
WILLIAM HAROLD ENCK

Associate Professor ◊ Department of Computer Science ◊ North Carolina State University
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EDUCATION

- Pennsylvania State University**, University Park, PA 2011
- **Ph.D.**, Computer Science and Engineering
 - Dissertation: *Analysis Techniques for Mobile Operating System Security*
 - Advisor: Dr. Patrick McDaniel
- Pennsylvania State University**, University Park, PA 2006
- **M.S.**, Computer Science and Engineering
 - Thesis: *Analysis of Open-Functionality in SMS-Capable Cellular Networks*
 - Advisor: Dr. Patrick McDaniel
- Pennsylvania State University**, University Park, PA 2004
- **B.S.**, Computer Engineering, with Honors and Highest Distinction
 - Thesis: *Study of Adaptive Routing Algorithms for NoC Architectures*
 - Thesis Supervisor: Dr. Chita R. Das

ACADEMIC AND RESEARCH APPOINTMENTS

- Associate Professor** 2016-present
Department of Computer Science, North Carolina State University, Raleigh, NC
- Assistant Professor** 2011-2016
Department of Computer Science, North Carolina State University, Raleigh, NC
- Research Assistant** 2005-2011
Computer Science and Engineering, Pennsylvania State University, University Park, PA
- Lead Graduate Student** 2009-2010
Systems and Internet Infrastructure Security Laboratory, Pennsylvania State University, University Park, PA
- co-Instructor**, CSE597a: Mobile Phone Security spring 2009
Computer Science and Engineering, Pennsylvania State University, University Park, PA
- Instructor**, EE/CSE458: Communications Networks summer 2007
Computer Science and Engineering, Pennsylvania State University, University Park, PA
- Teaching Assistant**, CSE473: Microcomputer Laboratory spring 2005
Computer Science and Engineering, Pennsylvania State University, University Park, PA

INDUSTRIAL EXPERIENCE

- Research Intern** summer 2009
Intel Labs, Seattle, WA
- Research Intern** summer 2006
AT&T Research, Florham Park, NJ
- Summer Intern** summer 2003
IBM Corp., Poughkeepsie, NY
- Systems Administrator** summers 2000-2002, 2004
Lebanon MobileFone Inc., Lebanon, PA

STUDENTS

Current PhD Students: Benjamin Andow (*expected 2019*); Luke Deshotels (*expected 2018*); Albert Gorski (*expected 2019*); TJ OConnor (*expected 2019*); Isaac Polinsky (*expected 2020*).

Current PhD Committees: Michael Grace [advised by Dr. Xuxian Jiang].

Current Masters Committees: Kunal Patel [advised by Dr. Xuxian Jiang]; Zhuowei Wang [advised by Dr. Vincent Freeh].

Past PhD Students: Adwait Nadkarni (Spring 2017) (now Assistant Professor William and Mary); Ruowen Wang (Spring 2016) [co-advised by Dr. Peng Ning] (now at Samsung); Jason Gionta (Spring 2015) [co-advised by Dr. Peng Ning].

Past Masters Students: Akash Verma (Fall 2016); Tsung-Hsuan (Anson) Ho (Fall 2013) [co-advised by Dr. Xiaohui (Helen) Gu]; Vasant Tendulkar (Summer 2013); Andrew Branscomb (Spring 2013) [co-advised by Dr. Ting Yu]; Adwait Nadkarni (Fall 2012).

Past PhD Committees: Kimberly Tam (Royal Holloway, University of London) (Spring 2016) [advised by Dr. Lorenzo Cavallaro]; Kamal K.C. (Summer 2015) [advised by Dr. Vincent Freeh]; Daniel Dean (Summer 2015) [advised by Dr. Xiaohui (Helen) Gu]; Rahul Pandita (Summer 2015) [advised by Dr. Laurie Williams]; Chiachih Wu (Spring 2015) [advised by Dr. Xuxian Jiang]; Xi Gi (Fall 2014) [advised by Dr. Emerson Murphy-Hill]; Hiep Nguyen (Fall 2014) [advised by Dr. Xiaohui (Helen) Gu]; Wu Zhou (Fall 2013) [advised by Dr. Xuxian Jiang]; Wei Wei (Summer 2013) [advised by Dr. Ting Yu]; Yongmin Tan (Summer 2012) [advised by Dr. Xiaohui (Helen) Gu].

