

ROBERT A. COCHRAN III

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INTERESTS

- Computer Security
- Distributed Systems
- Dynamic Analysis
- Software Verification
- Program Synthesis
- Container Security

EDUCATION

UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL CHAPEL HILL, NC
Doctor of Philosophy in Computer Science 2016
Thesis: *Symbolic Verification of Remote Client Behavior in Distributed Systems*
Advisor: Prof. Michael K. Reiter
CLEMSON UNIVERSITY CLEMSON, SC
Bachelor of Science in Computer Science *Magna Cum Laude* 2006

EMPLOYMENT AND RESEARCH EXPERIENCE

STACKROX, INC. MOUNTAIN VIEW, CA
Member of Technical Staff May 2017 - Present
– *Container Security*: Developing run-time detection and enforcement platform at a Series A startup.

UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL CHAPEL HILL, NC
Research Assistant with Prof. Michael Reiter. 2008 - 2016
– *Cheat Detection in Online Games*: Led initial development of an award-winning security method called symbolic client verification; demonstrated and implemented a framework to detect player misbehavior in the network logs of online games [1, 5]
– *Data-Driven Symbolic Execution*: Investigated the use of instruction traces to guide symbolic execution; implemented a toolchain using clustering and novel metrics that improved performance significantly [5]
– *Parallel Symbolic Execution*: Refactored the KLEE symbolic execution engine to enable thread-level parallelism; developed a lock-free algorithm leading to high performance on many-core architectures [2]
– *Verification of Cryptographic Clients*: Designed methods for verification of network behavior in cryptographic clients; enabling detection of OpenSSL client misbehavior (e.g. HeartBleed attacks) [2]
Research Assistant with Prof. Ketan Mayer-Patel. 2007- 2008
– *Spline-based Image Compression*: Investigated an image compression technique based on image decomposition using L1 splines; implemented the technique to evaluate image quality, compression ratio and speed
Teaching Assistant Fall 2008
– *COMP 535 Introduction to Computer Security*: Graded student programs and written assignments; led recitations and exam review sessions

MICROSOFT RESEARCH REDMOND, WA
Research in Software Engineering (RiSE) Intern with Dr. Ben Livshits Summer 2013
– *Program Synthesis via Crowd-sourcing*: Explored approaches for improving regular expressions using the "wisdom of crowds"; designed and implemented a toolchain that utilized genetic programming, symbolic automata and on-demand online workers [3, 7]

INTEL CORPORATION HILLSBORO, OR
Software Engineer in the Visual Computing Group 2006-2007
– *GPU Hardware Development*: Designed and developed a tool to interpret and record for playback Direct3D and OpenGL API calls; tool was crucial in performance analysis of prototype graphics hardware

CLEMSON UNIVERSITY CLEMSON, SC
Independent Research with Prof. Robert Geist 2006
– *Rendering with Realistic Lighting*: Designed and implemented a GPU-based algorithm for computing an approximation of indirect illumination [6]
Undergraduate Research Assistant with Prof. Jim Martin 2005
– *Network Data Analysis*: Developed a toolchain to evaluate updates to the DOCSIS MAC layer in network simulation research

PUBLICATIONS

JOURNAL ARTICLES

- [1] D. Bethea, **R. Cochran** and M. K. Reiter. "Server-side verification of client behavior in online games," In *ACM Transactions on Information and System Security (TISSEC)* 14(4), December 2011.

PEER-REVIEWED CONFERENCE PROCEEDINGS

- [2] A. Chi, **R. Cochran**, M. Nesfield, M. K. Reiter and C. Sturton. "A System to Verify Network Behavior of Known Cryptographic Clients," In *Proceedings of the 14th USENIX Symposium on Networked Systems Design and Implementation (NSDI)*, March 2017.
- [3] **R. Cochran**, L. D'Antoni, B. Livshits and M. Veanes. "Program Boosting: Program Synthesis via Crowdsourcing," In *Proceedings of the 42nd ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages (POPL)*, January 2015.
- [4] **R. Cochran** and M. K. Reiter. "Toward online verification of client behavior in distributed applications," In *Proceedings of the 20th ISOC Network and Distributed System Security Symposium (NDSS)*, February 2013.
- [5] D. Bethea, **R. Cochran** and M. K. Reiter. "Server-side verification of client behavior in online games," In *Proceedings of the 17th ISOC Network and Distributed System Security Symposium (NDSS)*, February 2010.
- [6] **R. Cochran** and J. Steele. "Second-order illumination in real-time," In *Proceedings of the ACM Southeast Regional Conference (ACMSE)*, March 2007.

PATENTS PENDING

- [7] B. Livshits and **R. Cochran**. "Program boosting including using crowdsourcing for correctness" US Patent Application 14/212,462. Sept 17, 2015.

SERVICE

EXTERNAL REVIEWER

ACM Conference on Data and Application Security and Privacy	2013, 2014
Network and Distributed System Security Symposium	2013, 2014

TALKS AND PRESENTATIONS

CONFERENCE TALKS

<i>Toward online verification of client behavior in distributed applications.</i> [4]	
20th ISOC Network and Distributed System Security Symposium, San Diego, CA.	February 2013
<i>Server-side verification of client behavior in online games.</i> [5]	
17th ISOC Network and Distributed System Security Symposium, San Diego, CA.	February 2010

TUTORIALS

<i>Introduction to General Purpose GPU (GPGPU) Programming.</i>	
45th Annual ACM Southeast Regional Conference, Winston-Salem, NC.	March 2007

AWARDS

Best Paper Award, Network and Distributed System Security Symposium [2]	2010
Best Paper Award, Annual ACM Southeast Regional Conference [3]	2007
Outstanding Senior in Computer Science, Clemson University	2006
Donald A. Norton Computer Science Scholarship, Clemson University	2006
Upsilon Pi Epsilon Honor Society, Clemson University	2005

EXPERTISE

PROGRAMMING:	C, C++, C++11, C#, Go, Java, Python, R, Bash
TOOLS AND PLATFORMS:	Docker, Kubernetes, LLVM, Git, LaTeX, VTune, SMT and SAT solvers, Mechanical Turk
COMMUNICATION:	Outstanding presentation skills and excellent writing ability
HOBBIES:	Improv comedy performance, analog synthesizer design, mountain biking