

# Christopher A. Wood

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Rochester, NY 14620

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## Academic Information

- **Rochester Institute of Technology**

*M.S. Computer Science*

Rochester, NY

2012 – 2013 (expected)

- Advisor: Stanisław Radziszowski
- Thesis: Optimal Representations of Cryptographic Substitution Boxes for Efficient Combinational Implementations (in progress)
- GPA: 4.0/4.0
- Thesis-related courses: Cryptography, Intelligent Security Systems, Data Communications and Networks, Algorithms, Optimization Methods

- **Rochester Institute of Technology**

*B.S. Computer Science and Software Engineering*

Rochester, NY

2008 – 2012

- Concentrations: Computational Mathematics and Computer Engineering
- Minors: Mathematics and Writing Studies
- GPA: 3.97/4.0 (Primary Field of Study GPA: 4.0/4.0)
- Main electives: Graph Theory, Number Theory, Operating Systems, Programming Language Concepts, Computer Organization, Modern Physics, Real-Time and Embedded Systems

## Publications (available at [www.christopher-wood.com](http://www.christopher-wood.com))

### Journal Articles

- J-1. C. Wood and J. Jacob, “Characterization Results for the  $L(2, 1)$ -Labeling Problem on Trees,” *in preparation*.
- J-2. C. Wood and J. Jacob, “Forbidden Subtree Construction Techniques for Trees Under the  $L(2, 1)$ -Labeling Problem on Trees,” *submitted to the SIAM Journal on Discrete Mathematics*.
- J-3. P. Bajorski, A. Kaminsky, M. Kurdziel, M. Lukowiak, S. Radziszowski, and C. Wood, “Statistical Analysis and Modeling of a Tree-Based Group Key Distribution Method in Tactical Wireless Networks,” *submitted to the IEEE Transactions on Wireless Communications*.
- J-4. M. Lukowiak, S. Radziszowski, J. Vallino, C. Wood, “Cybersecurity Education: Bridging the Gap between Hardware and Software Domains,” *submitted to the IEEE Transactions on Education*.

### Conference Proceedings

- C-1. M. Lukowiak, A. Meneely, S. Radziszowski, J. Vallino, and C. Wood, “Developing an Applied, Security-Oriented Computing Curriculum,” In *Proceedings of the ASEE 2012*, San Antonio, Texas. June 2012.
- C-2. C. A. Wood, “Chaos-Based Symmetric Key Cryptosystems,” In *Proceedings of the 2011 International Conference on Security & Management*, Las Vegas, Nevada. July 2011.
- C-3. C. A. Wood and R. K. Raj, “Keyloggers in Cybersecurity Education,” In *Proceedings of the 2010 International Conference on Security & Management*, Las Vegas, Nevada. July 2010.

## Conference Presentations

- P-1. "Characterization Results for the  $L(2,1)$ -Labeling Problem on Trees,"  
*AMS Sectional Meeting, Rochester Institute of Technology, Rochester, NY. September 22, 2012.*
- P-2. "Layered Driver Rootkit Detection on Microsoft Windows PCs," Poster Presentation,  
*RIT Undergraduate Symposium, Rochester Institute of Technology, Rochester, NY. August 24, 2009.*

## Research Experience

- **Keyboard Biometric-Based Continuous Authentication System** RIT  
*Intelligent Security Systems, Machine Learning* *September 2012 - present*
  - *Advisor:* Dr. Leonid Reznik (CS)
  - I am implementing a real-time keylogger, feature extraction, and classifier engine for use in continuous authentication schemes. Part of the work includes comparing classifiers based on free-form text input against those based on structured text-input. Results are being compared with past and present keyboard-based biometric authentication schemes.
- **Secure Logging Schemes for Cloud-Based SaaS Architectures** RIT  
*Cryptography, Computer Security, Secure Software Design* *July 2012 - present*
  - *Advisors:* Dr. Rajendra K. Raj (CS) and Dr. Andy Meneely (SE)
  - I am developing a novel secure logging architecture for cloud-based SaaS applications that utilizes ciphertext-policy attribute based encryption (CP-ABE) for log file integrity.
- **Wireless Ad-hoc Network Group Key Management** RIT  
*Applied Cryptography, Wireless Networking* *May 2011 - present*
  - *Advisors:* Dr. Stanisław Radziszowski (CS), Dr. Marcin Lukowiak (CE), Dr. Peter Bajorski (Statistics)
  - Resulted in publication J-3.
  - We are focusing on group key management protocols for wireless ad-hoc radio networks with constrained channel bandwidths and computational power. We explore solutions based on public- and private-key cryptosystems with varying levels of pre-placed radio data for node authentication and key generation. Our work involves implementing network simulators in SMURPH/SIDE and NS3 to obtain empirical performance measurements. We have also developed a mathematical model to compare with quantitative performance metrics.
- **$L(2,1)$ -Labeling Problem** RIT  
*Computational Graph Theory* *September 2011 - September 2012*
  - *Advisor:* Dr. Jobby Jacob (Mathematics)
  - Resulted in publications J-1 and J-2 and presentation P-1.
  - I worked on developing a characterization of  $L(2,1)$  spans of trees based on their structural properties. As part of this work I implemented a dynamic programming labeling algorithm to assist in the study of tree characterization, which helped to develop tree construction algorithms that are capable of producing infinitely many trees  $T$  with a label span of  $(\Delta(T) + 2)$ . With this, we found a complete  $L(2,1)$  label span characterization of trees. We also briefly investigated the  $L(2,1)$ -labeling problem on cubic bipartite graphs.
- **Secure Operating System Design Principles** RIT  
*Computer Security, Operating Systems* *March 2011 - June 2011*

- *Advisor:* Dr. Rajendra K. Raj (CS)
- I researched secure operating system design principles at all levels of the software stack. The main deliverable was a case study for a variety of popular operating systems with different purposes, including Microsoft Singularity, Chrome OS, Android, QNX, and Microsoft Azure.