Past Masters Committees: Anoosha Vangaveeti (Fall 2015) [advised by Dr. Mladen Vouk]; Roopak Venkatarishnan (Spring 2014) [advised by Dr. Mladen Vouk]; Ajay Saini (Summer 2014) [advised by Dr. Frank Mueller]; Nishanth Balasubramanian (Summer 2014) [advised by Dr. Frank Mueller]; Onkar Patil (Summer 2014) [advised by Dr. Frank Mueller]; Shrinivas Panchamukhi (Summer 2014) [advised by Dr. Frank Mueller]; Sandeep Kandula (Summer 2014) [advised by Dr. Frank Mueller].

HONORS

Distinguished Paper, ACM Asia Conference on Computer and Communications Security (ASIACCS), with Ruowen Wang, Ahmed M. Azab, Ninghui Li, Peng Ning, Xun Chen, Wenbo Shen, and Yueqiang Cheng, April 2016.

Best Paper, 6th ACM Conference on Security and Privacy in Wireless and Mobile Networks, with co-authors Saurabh Chakradeo, Brad Reaves, and Patrick Traynor, April 2013.

National Science Foundation Faculty Early Career Development Award (CAREER), 2012.

CGS/ProQuest Distinguished Dissertation Award Nominee, 2012.

Alumni Association Dissertation Award, Pennsylvania State University, 2010-2011.

Graduate Research Assistant Award, Department of Computer Science and Engineering, Pennsylvania State University, April 2010.

Best Paper, 25th Annual Computer Security Applications Conference, with co-authors Machigar Ongtang, Stephen McLaughlin, and Patrick McDaniel, December 2009.

Google Security and Product Safety Acknowledgement, in recognition of efforts in improving the security of the Google Android cellular phone operating system.

USENIX Student Travel Awards, USENIX Security, 2007; USENIX Security, 2008; USENIX OSDI, 2010.

ACM Student Travel Award, ACM CCS, 2009.

National Science Foundation Graduate Research Fellowship, Honorable Mention, 2006.

H. Thomas and Dorothy Willits Hallowell Scholarship, Pennsylvania State University, 2003.

Chris Mader Scholarship, Pennsylvania State University, 2002.

Lockheed Martin Engineering Scholars Award, Pennsylvania State University, 2002.

Richard A. McQuade Memorial Scholarship, Pennsylvania State University, 2001.

AFFILIATIONS

The Association for Computing Machinery (ACM)

The Institute of Electrical and Electronics Engineers (IEEE)

USENIX Advanced Computing Systems Association

Information Systems Security Association (ISSA)

COLLABORATORS

Akhil Acharya, William Aiello, Benjamin Andow, Olabode Anise, Adam Aviv, Ahmed M. Azab, Ahmed Azab, Juhee Bae, David Balzarotti, Greg Banks, David Barrera, Blake Bassett, Matt Blaze, Rahul Bobhate, Kevin

