

Scott Ruoti

SECURITY & PRIVACY · HUMAN-COMPUTER INTERACTION · USABLE PRIVACY & SECURITY

🏠 344 Min H. Kao Building, 1520 Middle Drive, Knoxville, TN 37996-2250

☎ (+1) 865-974-2250 | ✉ ruoti@utk.edu

Summary

- My research centers on the design, prototyping, and evaluation of secure systems that address real user needs
- My interests include authentication, blockchain technology, cloud security, TLS, and secure software development
- Recipient of the John Karat Award, which identifies future leaders in the field of usable security

Education

Ph.D. in Computer Science DEC. 2016
Brigham Young University GPA: 4.0

- Dissertation: *Usable, Secure Content-Based Encryption on the Web*
- Advisor: Kent Seamons
- President of the Computer Science Graduate Student Association

M.S. in Computer Science APR. 2015
Brigham Young University GPA: 4.0

- Thesis: *Authentication Melee: A Usability Analysis of Seven Web Authentication Systems*

B.S. in Computer Science, B.A. in Chinese APR. 2011
Brigham Young University GPA: 3.83

- Minor in Mathematics
- Participated in the Chinese Language Flagship Program
 - 2 years of intense Chinese study building professional-level language proficiency in Computer Science
 - Semester of graduate-level Computer Science classes taught in Chinese at Nanjing University (南京大学)

Professional Experience

Assistant Professor AUG. 2018–PRESENT
University of Tennessee, Knoxville, Tennessee

Technical Staff AUG. 2016–AUG. 2018
MIT Lincoln Laboratory, Lexington, Massachusetts

- PI leading research on blockchain technology
- PI leading research on high-performance encrypted databases
- Chief architect for a cybersecurity architecture designed to protect all U.S. Federal Government Departments and Agencies

Research Assistant AUG. 2009–AUG. 2016
Internet Security Research Lab, Brigham Young University, Provo, Utah

- Led research on secure email, authentication, TLS, and cloud security
- Co-authored several NSF grant proposals covering multiple security topics, resulting in \$500,000 in funding
- Mentored Ph.D., Masters, and undergraduate students

Ph.D. Year-Round Intern DEC. 2014–AUG. 2016
Sandia National Laboratories, Livermore, California

- Directed a team of student researchers investigating cloud security and intrusion detection

Research Intern

APR. 2014–AUG. 2014

Blue Coat Systems, Draper, Utah

- Conducted exploratory research into IP address-based detection of malicious network activity

Ph.D. Software Engineering Intern

MAY 2013–AUG. 2013

Google, Mountain View, California

- Designed and integrated push-based, fine-grained authorization into Android

Research Intern

MAY 2012–AUG. 2012

Microsoft, Redmond, Washington

- Designed and prototyped a tool that uses image and facial recognition to automatically tag and organize photos