- **Rootkit Design, Implementation, and Detection**

RIT

*Computer Security, Operating Systems, Malware Design and Detection*      May 2007 – Aug. 2007

- *Advisor:* Dr. Rajendra K. Raj (CS)
- Resulted in publication C-3 and presentation P-2.
- I examined malware rootkits that targeted the Windows NT family of operating systems. This study included user-mode and kernel-mode rootkit implementations and state-of-the-art static and dynamic techniques. As part of this work I developed a Windows NT filter driver in C to help determine the presence of keystroke-monitoring malware (targeted towards a specific rootkit implementation).

## Professional Experience

- **Intel Corporation, Virtual & Parallel Computing Group**

Folsom, CA

*Graphics Software Engineer Intern*

June 2012 - August 2012

- Developed production features for tool that processes hardware specifications to generate web content and source code for VHDL and C/C++ testbeds.
- Interacted with internal customers within the VPG to utilize debug tools and environments for architecture specification and post-silicon testing.

- **L-3 Communications**

Victor, NY

*Software Engineer Intern*

March 2011 - August 2011

- Designed and implemented a library and supporting drivers for the u-blox NEO5/6 GPS receiver driven by an Analog Devices Blackfin processor.
- Extended an existing FAT file system driver to add support for SD devices.
- Improved functionality of an existing CPLD design used to control the power supply in an embedded system.

- **Rochester Software Associates**

Rochester, NY

*Software Engineer Intern*

November 2010 - March 2011

- Led the design, development, and documentation efforts for a new printer job management application that would service any number of jobs from clients across the network.
- Tested and debugged an existing .NET implementation of an LPD client.

- **C Speed, LLC**

Liverpool, NY

*Software Engineer Intern*

May 2010 - August 2010

- Designed and implemented an internal manufacturing part supply management system.
- Implemented embedded firmware features and test routines in C, C++, and Assembly for Coldfire V2 processors.

## Teaching & Other Academic Experience

- **Hardware and Software Design with Cryptographic Applications**

RIT

*Teaching Assistant and Lecturer for Dr. Marcin Lukowiak (CE)*

February 2011 - present

- Developed and delivered lecture material on real-time and embedded software optimization techniques and the Impulse C high-level synthesis tool.

- Assisted students with weekly assignments and graded lab and project deliverables.
- Currently porting the AES cache timing attack on a Xilinx ML507 platform with MicroBlaze soft-core processor for student labs.

- **Computer Science I, II, and IV**

RIT

*Student Lab Assistant and Grader*

*January 2009 - present*

- Proctor weekly problem solving sessions and run lab meetings with brief lectures to cover weekly material.
- Hold four tutoring office hours per week to assist students in need.
- Grade weekly lab assignments and midterm examinations.

- **Personal Software Engineering**

RIT

*Teaching Assistant for Professor Tom Reichlmayr (SE)*

*December 2011 - March 2012*

- Assisted students with in-class programming assignments and course projects.
- Graded student projects based on the C/C++ and Ruby programming languages and Ruby on Rails web framework.

- **Engineering of Software Subsystems**

RIT

*Teaching Assistant for Dr. James Vallino (SE)*

*September 2011 - December 2011*

- Assisted students with in-class exercises and unit questions based on a subset of the design patterns taught during the course.
- Spent time with each student team to discuss course projects, including design decisions, application of design patterns, and alternatives considered.

## Honors & Awards

RIT Honors Program . . . . . 2009 – present  
 RIT Tau Beta Pi Engineering Honors Society, member . . . . . 2010 – present  
 Recipient of Golisano College Honors research assistantship award . . . . . Spring 2011  
 Recipient of Golisano College Honors research assistantship award . . . . . Winter 2009/2010  
 Recipient of RIT undergraduate research award stipend . . . . . Summer 2009  
 RIT Golisano College Dean's List . . . . . 2008 – present  
 Student mentor for the FIRST LEGO League team hosted by RIT . . . . . Fall 2009 – Winter 2010  
 Society of Software Engineers, member . . . . . Fall 2008 – Winter 2009/2010  
 RIT Electronic Gaming Society, member . . . . . Fall 2008 – Spring 2010  
 RIT Intramural Flag Football Team . . . . . Fall 2010

## Technical Skills

- Programming Languages: C/C++, C#, Java, Python, Ruby, Assembly (MIPS), Javascript, Scheme
- Modeling Languages and Tools: VHDL, Verilog, UML, SPIN (with PROMELA), Alloy
- Specialized Software: Mathematica, MATLAB, R, Weka
- Markup Languages: L<sup>A</sup>T<sub>E</sub>X, HTML, CSS

## Personal Information

- Born in Syracuse, NY
- Son of Robert and Jill Wood
- Lake Placid Marathon finisher, June 12, 2011. Time of 4:28:08.