Borders, Jasmine Bowers, Mihai Bucicoiu, Kevin Butler, Henry Carter, Pavol Cerny, Saurabh Chakradeo, Swarat Chaudhuri, Xun Chen, Yan Chen, Yueqiang Cheng, Mihai Chiroiu, Raymond Cho, Heesook Choi, Byung-Gon Chun, Sandy Clark, Marco Cova, Landon P. Cox, Landon Cox, Eric Cronin, Hiranava Das, Lucas Davi, Agnes Davis, Razvan Deaconescu, Daniel J. Dean, Daniel Dean, Luke Deshotels, Alexandra Dmitrienko, Viktoria Felmetzger, Peter Gilbert, Jason Gionta, Sigmund Albert Gorski III, Sigmund A. Gorski III, Albert Greenberg, Xiaohui Gu, Joseph Lorenzo Hall, Seungyeop Han, Stephan Heuser, Tsung-Hsuan Ho, Harri Hursti, Sharique Hussain, Trent Jaeger, Somesh Jha, Guoliang Jin, Lisa Johansen, Jaeyeon Jung, Hamza Karachiwala, Richard Kemmerer, Negar Kiyavash, Thomas La Porta, Per Larsen, Sihan Li, Ninghui Li, Dengfeng Li, Qian Liu, Wesam Lootah, Patrick McDaniel, Stephen McLaughlin, Anne Collins McLaughlin, Anne McLaughlin, Thomas Moyer, Adwait Nadkarni, Peng Ning, Terrence OConnor, Damien Oceau, Machigar Ongtang, Rahul Pandita, Praveen Kumar Pendyala, Matthew Pirretti, Jennifer Plaster, Jennifer Plasterr, Joe Pletcher, Laura Quilter, Sanjay Rao, Vaibhav Rastogi, Brad Reaves, Bradley Reaves, Douglas Reeves, Thomas Richardson, William Robertson, Hosam Rowihy, Sandra Rueda, Ahmad-Reza Sadeghi, Nolen Scaife, Joshua Schiffman, Panagiotis Sebos, Subhabrata Sen, Gaurav Shah, Ashwin Shashidharan, Wenbo Shen, Micah Sherr, Anmol N. Sheth, Anmol Sheth, Jaesheung Shin, Rui Shu, Kapil Singh, Adam Smith, Ryan Snyder, Sylke Spoerel, Yogesh Sreenivasan, Luke St. Clair, Yu-Wei Eric Sung, Nina Taft, Vasant Tendulkar, Patrick Traynor, Fredrik Valeur, Akash Verma, Giovanni Vigna, Ruowen Wang, Peipei Wang, Benjamin Watson, Udi Weinsberg, Byron Wright, Xusheng Xiao, Tao Xie, Dingbang Xu, Wei Yang, Xiaolan Zhang, Xinwen Zhang, Wu Zhou, Paul C. van Oorschot

PROFESSIONAL ACTIVITIES

Journal Editorial Positions

- Associate Editor: ACM Transactions on Internet Technology (TOIT), 2015-present.
- Associate Editor: IEEE Security and Privacy Magazine, 2016-present.
- Guest Editor: Special issue on Security and Privacy in Mobile Platforms, IEEE Transactions on Dependable and Secure Computing (TDSC), 2013.

Conference and Workshop Organization

- co-Chair: ACM CCS Workshop on Security and Privacy in Smartphones and Mobile Devices (SPSM), 2011, 2012.
- co-Chair: ACM Conference on Security and Privacy in Wireless and Mobile Networks (WiSec), 2016.
- co-Chair: USENIX Workshop on Offensive Technologies (WOOT), 2017.
- General Chair: ACM CCS Workshop on Security and Privacy in Smartphones and Mobile Devices (SPSM), 2013.
- Poster PC Member: ACM Conference on Computer and Communications Security (CCS), 2011, 2013.
- Student PC Chair: IEEE Symposium on Security and Privacy (Oakland), 2017.
- Poster Session Chair: USENIX Security Symposium, 2013.
- Steering Committee: ACM CCS Workshop on Security and Privacy in Smartphones and Mobile Devices (SPSM), 2014-present.
- Shadow PC co-Chair: ACM Symposium on Information, Computer and Communications Security (ASIACCS), 2017.
- Steering Committee: ACM Conference on Security and Privacy in Wireless and Mobile Networks (WiSec), 2016-present.

Technical Program Committees (total = 84)

- ACM Conference on Computer and Communications Security (CCS): 2014, 2015, 2016.
- IEEE Symposium on Security and Privacy (Oakland): 2012, 2013, 2014.
- ISOC Network and Distributed System Security Symposium (NDSS): 2013, 2014, 2015, 2016, 2017, 2018.
- USENIX Security Symposium: 2011, 2012, 2013, 2015, 2017.
- ACM CCS Workshop on IoT Security and Privacy: 2017.
- ACM Symposium on Information, Computer and Communications Security (ASIACCS): 2017.
- ACM Conference on Data and Application Security and Privacy (CODASPY): 2013, 2014, 2015, 2016.
- ACM Conference on Security and Privacy in Wireless and Mobile Networks (WiSec): 2013, 2015, 2017.
- Annual Computer Security Applications Conference (ACSAC): 2013, 2014, 2015.
- AsiaCCS Workshop on Security in Embedded Systems and Smartphones (SESP): 2013.
- DFRWS Annual Digital Forensics Conference: 2012, 2013, 2014, 2015.
- Financial Cryptography and Data Security (FC): 2013, 2014, 2015.

