

# Robert Underwood

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## Education

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### Clemson University

*PhD of Science in Computer Science, GPA 4.0/4.0*

**Clemson, SC**

*May 2021, expected*

### Clemson University

*Master of Science in Computer Science, GPA 4.0/4.0*

Concentration: Systems and Implementation

**Clemson, SC**

*August 2018*

### Clemson University, Calhoun Honors College

*Bachelor of Science in Computer Science, GPA 4.0/4.0*

Honors Thesis: Automation in the Classroom

**Clemson, SC**

*December 2016*

## Peer Reviewed Publications

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- [1] Robert Underwood, Jason Anderson, and Amy Apon. “Measuring Network Latency Variation Impacts to High Performance Computing Application Performance”. In: *Proceedings of the 9th International Conference on Performance Engineering*. To Appear. ACM/SPEC. Berlin, Germany, Apr. 2018, pp. 1–12.

## Research Experience

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### Clemson University

*Clemson Data Intensive Computing Environments*

**Clemson, SC**

*2016-2018*

- Applications and modeling of reliability and performance of error-bounded lossy compression
- Design experiments to analyze performance of high performance computing systems
- Analyzed and modeled latency variation in Ethernet and Infiniband
- Build models to improve reliability computer infrastructure.

### Clemson University

*Clemson PERSIST Lab*

**Clemson, SC**

*2015-2016*

- Designed and developed an automated grading framework using Python, C, Raspberry Pi, and Docker.
- System used modular design, supports process isolation, and multiple test formats.

## Teaching Experience

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### Clemson University

*CPSC/ECE 3220: Operating Systems*

**Clemson, SC**

*Fall 2018*

- Junior level course - 55 Students enrolled
- Served as a Graduate Instructor of Record – produced all lectures and most course materials
- 1 of 2 Graduate Teachers of Record in the School of Computing during Fall 2018
- Syllabus and course materials available: <https://robertu94.github.io/cpsc3220-f18/>

## Relevant Coursework

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### **Clemson University**

**Clemson, SC**

*CPSC 827: Language Translation*

*Fall 2016*

- Implemented a subset of Python from a yacc-able version of the full Python 2.7 grammar in C++, flex, and bison
- Included: a.s.t. generator; type system; function, global, nested, and returning scope; and primitive exceptions
- Designed and implemented using Object Oriented principals with 55 classes, over 3600 SLOC, in less than 2 months

### **Clemson University**

**Clemson, SC**

*CPSC 820: Parallel Architecture*

*Fall 2016*

- Studied hardware and software iterations that facilitate parallel and distributed computation
- Researched and presented on the design and implementation of Linux Bridge, OpenVSwitch, DPDK, SRIOV, and MACVLAN
- Designed and conducted experiment to quantify latency variation in RDMA using InfiniBand layers 1, 2, and 4

### **Clemson University**

**Clemson, SC**

*CPSC 822: Case Study in Operating Systems: Linux*

*Spring 2016*

- Designed and developed:
  - Graphics driver for an AMD Radeon-like device with frame buffer, fifo, and dma interfaces
  - System call to unconditionally kill a process
  - Disk scheduler for a SCSI disk controller
- Analyzed and debugged performance issues in the Linux kernel
- Worked with a complex system with limited documentation

## Work Experience

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### **The Boeing Company**

**Charleston, SC**

*Information Technology Intern*

*Summer 2016, 2017*

- Developed improvements for a web based portal system in HTML, Python, and JavaScript
- Developed the user interface for a materials database using HTML and JavaScript
- Designed, developed, and led development on a resource management tool using C#, HTML, and JavaScript.
- Worked on the Network Automation, Tooling, and Standards Integration Team

### **Unitrends, Inc**

**Columbia, SC**

*Software Development Intern*

*2014-2016*

- Developed GPU offloading for AES encryption using Nvidia CUDA.
- Designed and developed automated configuration scripts for testing environments using Ansible.
- Designed and developed new cloud infrastructure using LVM, Linux, and Docker
- Designed and developed a Dynamic Alert System in Python
- Worked on the Alerts System in PHP, BASH, C, PERL
- Worked on the internal Customer Incident Analysis web portal using Django, Postgreql, HTML, CSS, and JavaScript

## Extracurricular Activities

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### **Clemson University**

*Clemson School of Computing Graduate Student Organization, Secretary*

**Clemson, SC**

2017-2018

- Keep minutes and assist with program and logistics
- Coordinate with other student organizations and School of Computing staff

### **Clemson University**

*Clemson University Cyber Security Team*

**Clemson, SC**

2015-2018

- Competed in Collegiate Cyber Defense Competition 2015-2016
- Competed in Palmetto Cyber Defense Competition, 2015
- Primary developer for the Cyber Security reference material, 2016
- Designed and developed scripts to aid in auditing and administration of contest environments, 2016
- Lead training on:
  - Exploitable patterns in software design and how to mitigate them
  - User (strace, ltrace, lldb) and system (systemtap, dtrace) tracing tools for program analysis.

