Deepak Kumar

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Research Overview

My research focuses on computer security & privacy behaviors on the Internet. In particular, I study online abuse (e.g., online hate and harassment) and how new attacks pose threats to the digital safety of Internet users. My current research focuses on 1) measuring how abusive behaviors are operationalized online and 2) designing new defenses and tools to help Internet users protect themselves from unwanted abusive behavior.

Education and Training

Postdoctoral researcher, Stanford University, 2020—2023.
Advisor: Zakir Durumeric

Ph.D. Computer Science, University of Illinois, Urbana-Champaign, August 2020.
Dissertation: A Principled Approach to Measuring the IoT Ecosystem.
Advisor: Michael Bailey
Committee: Zakir Durumeric, Nikita Borisov, Adam Bates, Gang Wang.

B.S Computer Science, University of Michigan, 2016.

Honors and Awards

Computing Innovation Postdoctoral Fellow 2020–2023, Computing Research Association (CRA) and National Science Foundation fellowship awarded to study nascent challenges in online hate and harassment.

Magic Grant 2022–2023, Awarded a grant by The David and Helen Gurley Brown Institute for Media Innovation for research in online hate and harassment.

Conference Publications

20. **A Golden Age: Conspiracy Theories' Relationship with Misinformation Outlets, News Media, and the Wider Internet** Hans Hanley, Deepak Kumar, Zakir Durumeric
    To Appear: ACM Conference On Computer-Supported Cooperative Work And Social Computing (CSCW), October 2023.

19. **Hate Raids on Twitch: Echoes of the Past, New Modalities, and Implications for Platform Governance** Catherine Han, Joseph Seering, Deepak Kumar, Jeff Hancock, Zakir Durumeric
    To Appear: ACM Conference On Computer-Supported Cooperative Work And Social Computing (CSCW), October 2023.

18. **Detecting DNS Manipulation using TLS Certificates** Elisa Tsai, Deepak Kumar, Ram Sundara Raman, Gavin Li, Yael Eiger, Roya Ensafi
To Appear: Privacy Enhancing Technologies Symposium (PETS) 2023, July 2023.

17. **Happenstance: Utilizing Semantic Search to Track Russian State Media Narratives about the Russo-Ukrainian War On Reddit** Hans Hanley, Deepak Kumar, Zakir Durumeric
To Appear: In International Conference on Web and Social Media (ICWSM), June 2023.

16. **Understanding the Behaviors of Toxic Accounts on Reddit** Deepak Kumar, Jeff Hancock, Kurt Thomas, Zakir Durumeric
To Appear: ACM Web Conference (WebConf), May 2023.

15. **"A Special Operation": A Quantitative Approach to Dissecting and Comparing Different Media Ecosystems' Coverage of the Russo-Ukrainian War** Hans Hanley, Deepak Kumar, Zakir Durumeric
To Appear: In International Conference on Web and Social Media (ICWSM), June 2023.

14. **Toppling Top Lists: Evaluating the Accuracy of Popular Website Lists** Kimberly Ruth, Deepak Kumar, Brandon Wang, Luke Valenta, Zakir Durumeric.
In ACM Internet Measurement Conference (IMC '22). October 2022.

13. **On the Infrastructure Providers that Support Misinformation Websites** Catherine Han, Deepak Kumar, Zakir Durumeric
In International Conference on Web and Social Media (ICWSM), Atlanta, GA. June 2022.

12. **No Calm in the Storm: Investigation QAnon Website Relationships** Hans Hanley, Deepak Kumar, Zakir Durumeric
In International Conference on Web and Social Media (ICWSM), Atlanta, GA. June 2022.

11. **Measuring DNS-over-HTTPS Performance Around the World** Rishabh Chhabra, Paul Murley, Deepak Kumar, Michael Bailey, Gang Wang
In ACM Internet Measurement Conference (IMC '21), Virtual, November 2021.

10. **Designing Toxic Content Classification for a Diversity of Perspectives** Deepak Kumar, Patrick Gage Kelley, Sunny Consolvo, Joshua Mason, Elie Bursztein, Zakir Durumeric, Kurt Thomas, Michael Bailey
In 17th USENIX Symposium on Usable Privacy and Security (SOUPS '21), Virtual, August 8 - 10, 2021.