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- ICDE Workshop on Secure Data Management on Smartphones and Mobiles: 2012.
 - IEEE LCN Workshop on Security in Communications Networks (SICK): 2012.
 - Information Security Conference (ISC): 2009.
 - Innovations in Mobile Privacy and Security (IMPS): 2016, 2017.
 - International Conference on Information Security and Assurance (ISA): 2009.
 - International Conference on Information Systems Security (ICISS): 2007, 2012, 2013, 2014, 2015.
 - International Conference on Information Technology (ICIT): 2009.
 - International Conference on Internet Monitoring and Protection (ICIMP): 2009, 2010, 2011, 2012, 2013.
 - International Conference on Mobile Systems, Applications, and Services (MobiSys): 2014.
 - International Conference on Parallel and Distributed Systems (ICPADS): 2013.
 - International Conference on Privacy and Security in Mobile Systems (PRISMS): 2013.
 - International Conference on Trust and Trustworthy Computing (TRUST): 2013.
 - International ICST Conference on Security and Privacy in Mobile Information and Communication Systems (MobiSec): 2012.
 - International Symposium on Engineering Secure Software and Systems (ESSoS): 2017.
 - International Symposium on Research in Attacks, Intrusions and Defenses (RAID): 2015, 2016.
 - International Workshop on Secure Internet of Things (SIoT): 2016, 2017.
 - International Workshop on Security (IWSEC): 2010, 2011.
 - International Workshop on Trustworthy Embedded Devices (TrustED): 2011, 2012, 2013.
 - International World Wide Web Conference (WWW): 2012, 2016.
 - Mobile Security Technologies Workshop (MoST): 2014, 2015.
 - New Security Paradigms Workshop (NSPW): 2012, 2013.
 - Privacy Enhancing Technologies Symposium (PETS): 2015, 2016.
 - Symposium and Bootcamp on the Science of Security (HotSoS): 2014, 2015, 2017.
 - Symposium on Usable Privacy and Security (SOUPS): 2015.
 - USENIX Workshop on Hot Topics in Security (HotSec): 2012.
 - USENIX Workshop on Offensive Technologies (WOOT): 2016.
 - Workshop on Cyber Security Experimentation and Test (CSET): 2016.

Reviewer (Journal and Book): ACM Computing Surveys, 2009, 2011, 2015; ACM Transactions on Information and System Security (TISSEC), 2008, 2011, 2015; ACM Transactions on Internet Technology (TOIT), 2006, 2009, 2010; ACM Transactions on Mobile Computing (TMC), 2012, 2013; ACM Transactions on Privacy and Security (TOPS), 2016; Handbook of Computer Networks, 2006; IBM Journal of Research and Development, 2013; IEEE Communications Letters, 2008, 2009; IEEE Internet Computing, 2016; IEEE Security and Privacy Magazine, 2010, 2013, 2014; IEEE Transactions on Computers (TC), 2009; IEEE Transactions on Dependable and Secure Computing (TDSC), 2012, 2013; IEEE Transactions on Information Forensics and Security (TIFS), 2012, 2015; IEEE Transactions on Parallel and Distributed Systems (TPDS), 2014; IEEE Transactions on Software Engineering (TSE), 2007, 2010; International Journal of Information Security, 2013; Journal of Autonomic and Trusted Computing (JoATC), 2006; Security and Communication Networks (SCN), 2011, 2014; Software: Practice and Experience (SPE), 2013; Transactions on Computational Science (Springer-Verlag), 2010.