Publications

PEER-REVIEWED CONFERENCES

1. *A Comparative Usability Study of Key Management in Secure Email*
Scott Ruoti, Jeff Andersen, Tyler Monson, Daniel Zappala, Kent Seamons
14th Symposium on Usable Privacy and Security. USENIX, 2018. **SOUPS 2018**
Acceptance Rate: 23%
2. *A Tale of Two Studies: The Best and Worst of YubiKey Usability*
Joshua Reynolds, Trevor Smith, Ken Reese, Luck Dickinson, **Scott Ruoti**, Kent Seamons
38th IEEE Symposium on Security and Privacy. IEEE, 2018. **IEEE S&P 2018**
Acceptance Rate: 11%
3. *Layering Security at Global Control Points to Secure Unmodified Software*
Scott Ruoti, Kent Seamons, Daniel Zappala
2nd IEEE Secure Development Conference. IEEE, 2017. **Best Paper Award.** **IEEE SECDEV 2017**
Acceptance Rate: 32%
4. *PACE: Proactively-Secure Accumulo with Cryptographic Enforcement*
Scott Ruoti, Ben Kaiser, Ariel Hamlin, Cassandra Sparks, Robert Cunningham
21st IEEE High Performance Extreme Computing Conference. IEEE, 2017. **IEEE HPEC 2017**
5. *TrustBase: An Architecture to Repair and Strengthen Certificate-Based Authentication*
Mark O'Neill, Scott Heidbrink, **Scott Ruoti**, Jordan Whitehead, Dan Bunker, Luke Dickinson, Travis Hendershot, Joshua Reynolds, Kent Seamons, Daniel Zappala
27th USENIX Security Symposium. USENIX, 2017. **USENIX SECURITY 2017**
Acceptance Rate: 16%
6. *Intrusion Detection with Unsupervised Heterogeneous Ensembles using Cluster-based Normalization*
Scott Ruoti, Scott Heidbrink, Mark O'Neill, Eric Gustafson, Yung Ryn Choe
24th IEEE International Conference on Web Services. IEEE, 2017. **IEEE ICWS 2017**
Acceptance Rate: 22%
7. *Weighing Context and Tradeoffs: How Suburban Adults Selected Their Online Security Posture*
Scott Ruoti, Tyler Monson, Justin Wu, Kent Seamons, Daniel Zappala
13th Symposium on Usable Privacy and Security. USENIX, 2017. **SOUPS 2017**
Acceptance Rate: 27%
8. *TLS Proxies: Friend or Foe?*
Mark O'Neill, **Scott Ruoti**, Kent Seamons, Daniel Zappala
17th ACM Internet Measurement Conference. ACM, 2016. **ACM IMC 2016**
Acceptance Rate: 25%

9. *Private Webmail 2.0: Simple and Easy-to-Use Secure Email*
Scott Ruoti, Jeff Andersen, Travis Hendershot, Kent Seamons, Daniel Zappala
29th ACM Symposium on User Interface Software and Technology. ACM, 2016. ACM UIST 2016
Acceptance Rate: 20%
10. *User Attitudes Toward the Inspection of Encrypted Traffic*
Scott Ruoti, Mark O'Neill, Kent Seamons, Daniel Zappala
12th Symposium on Usable Privacy and Security. USENIX, 2016. SOUPS 2016
Acceptance Rate: 28%
11. *"We're on the Same Page": A Usability Study of Secure Email Using Pairs of Novice Users*
Scott Ruoti, Jeff Andersen, Scott Heidbrink, Mark O'Neill, Elham Vaziripour, Justin Wu, Daniel Zappala, Kent Seamons
34th ACM Conference on Human Factors in Computing Systems. ACM, 2016.
Honorable Mention for Best Paper. ACM CHI 2016
Acceptance Rate: 23%
12. *Authentication Melee: A Usability Analysis of Seven Web Authentication Systems*
Scott Ruoti, Brent Roberts, Kent Seamons
24th International Conference on World Wide Web. ACM, 2015. WWW 2015
Acceptance Rate: 14%
13. *Confused Johnny: When Automatic Encryption Leads to Confusion and Mistakes*
Scott Ruoti, Nathan Kim, Ben Burgon, Timothy W. van der Horst, and Kent Seamons.
9th Symposium on Usable Privacy and Security. ACM, 2013. SOUPS 2013
Acceptance Rate: 29%
14. *Private Facebook Chat*
Chris Robison, **Scott Ruoti**, Timothy W. van der Horst, and K. E. Seamons
2012 International Conference on Privacy, Security, Risk, and Trust and 2012 International Conference on Social Computing. IEEE, 2012. IEEE PASSAT/SOCIALCOM 2012
Acceptance Rate: 22%

PEER-REVIEWED MAGAZINES

1. *TLS Proxies: How Often and Who Cares?*
Mark O'Neill, **Scott Ruoti**, Kent Seamons, Daniel Zappala
IEEE Internet Computing. Vol. 21, No. 3, pages 22–29, May/June 2017. IEEE INTERNET COMPUTING