9. **SoK: Hate, Harassment, and the Changing Landscape of Online Abuse** Kurt Thomas, Devdatta Akhawe, Michael Bailey, Elie Burszstein, Dan Boneh, Sunny Consolvo, Nicki Dell, Zakir Durumeric, Patrick Gage Kelley, Deepak Kumar, Damon McCoy, Sarah Meiklejohn, Thomas Ristenpart, Gianluca Stringhini
In 42nd IEEE Symposium on Security and Privacy (Oakland '21), Virtual, May 23 - 27, 2021.

8. **Measuring Identity Confusion with Uniform Resource Locators**
Joshua Reynolds, Deepak Kumar, Zane Ma, Rohan Subramaniam, Meishan Wu, Martin Shelton, Joshua Mason, Emily Stark, Michael Bailey
In ACM Computer and Human Interaction Conference (CHI) 2020, Virtual.

7. **All Things Considered: An Analysis of IoT Devices on Home Networks**
Deepak Kumar, Kelly Shen, Benton Case, Deepali Garg, Galina Alperovich, Dmitry Kuznetsov, Rajarshi Gupta, Zakir Durumeric
In 28th USENIX Security Symposium (USENIX '19), Santa Clara, California. Aug 14 - 16, 2019.

6. **Skill Squatting Attacks on Amazon Alexa**
   Deepak Kumar, Riccardo Paccagnella, Paul Murley, Eric Hennenfent, Joshua Mason, Adam Bates, Michael Bailey
   In 27th USENIX Security Symposium (USENIX '18), Baltimore, Maryland. Aug 15 - 17, 2018.

5. **Erays: Reverse Engineering Ethereum's Opaque Smart Contracts**
   Yi Zhou, Deepak Kumar, Surya Bakshi, Joshua Mason, Andrew Miller, Michael Bailey
   In 27th USENIX Security Symposium (USENIX '18), Baltimore, Maryland. Aug 15 - 17, 2018.

4. **SoK: "Plug & Pray" Today – Understanding USB Insecurity in Versions 1 through C**
   Dave (Jing) Tian, Nolen Scaife, Deepak Kumar, Michael Bailey, Adam Bates, Kevin R. Butler
   In 39th IEEE Security and Privacy Symposium (Oakland '18), San Francisco, California. May 21 - 23, 2018.

3. **Tracking Certificate Misissuance in the Wild**
   Deepak Kumar, Zhengping Wang, Matthew Hyder, Joseph Dickinson, Joshua Mason, Michael Bailey, Gabrielle Beck, David Adrian, Zakir Durumeric, J. Alex Halderman.
   In 39th IEEE Security and Privacy Symposium (Oakland '18), San Francisco, California. May 21 - 23, 2018.

2. **Understanding the Mirai Botnet**
   Manos Antonakakis, Tim April, Michael Bailey, Matt Bernhard, Elie Bursztein, Jaime Cochran, Zakir Durumeric, J. Alex Halderman, Luca Invernizzi, Michalis Kallitsis, Deepak Kumar, Chaz Lever, Zane Ma, Joshua Mason, Damian Menscher, Chad Seaman, Nick Sullivan, Kurt Thomas, Yi Zhou.
   In 26th USENIX Security Symposium (USENIX Security '17), Vancouver, Canada, August 16-18, 2017.

1. **Security Challenges in an Increasingly Tangled Web**
   Deepak Kumar, Zane Ma, Zakir Durumeric, Ariana Mirian, Joshua Mason, Michael Bailey, and J. Alex Halderman.
   In 26th World Wide Web Conference (WWW'17). Perth, Australia. April 3 - 7, 2017.

In Submission

1. **A Golden Age: Conspiracy Theories' Relationship with Misinformation Outlets, News Media, and the Wider Internet**

2. **Do Users Write More Insecure Code with AI Assistants?**

Journal Publications

1. **Emerging Threats in IoT Voice Services** Deepak Kumar, Riccardo Paccagnella, Paul Murley, Eric Hennenfent, Joshua Mason, Adam Bates, and Michael Bailey
   In IEEE Security & Privacy Magazine. July 9, 2019.

Service

Program Committee. The Web Conference 2023, Web & Society Track.

Program Committee. 2022 USENIX Security Symposium.