Reviewer (Conference and Workshop): ACM Conference on Computer and Communications Security (CCS), 2008, 2010, 2011, 2012, 2013; IEEE Symposium on Security and Privacy (Oakland), 2007, 2008, 2011; ISOC Network and Distributed System Security Symposium (NDSS), 2007, 2009; USENIX Security Symposium, 2006, 2007, 2008, 2009; ACM Computer Security Architecture Workshop (CSAW), 2008; ACM Symposium on Access Control Models and Technology (SACMAT), 2006, 2008, 2009; Annual Computer Security Applications Conference (ACSAC), 2005, 2006, 2007, 2009, 2010, 2012; European Symposium on Research in Computer Security (ESORICS), 2005; Financial Cryptography and Data Security (FC), 2007; IEEE Computer Security Foundations Symposium (CSF), 2011; IEEE Conference on Computer Communications (Infocom), 2007; International Conference on Availability, Reliability and Security (ARES), 2009; International Conference on Distributed Computing Systems (ICDCS), 2008; International Conference on Emerging Trends in Information and Communications Security (ETRICS), 2006; International Conference on Information Systems Security (ICISS), 2006, 2008; International Conference on Mobile Computing and Networking (MobiCom), 2011, 2014; International Conference on Mobile Systems, Applications, and Services (MobiSys), 2012; International ICST Conference on Security and Privacy in Communication Networks (SecureComm), 2011; International Workshop on Security (IWSEC), 2006, 2007; International World Wide Web Conference (WWW), 2010; USENIX Annual Technical Conference,

2010; USENIX Workshop on Hot Topics in Security (HotSec), 2008, 2010; Workshop on Virtual Machine Security (VMSec), 2008.

PUBLICATIONS

Book Chapters

1. Adwait Nadkarni, Akash Verma, Vasant Tendulkar, and William Enck. Reliable Ad Hoc Smartphone Application Creation for End Users, *Intrusion Detection and Prevention for Mobile Ecosystems*, CRC Press, Editor: George Kambourakis, Asaf Shabtai, Konstantinos Kolias, Dimitrios Damopoulos, July, 2017.
2. William Enck. Android's Security Framework-Understanding the Security of Mobile Phone Platforms, *Encyclopedia of Cryptography and Security*, Springer, Editor: Henk C. A. Tilborg and Sushil Jajodia, 2011.
3. William Enck. ARP Spoofing, *Encyclopedia of Cryptography and Security*, Springer, Editor: Henk C. A. Tilborg and Sushil Jajodia, 2011.
4. Kevin Butler, William Enck, Patrick Traynor, Jennifer Plaster, and Patrick McDaniel. Privacy Preserving Web-Based Email, *Algorithms, Architectures and Information Systems Security, Statistical Science and Interdisciplinary Research*, World Scientific Computing, Editor: Bhargab Bhattacharya, Susmita Sur-Kolay, Subhas Nandy and Aditya Bagchi, November, 2008. (extends iciss06b)