WORKSHOPS

1. *A Usability Study of Secure Email Deletion*
Tyler Monson, Joshua Reynolds, Trevor Smith, **Scott Ruoti**, Daniel Zappala, Kent Seamons
3rd European Workshop on Usable Security. Internet Society, 2018. EURO USEC 2018
Acceptance Rate: 47%
2. *End-to-End Passwords*
Scott Ruoti, Kent Seamons
20th New Security Paradigms Workshop. ACM, 2017. NSPW 2017
Acceptance Rate: 41%
3. *Augmenting Centralized Password Management with Application-Specific Passwords*
Trevor Smith, **Scott Ruoti**, Kent Seamons
3rd Workshop on "Who Are You?! Adventures in Authentication". USENIX, 2017. WAY 2017

4. *Content-based Security for the Web* NSPW 2016
Acceptance Rate: 46%
Alexander Afanasyev, J. Alex Halderman, **Scott Ruoti**, Kent Seamons, Yingdi Yu, Daniel Zappala, Lixia Zhang
19th New Security Paradigms Workshop. ACM, 2016.
5. *Standard Metrics and Scenarios for Usable Authentication* WAY 2016
Scott Ruoti, Kent Seamons
2nd Workshop on “Who Are You?! Adventures in Authentication”. USENIX, 2016.
6. *Strengthening Passwords-based Authentication* WAY 2016
Scott Ruoti, Jeff Andersen, Kent Seamons
2nd Workshop on “Who Are You?! Adventures in Authentication”. USENIX, 2016.

POSTERS

1. *A Comparison of PGP, IBE, and Password-based Secure Email* SOUPS 2015
Scott Ruoti, Jeff Andersen, Tyler Monson, Daniel Zappala, Kent Seamons
12th Symposium on Usable Privacy and Security. USENIX, 2016.
2. *“We’re on the Same Page”: A Usability Study of Secure Email Using Pairs of Novice Users* SOUPS 2015
Scott Ruoti, Jeff Andersen, Scott Heidbrink, Mark O’Neill, Elham Vaziripour, Justin Wu, Daniel Zappala, Kent Seamons
12th Symposium on Usable Privacy and Security. USENIX, 2016.
3. *Authentication Melee: A Usability Analysis of Seven Web Authentication Systems* SOUPS 2015
Scott Ruoti, Brent Roberts, Kent Seamons
11th Symposium on Usable Privacy and Security. ACM, 2015. **Distinguished poster award.**
4. *A Comparison of PGP, IBE, and Password-based Secure Email* ACM CCS 2014
Mark O’Neill, **Scott Ruoti**, Kent Seamons, Daniel Zappala
21st ACM SIGSAC Conference on Computer and Communications Security. ACM, 2014.

TECHNICAL REPORTS AND PREPRINTS

1. *SoK: Securing Email* 2017
Jeremy Clark, Paul van Oorschot, **Scott Ruoti**, Kent Seamons, Daniel Zappala
Under submission.
2. *MessageGuard: A Browser-based Platform for Usable, Content-Based Encryption Research* 2016
Scott Ruoti, Jeff Andersen, Tyler Monson, Daniel Zappala, Kent Seamons
<https://arxiv.org/abs/1510.08943>
3. *Why Johnny Still, Still Can’t Encrypt: Evaluating the Usability of a Modern PGP Client* 2015
Scott Ruoti, Jeff Andersen, Daniel Zappala, Kent Seamons
<https://arxiv.org/abs/1510.08555>

