Jonathan Bateman

jmb7342@rit.edu — GitHub — Meet Jonathan

Secure software developer and applied mathematician specializing in cryptography, data science, and ethical AI. Combining technical depth with social awareness to solve complex problems. Committed to building transparent, innovative, and impactful technology through multidisciplinary thinking.

Education

Rochester Institute of Technology (RIT)
Honors Program
B.S. Applied Math and Computing Security
B.S. Sociology and Anthropology

Honors

YCombinator AI Startup School	2025
SOIS Gap Year Fellow	2025–Current
Partners & Napier Fellow	2024
Spectrum Scholar	2024–Current
RIT Multidisciplinary Scholar	2023–Current

Experience

Vulnerability History Project
Vulnerability Researcher — *Jan. 2025 - May 2025*

- Pioneered the first quantitative approach to SZZ algorithms using statistical confidence intervals to measure vulnerability accuracy through a new open source tool: Patch Vulnerability Commit Reconciliation (P-VCR)
- Designed a probabilistic model linking 290,000 CVEs from the NVD to 13,000 GitHub FOSS projects
- Embedded 13,000 FOSS project names using 9 semantic embedding models via Python/ Ollama and stored results in a WeaviateDB docker instance.
- Queried 290,000 CVE/CPE vendor:product combinations against WeaviateDB data and stored in MongoDB
- Discovered 47,979 commits contributing to 13,175 CVEs recorded in the National Vulnerability Database (NVD)

RIT Network & Security Research
Covert Channels Researcher — *Oct. 2024 - May 2025*

- Engineered a diverse dataset of 100,000+ network packets for advanced threat detection via a Neural Network
- Constructed a custom network parser that recognizes 9 protocols in the TCP/IP stack using Python and dependency injection
- Targeted 80%+ accuracy on DNS covert channel detection via neural models

OpenBWC & Rochester Police Department
ML & Criminology Researcher — *Jun. 2024 – Nov. 2024*

- Led a research team with the Principal Investigator on a $1 million dollar research grant administered by the DOJ and Rochester Police Department (RPD)
- Scraped, cleaned, and stored 3,945 YouTube based Police Body-Cam videos using Python, MongoDB, and OpenAI's Whisper model
- Facilitated the formation of a research alliance between RIT, RPD Office of Business Intelligence, and Locust Club Police Union by presenting body-cam data to 6 senior officials
- Spearheaded OpenBWC (Body-Worn-Camera), a FOSS project focused on bringing algorithmic transparency to AI and CV used in Police BWC analysis, by publishing source code and non-sensitive training data

Technologies

Languages:	Swift, Python, Rust, C, Java, HTML/CSS, x86 Assembly
Security:	GDB, IDA Pro, OpenSSL, Wireshark, Valgrind
Tools:	Jupyter Notebook, Docker, Flask, SQLite, MongoDB, WeaviateDB, ArcGIS Pro, Xcode
AI/ML:	NLP, Transformers, Sentence Transformers, Ollama, LLMs, Embedding Models, OpenCV, Whisper AI

Projects

ZeroOTP
- Building a zero-trust, open-source TOTP iOS authenticator app in Swift, following RFC 6238/4226 standards
- Securing OTP secrets using iOS Keychain with no cloud sync, tracking, or analytics; implementing strict input validation

SHA-1 in Rust
- Built full SHA-1 algorithm: 512-bit block processing, 80 rounds, Rust safety features
- Handles input up to 4GB using optimized memory & padding

OpenSSL CVE-2011-4354 Contribution
- Identified & tested EC CVE in OpenSSL 0.9.8g using specially crafted P-256/P-384 private key to validate regression & GDB
- Developed & submitted a regression test for a cryptographic bug affecting 32-bit Linux distributions, ensuring correctness in future releases

Skills

Open Source • iOS Development • OSINT • REST API • Data Science • Network Security • Cryptography • Semantic Search • Malware Analysis • Algorithm Design • GIS • Ethical AI/ML • Vulnerability Research • Technical Writing