Journal Publications

5. Stephan Heuser, Bradley Reaves, Praveen Kumar Pendyala, Henry Carter, Alexandra Dmitrienko, William Enck, Negar Kiyavash, Ahmad-Reza Sadeghi, and Patrick Traynor. Phion: Practical Protection of Metadata in Telephony Networks, *Proceedings on Privacy Enhancing Technologies (PoPETS)*, 2017(1), January, 2017.
6. Bradley Reaves, Jasmine Bowers, Sigmund Albert Gorski III, Olabode Anise, Rahul Bobhate, Raymond Cho, Hiranava Das, Sharique Hussain, Hamza Karachiwala, Nolen Scaife, Byron Wright, Kevin Butler, William Enck, and Patrick Traynor. *droid: Assessment and Evaluation of Android Application Analysis Tools, *ACM Computing Surveys (CSUR)*, 49(3), December, 2016.
7. Rui Shu, Peipei Wang, Sigmund A. Gorski III, Benjamin Andow, Adwait Nadkarni, Luke Deshotels, Jason Gionta, William Enck, and Xiaohui Gu. A Study of Security Isolation Techniques, *ACM Computing Surveys (CSUR)*, 49(3), December, 2016.
8. William Enck, Peter Gilbert, Seungyeop Han, Vasant Tendulkar, Byung-Gon Chun, Landon Cox, Jaeyeon Jung, Patrick McDaniel, and Anmol Sheth. TaintDroid: An Information-Flow Tracking System for Realtime Privacy Monitoring on Smartphones, *ACM Transactions on Computer Systems (TOCS)*, 32(2), June, 2014. (extends egc+10)
9. William Enck, Peter Gilbert, Byung-Gon Chun, Landon P. Cox, Jaeyeon Jung, Patrick McDaniel, and Anmol N. Sheth. TaintDroid: An Information-Flow Tracking System for Realtime Privacy Monitoring on Smartphones, *Communications of the ACM*, 57(3), March, 2014. Research Highlight.
10. Machigar Ongtang, Stephen McLaughlin, William Enck, and Patrick McDaniel. Semantically Rich Application-Centric Security in Android, *Journal of Security and Communication Networks*, 5(6):658-673, June, 2012. (extends omem09)
11. Patrick Traynor, Kevin Butler, William Enck, Kevin Borders, and Patrick McDaniel. malnets: Large-Scale Malicious Networks via Compromised Wireless Access Points, *Journal of Security and Communication Networks*, 3(2):102-113, March, 2010.
12. William Enck, Machigar Ongtang, and Patrick McDaniel. Understanding Android Security, *IEEE Security and Privacy Magazine*, 7(1):50-57, January/February, 2009.
13. William Enck, Thomas Moyer, Patrick McDaniel, Subhabrata Sen, Panagiotis Sebos, Sylke Spoerel, Albert Greenberg, Yu-Wei Eric Sung, Sanjay Rao, and William Aiello. Configuration Management at Massive Scale: System Design and Experience, *IEEE Journal on Selected Areas in Communications (JSAC)*, 27(3):323-335, April, 2009. (extends ems+07)
14. Patrick Traynor, William Enck, Patrick McDaniel, and Thomas La Porta. Mitigating Attacks on Open Functionality in SMS-Capable Cellular Networks, *IEEE/ACM Transactions on Networking (TON)*, 17(1), February, 2009. (extends teml06)
15. Patrick Traynor, William Enck, Patrick McDaniel, and Thomas La Porta. Exploiting Open Functionality in SMS-Capable Cellular Networks, *Journal of Computer Security*, 16(6), December, 2008. (extends etml05)
16. Wesam Lootah, William Enck, and Patrick McDaniel. TARP: Ticket-based Address Resolution Protocol, *Computer Networks*, 51(15):4322-4337, Elsevier, October, 2007. (extends lem05)

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17. Heesook Choi, William Enck, Jaesheung Shin, Patrick McDaniel, and Thomas La Porta. ASR: Anonymous and Secure Reporting of Traffic Forwarding Activity in Mobile Ad Hoc Networks, *Wireless Networks (WINET)*, 15(4):525–539, ACM/Kluwer, May, 2009. (Published online October 2007). (extends ces+05)