Presentations

1. *Securing Email for the Masses*
Invited Talk, Clemson University MAR. 9, 2018
2. *Securing Email for the Masses*
Invited Talk, University of Tennessee FEB. 26, 2018
3. *Securing Email for the Masses*
Invited Talk, New York University FEB. 16, 2018
4. *Securing Webmail for the Masses*
Invited Talk, University of Massachusetts Lowell FEB. 8, 2018
5. *End-to-End Passwords*
20th New Security Paradigms Workshop, Santa Cruz, California OCT. 4, 2017
6. *Weighing Context and Tradeoffs: How Suburban Adults Selected Their Online Security Posture*
13th Symposium on Usable Privacy and Security, San Jose, California JUL. 14, 2017
7. *Cryptographically Enforcing Visibility Fields*
Accumulo Summit, College Park, Maryland OCT. 13, 2016
8. *Standard Metrics and Scenarios for Usable Authentication*
2nd Workshop on “Who Are You?! Adventures in Authentication”, Denver, Colorado JUN. 22, 2016
9. *User Attitudes Toward the Inspection of Encrypted Traffic*
2nd Workshop on “Who Are You?! Adventures in Authentication”, San Jose, California MAY 10, 2016
10. *User Attitudes Toward the Inspection of Encrypted Traffic*
12th Symposium on Usable Privacy and Security, Denver, Colorado JUN. 23, 2016
11. *“We’re on the Same Page”: A Usability Study of Secure Email Using Pairs of Novice Users*
34th ACM Conference on Human Factors in Computing Systems, Denver, Colorado JUN. 22, 2016
12. *Securing Webmail for the Masses*
Invited Talk, University of Utah APR. 13, 2016
13. *Securing Webmail for the Masses*
Invited Talk, Massachusetts Institute of Technology Lincoln Laboratory MAR. 2, 2016
14. *Securing Webmail for the Masses*
Invited Talk, University of Tennessee FEB. 17, 2016
15. *When the Rubber Meets the Road*
Invited Talk, Sandia National Laboratories JAN. 28, 2016

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| 16. | <i>Helping Individuals and Organizations Protect Their Online Communication and Data</i>
Invited Talk, Sandia National Laboratories | NOV. 23, 2015 |
| 17. | <i>Security and Usability Research at BYU</i>
Invited Talk, College of Physical and Mathematics, College Volunteer Leadership Council, Brigham Young University | OCT. 9, 2015 |
| 18. | <i>The Conundrum of Secure Email</i>
Lightning Talk, 11th Symposium on Usable Privacy and Security, Ottawa, Canada | JUL. 23, 2015 |
| 19. | <i>Usable Security for Webmail and Single Sign-on</i>
Invited Talk, Symantec CTO Tech Exchange, Culver City, California | OCT. 17, 2013 |
| 20. | <i>Confused Johnny: When Automatic Encryption Leads to Confusion and Mistakes</i>
9th Symposium on Usable Privacy and Security, New Castle, United Kingdom | JUL. 25, 2013 |
| 21. | <i>Private Facebook Chat</i>
2012 International Conference on Privacy, Security, Risk, and Trust and 2012 International Conference on Social Computing, Amsterdam, Netherlands | SEP. 5, 2012 |

Professional Service

ORGANIZING COMMITTEE

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|----|---|---------------|
| 1. | 15th Symposium on Usable Privacy and Security | SOUPS 2019 |
| 2. | 40th IEEE Symposium on Security and Privacy | IEEE S&P 2019 |
| 3. | 14th Symposium on Usable Privacy and Security | SOUPS 2018 |

PROGRAM COMMITTEE

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|----|---|--------------------|
| 1. | 3rd European Workshop on Usable Security | EUROUSEC 2018 |
| 2. | 2018 Workshop on Usable Security | USEC 2018 |
| 3. | 3rd IEEE European Symposium on Security and Privacy | IEEE EURO S&P 2018 |
| 4. | 7th International Workshop on Socio-Technical Aspects in Security and Trust | STAST 2018 |
| 5. | 3rd Workshop on “Who Are You?! Adventures in Authentication” | WAY 2017 |
| 6. | 2nd European Workshop on Usable Security | EUROUSEC 2017 |
| 7. | 1st European Workshop on Usable Security | EUROUSEC 2016 |

