

# David L. Adei

Doctoral Student • Department of Computer Science • North Carolina State University

Website: <https://david.adei.love> — Email: [lokingdav@gmail.com](mailto:lokingdav@gmail.com) — Github: [github.com/lokingdav](https://github.com/lokingdav)

## PROFESSIONAL SUMMARY

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I am a PhD researcher specializing in systems security, cryptography, privacy-preserving technologies, and software engineering with a focus on distributed systems. Current work includes securing telephone networks, mitigating telecom fraud, and decentralized blockchain solutions. Recently, my work on tracing telephone scammers received both the **Distinguished Paper Award** and the **Distinguished Artifact Award** at the ACM Conference on Computer and Communications Security in October 2024. With over six years of prior industry experience, I aim to develop innovative, scalable systems that tackle real-world security challenges.

## EDUCATION

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- Ph.D in Computer Science (CS), North Carolina State University — Raleigh, NC, USA**  
August 2022 - 2026 (est.)  
Advisor: Dr. Bradley Reaves.  
*Relevant Coursework:* Cryptography, LLMs In Security, Algorithms Design & Data Structures, Operating Systems Security, Cellular and Telephone Networks Security, Software Security, Computer & Network Security and Advance Network Security.
- BSc in Computer Science — Kwame Nkrumah Univ. of Science & Technology — AR, Ghana.**  
August 2015 - July 2019  
Bachelor of Science in Computer Science, First Class Honors — Graduated as Best Computer Science Student.

## RESEARCH PUBLICATIONS

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- How to Recover a Cryptographic Secret From the Cloud**  
Tanner Verber, [David Adei](#), Alessandra Scafuro, Chris Orsini  
ACM Conference on Computer and Communications Security (CCS) October 2025
- Towards Declarative Blockchains: A SHACL-Based Model for Robust and Efficient Transactions**  
Kemafor Anyanwu, Sogolsadat Mansouri, [David Adei](#)  
IEEE International Conference on Blockchain and Cryptocurrency (ICBC) 2025
- Jäger: Automated Telephone Call Traceback**  
[David Adei](#), Varun Madathil, Sathvik Prasad, Bradley Reaves, Alessandra Scafuro  
ACM Conference on Computer and Communications Security (CCS) October 2024  
(1) [Distinguished Paper Award](#) · (2) [Distinguished Artifact Award](#)

## EXPERTISE & SKILLS

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<b>Languages:</b>	Go, Python, JavaScript, C++, JAVA, PHP
<b>Frameworks:</b>	Node.js, React.js, Vue.js, Express.js, Laravel, Flask, HTML & CSS
<b>Tools:</b>	Docker, Ansible, Terraform, Grafana k6, Git, PostgreSQL, MySQL, MongoDB, Redis, L <sup>A</sup> T <sub>E</sub> X
<b>Platforms:</b>	Linux, Web, MacOS, Amazon Web Services, Google Cloud Platform, Trusted Execution Environments
<b>Soft Skills:</b>	Mentoring, Efficient Time Management, Leadership, Problem-Solving, Teamwork, Attention to Detail, Written & Oral Communication

## EMPLOYMENT & EXPERIENCE

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### 1. Graduate Research Assistant — NC State University — Raleigh, NC, USA.

In-Person

Aug. 2022 - Present

- Developed secure cryptographic protocols for privacy-preserving call traceback and a scalable system to process 50,000 call records per second while minimal system resources.
- Implemented performant Witness Encryption Scheme based on BLS signatures in C++, achieving 200% increase in speed.
- Implemented credential-less secret recovery protocol using Trusted Execution Environments(TEEs) and blockchain.
- Implemented a security game with deceptive prompt-injecting attacks on Large Language Models (LLM) to solve cryptographic puzzles.
- Researched Peer-to-Peer (P2P) networks and distributed systems to enhance performance and security.