Conference Publications

18. Benjamin Andow, Akhil Acharya, Dengfeng Li, William Enck, Kapil Singh, and Tao Xie. UiRef: Analysis of Sensitive User Inputs in Android Applications, *Proceedings of the ACM Conference on Security and Privacy in Wireless and Mobile Networks (WiSec)*, July, 2017. (acceptance rate=22.3%)
19. Ruowen Wang, Ahmed M. Azab, William Enck, Ninghui Li, Peng Ning, Xun Chen, Wenbo Shen, and Yueqiang Cheng. SPOKE: Scalable Knowledge Collection and Attack Surface Analysis of Access Control Policy for Security Enhanced Android, *Proceedings of the ACM Asia Conference on Computer and Communications Security (ASIACCS)*, April, 2017. (acceptance rate=18.7%)
20. Rui Shu, Xiaohui Gu, and William Enck. A Study of Security Vulnerabilities on Docker Hub, *Proceedings of the ACM Conference on Data and Application Security and Privacy (CODASPY)*, March, 2017. Scottsdale, Arizona.
21. Luke Deshotels, Razvan Deaconescu, Mihai Chiroiu, Lucas Davi, William Enck, and Ahmad-Reza Sadeghi. Sand-Scout: Automatic Detection of Flaws in iOS Sandbox Profiles, *Proceedings of the ACM Conference on Computer and Communications Security (CCS)*, October, 2016. Vienna, Austria. (acceptance rate=16.5%)
22. Jason Gionta, William Enck, and Per Larsen. Preventing Kernel Code-Reuse Attacks Through Disclosure Resistant Code Diversification, *Proceedings of the IEEE Conference on Communications and Network Security (CNS)*, October, 2016. Philadelphia, PA. (acceptance rate=29.0%)
23. Adwait Nadkarni, Benjamin Andow, William Enck, and Somesh Jha. Practical DIFC Enforcement on Android, *Proceedings of the USENIX Security Symposium*, August, 2016. Austin, TX. (acceptance rate=15.6%)
24. Terrence OConnor, and William Enck. Code-Stop: Code-Reuse Prevention By Context-Aware Traffic Proxying, *Proceedings of the International Conference on Internet Monitoring and Protection (ICIMP)*, May, 2016. Valencia, Spain. (acceptance rate=28%)
25. Ruowen Wang, William Enck, Douglas Reeves, Xinwen Zhang, Peng Ning, Dingbang Xu, Wu Zhou, and Ahmed Azab. EASEAndroid: Automatic Policy Analysis and Refinement for Security Enhanced Android via Large-Scale Semi-Supervised Learning, *Proceedings of the USENIX Security Symposium*, August, 2015. Washington, DC. (acceptance rate=15.7%)
26. Daniel J. Dean, Peipei Wang, Xiaohui Gu, William Enck, and Guoliang Jin. Automatic Server Hang Bug Diagnosis: Feasible Reality or Pipe Dream?, *Proceedings of the IEEE International Conference on Autonomic Computing (ICAC)*, July, 2015. Grenoble, France. (short paper). (acceptance rate=27.5%)
27. Wei Yang, Xusheng Xiao, Benjamin Andow, Sihan Li, Tao Xie, and William Enck. AppContext: Differentiating Malicious and Benign Mobile App Behaviors Using Context, *Proceedings of the International Conference on Software Engineering (ICSE)*, May, 2015. Firenze, Italy. (acceptance rate=18.5%)
28. Jason Gionta, William Enck, and Peng Ning. HideM: Protecting the Contents of Userspace Memory in the Face of Disclosure Vulnerabilities, *Proceedings of the ACM Conference on Data and Application Security and Privacy (CODASPY)*, March, 2015. San Antonio, TX. (acceptance rate=21.3%)
29. Jason Gionta, Ahmed Azab, William Enck, Peng Ning, and Xiaolan Zhang. SEER: Practical Memory Virus Scanning as a Service, *Proceedings of the Annual Computer Security Applications Conference (ACSAC)*, December, 2014. New Orleans, LA. (acceptance rate=19.9%)
30. Stephan Heuser, Adwait Nadkarni, William Enck, and Ahmad-Reza Sadeghi. ASM: A Programmable Interface for Extending Android Security, *Proceedings of the USENIX Security Symposium*, August, 2014. San Diego, CA. (acceptance rate=19.1%)
31. Adwait Nadkarni, Vasant Tendulkar, and William Enck. NativeWrap: Ad Hoc Smartphone Application Creation for End Users, *Proceedings of the ACM Conference on Security and Privacy in Wireless and Mobile Networks (WiSec)*, July, 2014. Oxford, United Kingdom. (acceptance rate=26.0%)
32. Tsung-Hsuan Ho, Daniel Dean, Xiaohui Gu, and William Enck. PREC: Practical Root Exploit Containment for Android Devices, *Proceedings of the ACM Conference on Data and Application Security and Privacy (CODASPY)*, March, 2014. San Antonio, TX. (acceptance rate=16.0%)
33. Adwait Nadkarni, and William Enck. Preventing Accidental Data Disclosure in Modern Operating Systems, *Proceedings of the 20th ACM Conference on Computer and Communications Security (CCS)*, November, 2013.

