

# Kaushal Kafle

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## EDUCATION

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**William & Mary, Williamsburg, USA**

*PhD in Computer Science*

*Advisor: Dr. Adwait Nadkarni*

*Expected graduation: May, 2024*

**August 2017 - Present**

**Pulchowk Campus, Tribhuvan University**

*BE in Computer Engineering*

**Nov 2011 - Nov 2015**

## PUBLICATIONS

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### Conference Papers

- [1] **Kaushal Kafle**, Prianka Mandal, Kapil Singh, Benjamin Andow, and Adwait Nadkarni, “Understanding the Privacy Practices of Political Campaigns: A Perspective from the 2020 US Election Websites”, In *Proceedings of the 45<sup>th</sup> IEEE Symposium on Security and Privacy (IEEE S&P)*, CA, USA, 2024. To appear [\[Pre-print\]](#)
- [2] **Kaushal Kafle**, Kirti Jagtap, Mansoor Ahmed-Rengers, Trent Jaeger, Adwait Nadkarni, “Practical Integrity Validation in the Smart Home with HomeEndorser”, In *Proceedings of the 17th ACM Conference on Security and Privacy in Wireless and Mobile Networks (WiSec)*, Seoul, Korea, 2024, To appear [\[Pre-print\]](#)
- [3] Xin Jin\*, Sunil Manandhar\*, **Kaushal Kafle**, Zhiqiang Lin, and Adwait Nadkarni. “Understanding IoT Security from a Market-Scale Perspective”. In *Proceedings of the 29th ACM Conference on Computer and Communications Security (CCS)*, Los Angeles, CA, USA, Nov 2022. \*Co-first Authors. [\[PDF\]](#)
- [4] Sunil Manandhar, **Kaushal Kafle**, Benjamin Andow, Kapil Singh, and Adwait Nadkarni, “Smart Home Privacy Policies Demystified: A Study of Availability, Content, and Coverage”. In *Proceedings of the 31st USENIX Security Symposium (USENIX)*, Boston, MA, USA, 2022. [\[PDF\]](#)
- [5] Amit Seal Ami, Nathan Cooper, **Kaushal Kafle**, Kevin Moran, Denys Poshyvanyk, and Adwait Nadkarni, “Why Crypto-detectors Fail: A Systematic Evaluation of Cryptographic Misuse Detection Techniques,” in *Proceedings of the 43<sup>rd</sup> IEEE Symposium on Security and Privacy (IEEE S&P)*, 2022. [\[PDF\]](#)
- [6] Sunil Manandhar, Kevin Moran, **Kaushal Kafle**, Ruhao Tang, Denys Poshyvanyk, and Adwait Nadkarni. “Towards a Natural Perspective of Smart Homes for Practical Security and Safety Analyses.” In *Proceedings of the 41st IEEE Symposium on Security and Privacy (S&P)*, San Francisco, CA, USA, May 2020. [\[PDF\]](#)
- [7] **Kaushal Kafle**, Kevin Moran, Sunil Manandhar, Adwait Nadkarni, and Denys Poshyvanyk. “A Study of Data Store-based Home Automation.” In *Proceedings of the 9th ACM Conference on Data and Application Security and Privacy (CODASPY)*. Dallas, TX, USA, March 2019. **Best Paper Award** 🏆 [\[PDF\]](#) [\[press coverage\]](#)
- [8] Richard Bonett, **Kaushal Kafle**, Kevin Moran, Adwait Nadkarni, and Denys Poshyvanyk. “Discovering Flaws in Security-Focused Static Analysis Tools for Android using Systematic Mutation.” In *Proceedings of the 27th USENIX Security Symposium*. Baltimore, MD, USA, Aug 2018. [\[Source code\]](#) [\[PDF\]](#)

### Journal Papers

- [9] Amit Seal Ami, **Kaushal Kafle**, Kevin Moran, Adwait Nadkarni, and Denys Poshyvanyk. “Systematic Mutation-based Evaluation of the Soundness of Security-focused Android Static Analysis Techniques”. In *ACM Transactions on Security & Privacy (TOPS)*, 2021. [\[PDF\]](#)

- [10] **Kaushal Kafle**, Kevin Moran, Sunil Manandhar, Adwait Nadkarni, and Denys Poshyvanyk. “Security in Centralized Data Store-based Home Automation Platforms- A Systematic Analysis of Nest and Hue.” In *ACM Transactions on Cyber-Physical Systems (TCPS)*, 2020. [\[PDF\]](#)

