEE S&P Paper”, in Proceedings of the Symposium and Bootcamp on the Science of Security (HotSoS’17) 2017, pages: 13-23.
7. **Akond Rahman** and Laurie Williams, “Software Security in DevOps: Synthesizing Practitioners’ Perceptions and Practices”, in Proceedings of International Workshop on Continuous Software Evolution and Delivery (CSED), May, 2016, Austin, TX, USA.
6. **Akond Rahman** and Laurie Williams, “Security Practices Used in DevOps”, in Proceedings of Symposium and Bootcamp on the Science of Security (HotSoS), April, 2016, Pittsburg, PA, USA.
5. **Akond Rahman**, Eric Helms, Laurie Williams, and Chris Parnin, “Synthesizing Continuous Deployment Practices in Software Development”, in Proceedings of 13th Agile Conference, pages 1-10, Washington D.C., USA, August, 2015.

4. **Akond Rahman**, Md. Atiqul Islam Mollah, and Mahmuda Naznin, “Multiple Targets Tracking Using Kinematics in Wireless Sensor Networks” in Wireless Sensor Network, pages 263-274, August, 2011.
3. **Akond Rahman**, Mahmuda Naznin, and Md. Atiqul Islam Mollah, “Energy Efficient Multiple Targets Tracking Using Target Kinematics in Wireless Sensor Networks” in Proceedings of 4th International Conference on Sensor Technologies and Applications (SensorComm), pages 275-280, Venice, Italy, July, 2010.
2. **Akond Rahman**, Mahmuda Naznin, and Md. Atiqul Islam Mollah, “Service Priority Based Target Tracking Framework in a Wireless Sensor Network” in Proceedings of 3rd IEEE International Conference on Computer Science and Information Technology (ICCSIT), pages 389-392, Chengdu, China, July, 2010.
1. M.M.Shahiduzzaman, Mahmuda Naznin, and **Akond Rahman**, “Portable and Secure Multimedia Data Transfer in Mobile Phones Using Record Management Store (RMS)” in Proceedings of 3rd IEEE International Conference on Computer Science and Information Technology (ICCSIT), pages 364-367, Chengdu, China, July, 2010.

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## THESIS SUPERVISION

- Ph.D.:
  - Farhat Lamia Barsha: Thesis Supervisor
  - Md. Shazibul Islam Shamim: Thesis Supervisor
  - Rajesh Manicavasagam: Thesis Committee Member
  - Sharif Abdelfattah: Thesis Committee Member
- M.Sc.:
  - Raunak Shakya: Thesis Supervisor (Graduated)
  - Justin Murphy: Thesis Supervisor (Graduated)
  - Kaitlyn Cottrel: Project Supervisor
  - Debolina Halder Lina: Thesis Committee Member (Graduated)

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## COMMUNITY SERVICE

- **Panelist:**
  - National Science Foundation (NSF), 2021
- **Co-chair:**
  - Diversity and Inclusion Track, International Conference on Software Maintenance and Evolution (ICSME) 2021
- **Program Committee Assignment:**
  - Mining Software Repositories 2022 (MSR 2022) - Shadow PC Mentor
  - Mining Software Repositories 2022 (MSR 2022) - Research Track
  - Innovations in Software Engineering Conference (ISEC) 2021 - ACM Student Research Competition Track
  - International Conference on Software Maintenance and Evolution (ICSME) 2021 - Research Track
  - Mining Software Repositories 2021 (MSR 2021) - Research Track
  - 26th annual conference on Innovation and Technology in Computer Science Education (ITiCSE) 2021 - Associate Program Chair
  - SIGCSE Technical Symposium 2021 (SIGCSE 2021) - Experience Report Track
  - IEEE International Workshop on Reliability and Security Data Analysis (RSDA 2020)

- IEEE/ACM International Conference on Automated Software Engineering 2020 (ASE 2020) - Late Breaking Results Track
  - Foundation of Software Engineering (FSE) 2020 - Industry Track
  - International Conference on Software Maintenance and Evolution (ICSME) 2020 - Research Track
  - Mining Software Repositories (MSR) 2020 - Challenge Track
  - Annual Conference on Innovation and Technology in Computer Science Education (ITiCSE) 2020
  - **Reviewer:**
    - Computers and Security 2021
    - NASA (Grant Reviewer) 2020
    - IEEE Transactions on Software Engineering (TSE) 2020
    - ACM Transactions on Software Engineering and Methodology (TOSEM) 2020, 2021
    - Journal of Science of Computer Programming (SCP) 2020
    - Journal of Information Technology and Management (ITEM) 2020
    - Journal of Systems and Software (JSS) 2019, 2020
    - Journal of IEEE Access 2020
    - IEEE Software 2019, 2020
    - Communications of the ACM (CACM) 2019
  - **Sub-reviewer:**
    - ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE) 2019-Industry Track
    - International Symposium on Empirical Software Engineering and Measurement (ESEM) 2019
    - International Conference on Secure Development (SecDev) 2019
    - 6<sup>th</sup> Annual Hot Topics in the Science of Security Symposium (HotSoS) 2019
    - 12<sup>th</sup> International Conference on Software Testing, Verification and Validation (ICST) : Industry Track 2019
    - 9<sup>th</sup> International Symposium on Engineering Secure Software and Systems (ESSoS) 2018
    - 4<sup>th</sup> International Workshop on Rapid Continuous Software Engineering (RCoSE) 2018
    - 1<sup>st</sup> International Workshop on Security Awareness from Design to Deployment (SEAD) 2018
    - 28<sup>th</sup> International Symposium on Software Reliability Engineering (ISSRE) 2017
    - 11<sup>th</sup> International Symposium on Empirical Software Engineering and Measurement (ESEM) 2017
    - 14<sup>th</sup> International Conference on Mining Software Repositories (MSR) 2017
    - 37<sup>th</sup>, and 40<sup>th</sup> International Conference on Software Engineering (ICSE) 2015 and 2018
  - **Student volunteer:**
    - 39<sup>th</sup> International Conference on Software Engineering (ICSE) 2017
    - 40<sup>th</sup> International Conference on Software Engineering (ICSE) 2018
  - **Team Leader for NCSU Team at IT Architecture Competition:**

I led the NCSU team in the Student Showdown competition arranged by the Raleigh Chapter of International Association for Software Architects (IASA) (<http://members.iasaglobal.org/news/281134/Iasa-IT-Architect-Competition.htm>).
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## INVITED TALKS

- “Integrating Quality Into Infrastructure as Code Development”, Research Talk, WindRiver Associates, Oct 22, 2021.
- “Information Flow Analysis for Better Security Static Analysis of Configuration Scripts”, Research Talk, Dagstuhl Seminar on Resilient Software Configuration and Infrastructure Code Analysis, Nov 28 - Dec 03, 2021.