

Zachary Ratliff

PhD Student, Harvard University
Staff Scientist, Raytheon BBN

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Education

Ph.D., Computer Science - Harvard University

Cambridge, MA, 2021 - 2026

- Advisors: Salil Vadhan & James Mickens
- Theory of Computation Group

B.S., Computer Science - Texas A&M University

College Station, TX, 2018

- Minor in Mathematics, Cybersecurity
- Undergraduate Research Scholar Honors Distinction

Organizations: Cybersecurity Club

Relevant Courses: Cryptography, Systems Security, Applied Data Privacy, Algorithmic Fairness and Validity, Networks & Distributed Processing, Wireless & Mobile Systems, Artificial Intelligence, Reverse Engineering

Programming: C / C++, Java, Rust, Python

Professional Experience

Staff Scientist I - Raytheon BBN

Cambridge, MA, 2019 – Present

- MANTIS (AFRL)** – Implemented zero-knowledge proofs for content filtering in cross-domain solutions. This entailed programming efficient arithmetic circuits using Rank-1 Constraint Satisfiability (R1CS) and the libsnark library. (C++)
- Network-UP (DARPA)** – Implemented algorithms for improving performance in mobile ad hoc networks that experience frequent and severe signal degradation. My contributions included programming reinforcement-learning algorithms for adapting channel access decisions based on environmental conditions. (C, Python)
- Brandeis (DARPA)** – Developed and integrated privacy-enhancing technologies for mobile phones. My contributions included writing Android applications that used secure multi-party computation and differentially private algorithms to protect sensitive user data. (Java, Python, Docker, AWS)

Undergraduate Researcher – Texas A&M Cyber Center

College Station, TX, 2018

Advisor: Daniel Ragsdale

- (Undergraduate Thesis) – Researched the effectiveness of using sequence covering arrays for finding software vulnerabilities in Android applications. (Haskell)
- Developed cybersecurity challenges for an annual cyber competition, tamuCTF. (Java, Python, x86)

Undergraduate Researcher – NIST

Gaithersburg, MD, summers 2015 & 2016

Advisors: Richard Kuhn & Raghu Kacker

- Researched the relationship between the combination of inputs required to trigger software faults to the classifications of software bugs. I focused on applying my findings to combinatorial testing methods.
 - Developed a combinatorial coverage measurement tool for software testing (Java)
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Honors & Fellowships

- (2020) Raytheon Intelligence & Space Innovation Award
- (2019) National Science Foundation GRFP Honorable Mention
- (2018) Texas A&M Undergraduate Research Scholar
- (2015 & 2016) NIST Undergraduate Research Fellowships

Publications

- Khoury, J., **Ratliff, Z.**, & Atighetchi, M. (2021, October). Towards Decentralized and Provably Secure Cross-Domain Solutions. In International Workshop on Security and Trust Management (pp. 185-203).
- Angel, S., Kannan, S., & **Ratliff, Z.** (2020, May). Private resource allocators and their applications. In 2020 IEEE Symposium on Security and Privacy (SP). IEEE.
- **Z. Ratliff**, D. R. Kuhn, and D. Ragsdale. Detecting Vulnerabilities in Android Applications using Event Sequences. In 2019 IEEE 19th International Conference on Software Quality, Reliability and Security (QRS), 2019.
- **Z. Ratliff**, D. R. Kuhn, R. N. Kacker, Y. Lei, and K. S. Trivedi. The Relationship between Software Bug Type and Number of Factors Involved in Failures. In 2016 IEEE International Symposium on Software Reliability Engineering Workshops (ISSREW), 2016.

Patents

- **Ratliff, Z.**, Khoury, J. (2021). Privacy-preserving contact tracing. US Patent App. 17/326,498.
- Khoury, J., Atighetchi, M., & **Ratliff, Z.** (2021). Verifiable computation for cross-domain information sharing. US Patent App. 17/172,825
- Gregory, DA., Basu, P., **Ratliff, Z.**, Pal, S., Gavin, K., Montgomery, B., & Khoury, J. (2021). Geospatial-temporal pathogen tracing in zero knowledge. US Patent App. 17/364,048