Program Committee. 2021 USENIX Security Symposium.

Web Chair. 2022 International Conference on Web and Social Media (ICWSM).

I have also served as an external reviewer for USENIX Security (2018–2020), ACM Internet Measurement Conference (2019–2020), and AAAI ICWSM (2022–2023).

Teaching

The Modern Internet (CS 249i), Stanford University
Terms: Fall 2021
Responsibilities: Helped to create a new advanced networking course that covers how the Internet has evolved and operates today. Responsible for three lectures and one project (approximately 1/4 of the overall course.)

Introduction to Computer Security (CS 461), University of Illinois
Terms: Spring 2017, Fall 2019, Spring 2020
Responsibilities: Graduate TA responsible for course administration, office hours, section leading, grading, exam creation, and guest lectures. In Fall 2019, I helped to redesign the syllabus for the class in collaboration with the instructor.

Introduction to Computer Security (EECS 388), University of Michigan
Terms: Fall 2015, Winter 2016.
Responsibilities: Undergraduate TA responsible for section leading, office hours, and exam administration.

ICOS Big Data Bootcamp, University of Michigan
Terms: Summer 2016
Responsibilities: Taught introductory computer science lectures for summer course designed to introduce humanities graduate students to using computing for research.

Mentoring

Undergraduate, Masters, and PhD students I have mentored/collaborated with:

2022: Elisa Tsai, Lauren Saue-Fletcher, Jaylene Martinez, Britney Tran, Amrita Palaparthi, Blain Engeda, Joyce Lu, Jinyoung Kim

2021: Catherine Han, Hans Hanley, Kimberly Ruth, Rishabh Chhabra, Oumnia Chellah, Sanjaye Narayan

2020: Muskan Shafat, Brandon Wang

2019: Rohan Subramanian, Meishan Wu, Eric Hennenfent

2018: Yi Zhou

2017: Zhengping Wang, Gabrielle Beck

Invited Talks

11. **Understanding Accounts That Engage in Hate and Harassment on Reddit**, Stanford SIO Trust and Safety Research Conference. September 2022.

10. **Understanding Accounts That Engage in Hate and Harassment on Reddit**, Stanford Computer Forum. March 2022.

9. **Understanding Hate and Harassment as a Security Problem**, Stanford Security Lunch. February 2022.

8. **Understanding Hate and Harassment as a Security Problem**, Stanford Cyberfest. Virtual. October 2021.

7. **Let's Talk about Technology**, Chicago Teen Mentor's STEM Technology Day. Virtual. September 2021.

6. **Designing Toxic Content Classification for a Diversity of Perspectives**, USENIX Symposium on Usable Security and Privacy (SOUPS '21). Virtual. August 2021.

5. **SoK: Hate, Harassment, and the Changing Landscape of Online Abuse**, IEEE Symposium on Security and Privacy (Oakland '21). Virtual. May 2021.

4. **All Things Considered: An Analysis of IoT Devices on Home Networks**, USENIX Security Symposium. Santa Clara, CA. Aug 2019.

3. **Skill Squatting Attacks on Amazon Alexa**, USENIX Security Symposium. Baltimore, Maryland. Aug 2018.

2. **Tracking Certificate Misissuance in the Wild**, IEEE Symposium on Security and Privacy (Oakland '18). San Francisco, CA. May 2018.

1. **Security Challenges in an Increasingly Tangled Web**, World Wide Web Conference (WWW'17). Perth, Australia. April 2017.

Industry Experience

Software Engineering Research Intern, Google. May 2018 – Aug 2018.

Software Engineering Intern, Microsoft. May 2016–August 2016.

Software Engineering Intern, Microsoft. May 2015–August 2015.

hackNY Fellow, hackNY. May 2014–August 2014.

References

1. Michael Bailey, Chair of the School of Cybersecurity and Privacy (SCP), Georgia Institute of Technology

2. Zakir Durumeric, Assistant Professor of Computer Science, Stanford University

3. Jeff Hancock, Professor of Communication, Stanford University

4. Nikita Borisov, Professor of Electrical & Computer Engineering, University of Illinois, Urbana-Champaign.

5. Roya Ensafi, Assistant Professor of Computer Science & Engineering, University of Michigan

Last updated: March 16, 2023