### **Tool Demo Papers**

- [11] Prianka Mandal, Sunil Manandhar, **Kaushal Kafle**, Kevin Moran, Denys Poshyvanyk, and Adwait Nadkarni. “*Helion: Enabling Natural Testing of Smart Homes*”. In *Proceedings of the ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE), Demonstration Track*, Dec 2023. [\[PDF\]](#)
- [12] Amit Seal Ami, Syed Yusuf Ahmed, Radowan Mahmud Redoy, Nathan Cooper, **Kaushal Kafle**, Kevin Moran, Denys Poshyvanyk, and Adwait Nadkarni. “MASC: A Tool for Mutation-based Evaluation of Static Crypto-API Misuse Detectors”. In *Proceedings of the ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE), Demonstration Track*, Dec 2023. [\[PDF\]](#)
- [13] Amit Seal Ami, **Kaushal Kafle**, Kevin Moran, Adwait Nadkarni, and Denys Poshyvanyk. “Demo: Mutation-based Evaluation of Security-focused Static Analysis Tools for Android.” In *Proceedings of the 43rd IEEE/ACM International Conference on Software Engineering (ICSE’21), Formal Tool Demonstration*, May 2021, [\[PDF\]](#)

### **Posters**

- [14] “Understanding the Privacy Practices of Political Campaigns”, at the *Network and Distributed System Security (NDSS) Symposium ’24*, San Diego, CA – Feb 2024 [\[PDF\]](#)
- [15] “Security and Privacy in the Smart Home Ecosystem”, at the *Annual Virginia Academy of Science, Engineering and Medicine (VASEM) Summit*, Richmond, VA – Oct 2023 [\[PDF\]](#)
- [16] “Expanding Computer Science Learning Opportunities in K-12 Instruction in Virginia Schools”, at the *Annual Virginia Academy of Science, Engineering and Medicine (VASEM) Summit*, Richmond, VA – Oct 2023 [\[PDF\]](#)
- [17] “Understanding the Privacy Practices of Political Campaigns”, at the *CCI Symposium ’23*, Richmond, VA – April 2023 – **Best Poster Award** 🏆 [\[PDF\]](#)
- [18] “Smart Home Privacy Demystified”, at the *CCI Symposium 2022*, Richmond, VA – April 2022 [\[PDF\]](#)
- [19] “A Study of Data Store-based Home Automation“, at *ACM CODASPY’19* , Dallas, TX – March 2019 [\[PDF\]](#)

### **CONTRIBUTION IN AWARDED GRANT**

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- [1] [NSF Grant CNS – 2132281](#)
- Title: “*Enabling Data-Driven Security and Safety Analyses for Cyber-Physical Systems*”
  - PI: Adwait Nadkarni, Kevin Moran, Co-PI: Denys Poshyvanyk, **Contributor: Kaushal Kafle**
  - Award amount: \$799,839

### **RESEARCH EXPERIENCE**

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#### **Graduate Research Assistant**

Jan 2018 – Present

*Secure Platforms Lab (SPL)*, Department of Computer Science, William & Mary

**Research Overview:** Under the advisership of Prof. Adwait Nadkarni at SPL, I have worked primarily in the analysis of security and/or privacy of diverse emergent and evolving consumer-oriented software systems.

#### **Projects and Artifacts:**

- Polityzer**, IEEE S&P’24 - [Source Code](#)

2. **Security of Centralized Home Automation**, *Best Paper*, ACM CODASPY'19 - [Press Coverage](#)
3. **IoTspotter**, ACM CCS'22 - [Source Code](#)
4. **Smart Home Privacy Policies Demystified**, USENIX'22 - [Data](#)
5. **Helion**, IEEE S&P'20 - [Source Code](#)
6. **HomeEndorser** (*To appear, WiSec'24*): [Data](#), Source code to be open-sourced
7. **Mutation-based Soundness Evaluation (MUSE)**, USENIX'18 - [Source Code](#)
8. **Mutation Analysis for evaluating Static Crypto-API misuse detectors (MASC)**, IEEE S&P'22 - [Source Code](#)

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## Lead Graduate Student

June 2022 – Present

*Secure Platforms Lab (SPL)*, Department of Computer Science, William & Mary

### Responsibilities:

- Provided individual research mentorship and support to other graduate/undergraduate students
- Helped in fostering a good working environment among lab students
- Organized and led student-run weekly meetings, and other daily lab operational activities

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## INDUSTRY EXPERIENCE

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### Virginia Department of Education, Richmond, VA

May 2023 – Aug 2023

*Commonwealth of Virginia Engineering and Science (COVES) Policy Fellow*

**Mentors:** Keisha Tennessee (Virginia Computer Science Coordinator), Professor Anita Jones (UVA)

### Responsibilities:

- Support the strategic planning in VA to expand capacity, access, and participation in K-12 Computer Science Education
- Dataset collection, analysis and providing data-based recommendations

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### Mojo Vision, Tectus Corp., Saratoga, CA

Sep 2022 – Nov 2022

*Graduate Research Intern, Mentor:* Dr. Michael Grace

### Responsibilities:

- Investigate the security and privacy implications of AR Contact Lens
- Design a new security framework for AR Contact Lens

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### IBM Research, Yorktown Heights, NY