### **Clemson University**

*Clemson Association for Computing Machinery Vice President*

**Clemson, SC**

2014-2016

- Planned and help found the Clemson Association for Computing Machinery Technology Seminar, Fall 2016
- Prepared and presented 4 seminars per semester on Git, Linux, Vim, Firewalls, Unix tools, and other topics, 2014-2016
- Coordinated with President to set up professional development and social events, 2014-2016
- Assisted with semester planning and manage Clemson Association for Computing Machinery calendar, 2014-2016
- Prepared and presented to School of Computing faculty on automation in the classroom, April 2016.

### **Clemson University**

*Clemson Association for Computing Machinery Programming Team*

**Clemson, SC**

2013-2016

- Competed in competitions to design efficient algorithms to solve problems
- Team placed 1<sup>st</sup> at the Mercer Spring Programming Competition in 2014 and 2015
- Team placed 3<sup>rd</sup> at Association for Computing Machinery Southeast Regional Competition 2015
- Invited to participate in the National Invitational Programming Competition 2015, 2016
- Primary developer for the Clemson Hackpack algorithms reference
- Student apprentice judge at Mercer Programming Competition February 2016.

## Presentations

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### **Systemd tools**

*Overview of useful, but lesser know `systemd` features*  
CU Cyber

**Clemson, SC**

November 2017

### **C++ Templates: Staring into the Abyss**

*Advanced talk on C++11-17 templates and uses*  
Clemson ACM Technology Seminar, Guest talk

**Clemson, SC**

April 2017

**Dockerize all the Things!**

*Introduction to container technology and uses*  
Clemson ACM Technology Seminar, Guest talk

Clemson, SC  
February 2017

**Exploitable III: Reverse Engineering**

*Overview of binary analysis, user and kernel level tracers, and debuggers*  
CU Cyber and Clemson ACM Crossover Seminar

Clemson, SC  
September 2016

**Automation in the Classroom**

*Motivation and demonstration of classroom automation*  
School of Computing Seminar, Spring 2016 Seminar Series

Clemson, SC  
April 2016

**Python: A Parser Tongue Primer**

*Introduction to idiomatic Python programming*  
Clemson ACM Seminar

Clemson, SC  
April 2016

**Exploitable II: Application Design**

*Overview of writing secure software*  
CU Cyber and Clemson ACM Crossover Seminar

Clemson, SC  
March 2016

**Provisioning At the Speed of Thought**

*Evaluation and Uses of Ansible, Salt and Puppet*  
Clemson ACM Technology Seminar

Clemson, SC  
October 2016

**Writing Semantic Code**

*Using refactoring and design patterns for better code*  
Clemson ACM Technology Seminar

Clemson, SC  
August 2016

**Think Different**

*Introduction to approaching computer science projects*  
Clemson ACM Various Venues, Also titled "Perfecting Your Projects"

Clemson, SC  
February 2016, et al

**Linux is Scary**

*Introduction to Linux for new computer science students*  
Clemson ACM Seminar

Clemson, SC  
February 2016, et al

**Thou Shall Not Pass**

*Introduction to open source firewalls*  
Clemson ACM Seminar

Clemson, SC  
February 2016

**Exploitable: Ethical Hacking**

*Introduction to ethical software penetration testing*  
CU Cyber and Clemson ACM Crossover Seminar

Clemson, SC  
October 2015

**Git Well Soon**

*Introduction to the Git distributed version control system*  
Clemson ACM Various Venues, Also titled "Git Thee to a Version Control System"

Clemson, SC  
September 2015, et al

**Intermediate Vim**

*Advanced seminar on using the Vim text editor*  
Clemson ACM Seminar

Clemson, SC  
February 2015

**N Unix Tools in  $O(N)$  Minutes**

*Overview of scripting tools for POSIX platforms*  
Clemson ACM Seminar

Clemson, SC  
March 2015

## Computer Skills

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**Advanced:** Bash, Bourne Shell, C, C++, Docker, Linux Kernel and Userspace, Python, Vim

**Intermediate:** Ansible, Git, Hadoop, JAVA, JavaScript, L<sup>A</sup>T<sub>E</sub>X, SaltStack, Systemd, SQL

**Basic:** ARM assembly, C#, FreeBSD, MPI, PHP, Perl, Puppet, SNMP, SVN, Apache Spark

## Professional Affiliations

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Association for Computing Machinery: Student Member 2014-2018

## Professional Service

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**Reviewer:** ICPE 2017, ICCCN 2017, PBAS 2017, SC17

## Honors

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- Eagle Scout 2010
- Order of the Arrow, Vigil Honor 2013
- President's List at Clemson University 2013-2016
- Outstanding Sophomore in Computer Science at Clemson University 2015
- Palmetto Fellows Recipient 2013-2016
- McAlister Scholarship 2015-2016
- Benefitfocus Scholarship 2015-2016
- Faculty Scholarship Award, Clemson University 2016
- National Science Foundation Graduate Research Fellowship Honorable Mention 2017
- Graduate Fellowship, National Research Traineeship: Resilient Infrastructure Systems