### 2. Senior Software Developer — Scopic Software — Rutland, MA, USA.

Remote, Contractual

Oct. 2021 - Aug. 2022

- Implemented web applications for image manipulation, 3D modeling, and data synchronization between Teamwork.com and Jira Cloud with overall 35% increased in client satisfaction.
- Refactored core modules to improve frontend speed by 56%, reducing page load times significantly.
- Resolved critical production bugs, reducing server downtime by 48% and bug rates by 36%.
- Containerized 4 projects with Docker, cutting deployment time by 90%.
- Upgraded outdated SDKs an API backend to reduce system crashes and increased uptime by 80%.

### 3. Senior Software Engineer — Cmunily — Raleigh, NC, USA.

Remote, Contractual

Nov. 2020 - Oct. 2021

- Replaced legacy web app with a cross-platform, offline-first mobile app, improving speed by 26% and user engagement by 48%.
- Redesigned monolithic ad-matching platform into a microservices architecture, improving scalability by 40%.

### 4. Software Engineer — Clearcare Solutions Ltd — Stafford, England.

Remote, Contractual

Nov. 2019 - Oct. 2020

- Migrated legacy PHP app for 1,000 DAUs to Laravel, improving performance by 630x and increasing DAUs by 23%.
- Overhauled frontend, enhancing user interface and boosting UX satisfaction by 15%.

### 5. Senior Software Engineer — W3MSYS Company Limited — Accra, GA, Ghana.

Hybrid

Jan. 2017 - Nov. 2019

- Led the development of a nationwide healthcare management system with 1,000 DAUs.
- Designed a rate-limited Role-Based Access Control microservice handling 10,000 API requests/hour, achieving 99.99% uptime.
- Managed a team of 3 developers through Agile resulting in 24% increase in team productivity.

### 6. Software Engineer — Freelancing.

Remote, Contractual

Sept. 2015 - Jan. 2017

- Collaborated with clients to design tailored software solutions, optimizing business operations.
- Delivered high-impact features across a variety of platforms and technologies.

## AUTHORED OPEN SOURCE LIBRARIES

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### 1. BBS Group Signatures

C++ library with Go and Kotlin bindings. Implements the conventional BBS04 group signature scheme and its threshold variants. — [View Code on Github](#)

### 2. Witness Encryption Based on BLS Signatures

C++ library with Python bindings. Implements Witness Encryption Scheme (WES) based on BLS Signatures. — [View Code on Github](#)

### 3. Jäger: Automated Telephone Call Traceback — ACM CCS Distinguished Artifact Award

Python implementation of Jäger system components. Integrates Oblivious PRF protocol, Group Signatures, BLS signatures and WES. — [View Code on Github](#)

#### 4. **How to Recover a Cryptographic Secret From the Cloud**

Python implementation of a cloud-based secret recovery mechanism using blockchain and AWS Nitro Enclave in the presence of a malicious cloud provider. — [View Code on Github](#)

### AWARDS & HONORS

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1. **College of Engineering Summer Graduate Merit Award**, NC State University, 2025 — Cash prize of \$3,000 awarded for academic excellence and research achievement.
2. **Distinguished Paper Award**, ACM Conference on Computer and Communications Security (CCS) 2024.
3. **Distinguished Artifact Award** ACM Conference on Computer and Communications Security (CCS) 2024.
4. **First Class Honors** - Kwame Nkrumah University of Science and Technology, BSc Computer Science, 2019.

### VOLUNTEER EXPERIENCE

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| 1. Invited Talk on Cybersecurity – North Carolina Annual Cybersecurity Symposium   | April 2025.             |
| 2. Sub Reviewer – IEEE S&P   | 2024                    |
| 3. Sub Reviewer – IEEE S&P   | 2023                    |
| 4. Web Development Team Lead – Google Developer Students Club                      | Nov. 2018 - Sept. 2019  |
| 5. Research Assistant – Kwame Nkrumah University of Science & Technology           | Apr. 2017 – May 2019    |
| 6. President of Computer Science, Kwame Nkrumah University of Science & Technology | Sept. 2017 - Sept. 2018 |

### POSTERS

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1. **PrivyTrace: Privacy-preserving trace back/forward of phone calls**  
David Adei, Bradley Reaves  
Network and Distributed System Security Symposium (NDSS), Feb 2023