May 2022 – Aug 2022

*Graduate Research Intern, Mentor:* Dr. Kapil Singh

### Responsibilities:

- Investigate the feasibility of mapping specific privacy and data policies to the software code behavior

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## TEACHING EXPERIENCE

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### Guest Lecturer, William & Mary

1. Guest Lecture on “*Practical Integrity in the Smart Home*”, in Concepts of Computer Security – CSCI 667 (Graduate-level course) – Spring 2022
2. Guest Lecture on “*Ramifications of SSL Issues in Mobile Apps for the Smart Home*”, in Mobile Application Security – CSCI 445 (Undergraduate-level course) – Fall 2021 – Online (over zoom)
3. Guest Lecture on “*Securing a Smart Home*”, in IoT Security and Safety – CSCI 680 (Graduate-level course) – Spring 2021 – Online (over zoom)

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### Teaching Assistant, William & Mary

Aug 2017 – May 2019

4. Taught labs and graded assignments in *Computational Problem Solving* – CSCI 141 (133 Students)
5. Taught labs and graded assignments in *Programming for Data Science* – CSCI 140 (93 Students)
6. Graded assignments in *Mobile App Security* – CSCI 520 – Spring 2018 (20 Students), Fall 2018 (12 Students)

## CONFERENCE PRESENTATIONS, INVITED TALKS AND OUTREACH

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### Conference Presentations

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1. “*Helion: Enabling Natural Testing of Smart Homes*” at the **Foundations of Software Engineering (FSE’23), Demonstrations Track**, San Francisco, CA – December 2023
2. “*A Study of Data-store Based Home Automation*” at the **9<sup>th</sup> ACM CODASPY**, Dallas, TX – March 2019
3. “*A Study of Data-store Based Home Automation*” at the **18<sup>th</sup> Graduate Research Symposium**, William & Mary, Williamsburg – March 2019
4. “*Discovering Flaws in Security-Focused Static Analysis Tools for Android using Systematic Mutation*” at the **27<sup>th</sup> USENIX Security Symposium**, Baltimore – August 2018

### Invited Talks and Outreach

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5. “*Guest Post: A PhD Student’s Experience at the LiSPI Workshop*”, **Leadership in Science Policy Institute (LiSPI) workshop**, invited by *Computing Research Association (CRA)*, Washington DC – Nov 2023 [\[Link\]](#)
6. “*Understanding the Security of Smart Home Platforms*”, as part of the **Emerging Scholar Series**, Public Scholarship Initiative, Williamsburg Regional Library – March 2022
7. “*How hackable is your home?*”, invited as an expert on smart home security in *Which? Investigates* podcast ([Episode Link](#)) – October 2021
8. “*The Security of Smart Home Platforms*”, Research talk at the **Journal Club**, William & Mary, Williamsburg – September 2019
9. “*Enabling Safe and Secure Home Automation: Problems, Best Practices and Future Opportunities*”, William & Mary Developer Outreach to Williamsburg Developers Group, Williamsburg, VA, July 2019
10. *Outreach to High School Students*, invited by **Advanced Technology Center**, V. Beach, VA – April 2019
11. “*Hacking Your Smart Home*” podcast, invited to discuss my work on smart home security by **News Radio WINA** – December 2018

## AWARDS & HONORS

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1. Participant in the **Science Policy & Advocacy for Research Competition (SPARC) series**, *Universities Research Association (URA)*, 2024
2. **Commonwealth of Virginia Engineering & Science (COVES) Policy Fellow**, Selected by *Virginia Academy of Science, Engineering and Medicine (VASEM)*, Host office - *Virginia Department of Education*, 2023
3. **Best Poster Award**, CCI Symposium 2023, Richmond, VA, USA – April 2023
4. **Best Paper Award**, ACM CODASPY, Dallas, TX, USA - March 2019
5. **Graduate Studies Advisory Board (GSAB) Research Grant**, William & Mary - Fall 2021
6. **International Student Opportunity Award**, William & Mary - Spring 2020, Spring 2021
7. **Travel Award** - USENIX Security Symposium (2018), Computing Research Association (2023), NDSS (2024)

## PROFESSIONAL SERVICE

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1. **Conference Program Committee Member**
  - a. *USENIX Security Symposium (USENIX)* Artifact Evaluation Committee - 2021, 2022, 2023
  - b. *Annual Computer Security Applications Conference (ACSAC)* Artifact Evaluation Committee – 2023
  - c. *IEEE/ACM Workshop on Internet of Safe Things (SafeThings)* Program Committee - 2024
2. **Conference External Reviewer**
  - a. *Top-tier conferences* - NDSS (2020, 2021, 2022, 2023), USENIX (2019, 2021)
  - b. *Other conferences* - ACSAC (2022, 2023), ICISS (2019, 2022, 2023), ACNS (2022, 2023, 2024)
3. **2024 COVES Fellow Selection Committee**, Virginia Academy of Science, Engineering and Medicine (VASEM) - 2024