AKUL GOYAL

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RESEARCH INTERESTS

System Security, Intrusion Detection, Machine Learning, Threat Investigation, Data Provenance

EDUCATION

Ph.D. in Computer Sciences, University of Urbana-Champaign	May, 2025 (expected)
M.S. in Computer Science, University of California, Santa Cruz	June, 2019
B.S. in Computer Science, University of California, Santa Cruz	June, 2018

AWARDS AND HONORS

• Cozad New Venture Challenge	2024
• NSF National I-Corps Program	2024
• Illinois Proof-of-Concept Program	2024
• DOD Cyber Innovators Challenge	2024
• Illinois Innovation Award	2024
• Catapult Award EnterpriseWorks	2024
• Alan Singleton Award	2024

PEER-REVIEWED CONFERENCE PRESENTATIONS

1. Akul Goyal, Gang Wang, and Adam Bates. *R-CAID: Embedding Root Cause Analysis within Provenance-based Intrusion Detection*
   IEEE Symposium on Security and Privacy (S&P) 2024   [PDF]

2. Muhammad Adil Inam, Yinfang Chen, Akul Goyal, Jason Liu, Jaron Mink, Noor Michael, Sneha Gaur, Adam Bates, and Wajih Ul Hassan. *SoK: History is a Vast Early Warning System: Auditing the Provenance of System Intrusions.*
   IEEE Symposium on Security and Privacy (S&P) 2023 [PDF]

3. Akul Goyal, Xueyuan Han, Gang Wang, and Adam Bates. *Sometimes, You Aren't What You Do: Mimicry Attacks against Provenance Graph Host Intrusion Detection Systems*
   ISOC Network and Distributed System Security Symposium (NDSS) 2023 [PDF]

4. Muhammad Adil Inam, Akul Goyal, Jason Liu, Jaron Mink, Noor Michael, Sneha Gaur, Adam Bates, and Wajih Ul Hassan. *FAuST: Striking a Bargain between Forensic Auditing's Security and Throughput*
   Annual Computer Security Applications Conference (ACSAC) 2022 [PDF]

POSTERS

1. Akul Goyal, Xueyuan Han, Gang Wang, and Adam Bates. *Poster: Sometimes, You Aren't What You Do: Mimicry Attacks against Provenance Graph Host Intrusion Detection Systems*
   IEEE Symposium on Security and Privacy (S&P) 2023 [PDF]

SUBMITTED CONFERENCE PAPERS

1. Akul Goyal, Jason Liu, Gang Wang, and Adam Bates.
   ORCHID: Streaming Threat Detection over Versioned Provenance Graphs [PDF]

2. <u>Akul Goyal</u>, Carl Edwards.
   Class-based Subset Selection for Transfer Learning under Extreme Label Shift

3. <u>Akul Goyal</u>, Adam Bates, Michael R Smith.
   Crossing Streams: Applying Domain Generalization to Static Malware Analysis

4. <u>Akul Goyal</u>, Varun Chandrasekaran.
   Property Aware Crawling

5. Jason Liu, Adil Inam, <u>Akul Goyal</u>, Andy Riddle, Kim Westfall, and Adam Bates.
   What We Talk About When We Talk About Logs: Understanding the Effects of Dataset Quality on Endpoint Threat Detection Research

PATENTS

1. <u>Akul Goyal</u>, Gang Wang, and Adam Bates. *Real-Time Detection of Network Threats Using a Graph-Based Model*
   U.S. Provisional Patent Application (Filed on March 21, 2024)

IMPACTS

- Cofounded Provenance Security that incorporates ORCHID into core malware detection algorithm.

- Collaborated with the university, local hospital, and local government to test ORCHID on their system

EMPLOYMENT

Cofounder, *Provenance Security*
Champaign, Illinois   July 2024 - Present

Research Intern,*Sandia National Laboratory*, Mentor: Michael R. Smith
Albuquerque, New Mexico   June 2022 - April 2024

Software Engineering Intern, *Microsoft*
Seattle, Washington   June 2019 - August 2019

Software Engineering Intern, *Intuit*
San Diego, California   June 2018 - August 2018

TEACHING

- **Guest Lecturer:**

  - Sigpwny: Presented 60-minute lecture on provenance aware malware detection   2022

  - ACM: Presented 60-minute lecture on kernel-level data provenance   2022

  - CS SAIL: Present 60-minute lecture on cybersecurity risk and safety   2021-Present

- **Teaching Assistant:**

  - Intro Computing for Non-Techincal Majors   2021

MEDIA COVERAGE

- "CS students are building award-winning tech startup"
  Illinois CS. August 26th, 2024. https://siebelschool.illinois.edu/news/2024-student-run-startups

- "The Grainger Foundation Annual Impact Report 2024."
  Illinois. https://grainger.illinois.edu/yourimpact/thegraingerfoundation-2024

- "Bioengineering Graduate Student Developing Next-Generation Therapies for Neurodegenerative Disorders Receives Illinois Innovation Award"
  Illinois TEC. April 24th, 2024. https://tec.illinois.edu/news/66472

- "Cozad New Venture Challenge 2024 Finalists "
  Illinois TEC. April 12th, 2024. https://tec.illinois.edu/news/66064

UNDERGRADUATE STUDENT RESEARCH ADVISING

Heramb Joshi	Supervising project on provenance graph visualization.	2024–Present
Mihir Gune	Supervising project on provenance graph visualization.	2024–Present
Stephanie Tian	Supervising project on provenance graph visualization.	2024–Present
Danish Sethi	Supervising project on provenance graph visualization.	2024–Present
Hemant Pardeshi	Supervising project on provenance graph visualization.	2024–Present
Qi Liu	Supervising project applying LLMs to provenance graphs.	2024–Present
Saurav Chittal	Supervised project creating dataset with an APT Attack. Paper Under Submission. Post Grad: MS at Purdue	2023–2024
Sreenidhi Vijayaraghavan	Supervised semester-long research project through the PURE program. Post Grad: MS at UIUC	2020–2021
June Vanlerberghe	Supervised semester-long research project through the PURE program. Post Grad: MS at Duke	2020–2021
Tejal Athreya	Supervised semester-long research project through the PURE program. Post Grad: SWE at Visa	2020–2021

TRAVEL GRANTS

- Conference on Applied Machine Learning in Information Security   2023
- Annual Computer Security Applications Conference (ACSAC)   2022