REVIEWER

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|----|---|---------------------|
| 1. | 37th ACM Conference on Human Factors in Computing Systems | ACM CHI 2019 |
| 2. | 18th Privacy Enhancing Technologies Symposium | PETS 2018 |
| 3. | ACM Computing Surveys | ACM CS |
| 4. | Transactions on Dependable and Secure Computing | IEEE TDSC |
| 5. | 36th ACM Conference on Human Factors in Computing Systems | ACM CHI 2018 |
| 6. | Behavioral Public Policy (Journal) | BPP |
| 7. | IEEE Security and Privacy (Magazine) | IEEE S&P (MAGAZINE) |

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| 8. | IEEE Transactions on Information Forensics and Security | IEEE T-IFS |
| 9. | 13th Symposium on Usable Privacy and Security Posters | SOUPS POSTER JURY 2017 |
| 10. | 30th ACM Symposium on User Interface Software and Technology | ACM UIST 2017 |
| 11. | 35th ACM Conference on Human Factors in Computing Systems | ACM CHI 2017 |
| 12. | 23rd ACM SIGSAC Conference on Computer and Communications Security | ACM CCS 2016 |
| 13. | 12th Symposium on Usable Privacy and Security Posters | SOUPS POSTER JURY 2016 |
| 14. | 34th ACM Conference on Human Factors in Computing Systems | ACM CHI 2016 |
| 15. | 4th IEEE Workshop on Mobile Security Technologies | IEEE MOST 2015 |
| 16. | 33rd ACM Conference on Human Factors in Computing Systems | ACM CHI 2015 |

Courses Taught

UNIVERSITY OF TENNESSEE, KNOXVILLE

COSC 494/594 Usable Security and Blockchain Technology FALL 2018

BRIGHAM YOUNG UNIVERSITY

CS465 Computer Security WINTER 2016

Honors and Awards

PROFESSIONAL

- 2017 **Best Paper Award**
2nd IEEE Secure Development Conference (SecDev 2017)
- 2017 **John Karat Usable Privacy and Security Student Research Award**
13th Symposium on Usable Privacy and Security
 - Award recognizing future leaders in the field of Usable Security.
 - Selected based on scholarship, mentoring, and professional service.
- 2017 **Excellent Reviewer Recognition**
37th ACM Conference on Human Factors in Computing Systems (CHI 2017)
- 2016 **Honorable Mention for Best Paper**
34th ACM Conference on Human Factors in Computing Systems (CHI 2016)
- 2016 **Excellent Reviewer Recognition**
34th ACM Conference on Human Factors in Computing Systems (CHI 2016)
- 2015 **Distinguished Poster Award**
12th Symposium on Usable Privacy and Security

STUDENT

- 2016 **Phi Kappa Phi Inductee**
Phi Kappa Phi Chapter of Brigham Young University
- 2014 **Competitive Scholarship Recipient**
The International Information System Security Certification Consortium [(ISC)²]
- 2013 **Competitive Scholarship Recipient**
The International Information System Security Certification Consortium [(ISC)²]

COMPETITION

- 2016 **First Place**, Three Minute Thesis Competition, College of Mathematics and Physical Sciences, Brigham Young University
- 2011 **First place**, MITRE STEM Cyber Challenge
- 2009 **First place**, Techtopia Computer Science Competition
- 2008 **First place**, Techtopia Computer Science Competition

Languages

- English** Native Language
- Mandarin Chinese** Fluent, near native reading, writing, and speaking
- 汉语水平考试 (HSK)—Level 6 (Highest Level)
 - Oral Proficiency Interview—Superior (Highest Level)

Professional Skills

- Programming** C/C++, C#, Java, Python, SQL
- Familiar with: F#, MatLab, Mathematica, PHP, Ruby, Scheme, Visual Basic .NET
- Web** HTML5, JavaScript, ES6+, ASP .NET
- Frameworks** Bootstrap, ExtJS, JQuery, MooTools, NodeJS, WinForms, WPF
- Databases** Essent, FireBird, Microsoft Access, Microsoft SQL Server, MySQL, Oracle iSQL, SQLite
- Platform** Centos-Based Linux, Debian-Based Linux, MacOS, Windows