Matthew Cole

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Education

05/2024 (expected)	**Ph.D. Computer Science**, State University of New York at Binghamton University, Binghamton, New York. Dissertation: *Enforcing Integrity Models Through Hardware-Software Cohesive Systems.* Advisor: Aravind Prakash
08/2018	**M.Sc. Computer Science**, State University of New York at Binghamton University, Binghamton, New York. GPA: 3.97/4.00
05/2005	**B.Sc. Computer Science**, United States Naval Academy, Annapolis, Maryland. GPA: 3.78/4.00 (major), 3.60/4.00 (overall). Graduated *With Merit*, Upsilon Pi Epsilon

Experience

Research Experience

08/2015 - 08/2023 **Binghamton University, Computer Science Department** Binghamton, NY
Research Assistant
➤ Repurposed Intel Memory Protection Extensions for generalized storage, and investigated performance implications of these register accesses.
➤ Engineered an implementation of the RISC-V architecture employing inline code tagging for integrity models from compiler-driven static program analysis techniques, using the LLVM compiler toolchain.
➤ Extended our compiler toolchain to perform out-of-band data tagging, with the ability to achieve relaxation and linkage resolution at link-time using a modified version of the LLD linker.
➤ Developed a prototype extending data tagging for a read- and write-limited data model that specifically enforces compile-time `const` qualifiers as run-time assurances.
➤ Scrutinized scientific misutilization of performance benchmark tools such as SPEC CPU2006, SPEC CPU2017 and MIBench.

05/2004 - 08/2004 **United States Naval Research Laboratory** Washington, DC
Networks and Communications Systems Intern
➤ Prototyped a Java Management Extension (JMX) for Mobile Ad Hoc Wireless Networks (MANETs) serving city-sized distributed sensor networks in real-time.

Research Links
- 🆔 https://orcid.org/0000-0003-1743-1504
- 🎓 https://scholar.google.com/citations?user=GfQ-ozgAAAAJ

Professional Experience

01/2022 - Present **Binghamton University, Computer Science Department** Binghamton, NY
Lecturer
- Fall 2023 – CS 580U: Programming Systems and Tools
- Fall 2022 – CS 580U: Programming Systems and Tools
- Spring 2022 – CS 458, CS 558: Introduction to Computer Security

08/2017 - 05/2023 **Binghamton University, Computer Science Department** Binghamton, NY
Teaching Assistant
- Spring 2023 – CS 458, CS 558: Introduction to Computer Security
- Spring 2018 – CS 480, CS 580: Special Topics: Software Security
- Fall 2017 – CS 220: Computer Systems II, Architecture and C Programming

Experience (continued)

| 09/2011 - 06/2014 | **United States Navy, Trident Training Facility** | Silverdale, WA |

Instructor
- ➤ Qualified as Instructor, Instructor Evaluator and Course Supervisor. Served as Navigation Department Director, managing a department of 40 instructors and 11 labs. Awarded Navy and Marine Corps Commendation Medal with Gold Star.
- ➤ Improved annual throughput in a ship piloting simulator by 18% (75 sessions) by repairing over 30 script files and qualifying two new instructors. Created an additional 32 trainer sessions per month by guiding a comprehensive lab redesign.
- ➤ Delivered lectures for 120 submarine officers annually (66% increase) and practical skills training for 23 ships, earning a "highly effective" rating by external auditors.

| 04/2010 - 04/2011 | **Headquarters, U.S. Forces Afghanistan** | Kabul, AF |

Operations Officer
- ➤ Guided ad-hoc, cross-functional teams of 6-8 in a position normally assigned to a more senior pay grade. Awarded Defense Meritorious Service Medal.
- ➤ One of three officers selected from a theatre-level command to certify deployment readiness for 54 units and 6500+ personnel.
- ➤ Expedited processing by 30% (4 days) and enabled a 144% increase (128 items) in annual traffic by improving tracking methods, reducing retention requirements and implementing SharePoint collaboration tools.
- ➤ Responded to a major diplomatic cables leak by building a database for tracking compromised personnel that reduced outgoing traffic by 92% (920 messages).

| 08/2009 - 08/2011 | **United States Navy, Amphibious Squadron Six** | Little Creek, VA |

Department Head
- ➤ Qualified as Staff Tactical Watch Officer (operations floor manager). Served as Administrative Department Head with 6 direct reports and oversight of 4 ships' administrative and human resources departments. Awarded Navy and Marine Corps Commendation Medal.
- ➤ Authored contingency plans and coordinated with 8 partner nations to deliver over 100K pounds of humanitarian supplies following the 2010 Haitian earthquake.

| 12/2006 - 06/2009 | **United States Navy, USS Maine (SSBN-741)** | Silverdale, WA |

Division Officer
- ➤ Qualified as Submarine Warfare Officer and Nuclear Engineering Officer. Guided operation, maintenance and testing of nuclear reactor instrumentation, control systems and protective features.
- ➤ Held responsibility for a $2B submarine, $100M nuclear reactor plant and $50M-$75M annual operating budgets.
- ➤ Resolved a decade-long persistent fault in the S8G Nuclear Instrumentation and Pump Control systems. Awarded Navy and Marine Corps Achievement Medal.

Skills

Languages	C, C++, Python, x86/RISC-V/ARM assembly, LLVM IR, Rust, Java
Operating Systems	Unix/Linux (Debian/Ubuntu/Solaris), MacOS
Benchmarking	SPEC CPU 2006/2017, Google Benchmark, Hayai, Hyperfine
Testing	CUnit, Google Test, Boost.Test, Python unittest, LLVM Lit
Build/Deploy	GNU Make, CMake, Github Actions, Travis-CI, Git
Reverse Engineering	Ghidra, Hopper

Miscellaneous

U.S. Citizen. Held SECRET (2001-2006) and TOP SECRET/SCI (2006-2014) clearances.