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- Berlin, Germany. (acceptance rate=19.8%)
34. Rahul Pandita, Xusheng Xiao, Wei Yang, William Enck, and Tao Xie. WHYPER: Towards Automating Risk Assessment of Mobile Applications, *Proceedings of the USENIX Security Symposium*, August, 2013. Washington, D.C.. (acceptance rate=16.2%)
 35. Saurabh Chakradeo, Brad Reaves, Patrick Traynor, and William Enck. MAST: Triage for Market-scale Mobile Malware Analysis, *Proceedings of the ACM Conference on Security and Privacy in Wireless and Mobile Networks (WiSec)*, April, 2013. Budapest, Hungary. (**best paper**). (acceptance rate=15.1%)
 36. Vaibhav Rastogi, Yan Chen, and William Enck. AppsPlayground: Automatic Large-scale Dynamic Analysis of Android Applications, *Proceedings of the ACM Conference on Data and Application Security and Privacy (CODASPY)*, February, 2013. San Antonio, TX. (acceptance rate=23.1%)
 37. Vasant Tendulkar, Joe Pletcher, Ashwin Shashidharan, Ryan Snyder, Kevin Butler, and William Enck. Abusing Cloud-based Browsers for Fun and Profit, *Proceedings of the 28th Annual Computer Security Applications Conference (ACSAC)*, December, 2012. Orlando, FL. (acceptance rate=19.0%)
 38. William Enck, Damien Octeau, Patrick McDaniel, and Swarat Chaudhuri. A Study of Android Application Security, *Proceedings of the 20th USENIX Security Symposium*, August, 2011. San Francisco, CA. (acceptance rate=17.2%)
 39. William Enck, Peter Gilbert, Byung-Gon Chun, Landon P. Cox, Jaeyeon Jung, Patrick McDaniel, and Anmol N. Sheth. TaintDroid: An Information-Flow Tracking System for Realtime Privacy Monitoring on Smartphones, *Proceedings of the 9th USENIX Symposium on Operating Systems Design and Implementation (OSDI)*, October, 2010. Vancouver, BC. (acceptance rate=16.1%)
 40. Machigar Ongtang, Stephen McLaughlin, William Enck, and Patrick McDaniel. Semantically Rich Application-Centric Security in Android, *Proceedings of the 25th Annual Computer Security Applications Conference (ACSAC)*, December, 2009. Honolulu, HI. (**best paper**). (acceptance rate=19.0%)
 41. William Enck, Machigar Ongtang, and Patrick McDaniel. On Lightweight Mobile Phone Application Certification, *Proceedings of the 16th ACM Conference on Computer and Communications Security (CCS)*, November, 2009. Chicago, IL. (acceptance rate=18.4%)
 42. William Enck, Patrick McDaniel, and Trent Jaeger. PinUP: Pinning User Files to Known Applications, *Proceedings of the 24th Annual Computer Security Applications Conference (ACSAC)*, December, 2008. Anaheim, CA. (acceptance rate=24.3%)
 43. William Enck, Kevin Butler, Thomas Richardson, Patrick McDaniel, and Adam Smith. Defending Against Attacks on Main Memory Persistence, *Proceedings of the 24th Annual Computer Security Applications Conference (ACSAC)*, December, 2008. Anaheim, CA. (acceptance rate=24.3%)
 44. Patrick Traynor, Kevin Butler, William Enck, and Patrick McDaniel. Realizing Massive-Scale Conditional Access Systems Through Attribute-Based Cryptosystems, *Proceedings of the 15th Annual Network and Distributed System Security Symposium*, February, 2008. San Diego, CA. (acceptance rate=17.7%)
 45. William Enck, Patrick McDaniel, Subhabrata Sen, Panagiotis Sebos, Sylke Spoerel, Albert Greenberg, Sanjay Rao, and William Aiello. Configuration Management at Massive Scale: System Design and Experience, *Proceedings of the USENIX Annual Technical Conference*, June, 2007. Santa Clara, CA. (acceptance rate=23.8%)
 46. Hosam Rowihy, William Enck, Patrick McDaniel, and Thomas La Porta. Limiting Sybil Attacks in Structured P2P Networks, *Proceedings of the IEEE INFOCOM'07 Minisymposium*, May, 2007. (acceptance rate=25%)
 47. Kevin Butler, William Enck, Jennifer Plasterr, Patrick Traynor, and Patrick McDaniel. Privacy-Preserving Web-Based Email, *Proceedings of 2nd International Conference on Information Systems Security (ICISS)*, December, 2006. Kolkata, India. (acceptance rate=30.4%)
 48. Patrick Traynor, William Enck, Patrick McDaniel, and Thomas La Porta. Mitigating Attacks on Open Functionality in SMS-Capable Cellular Networks, *Proceedings of the Twelfth Annual International Conference on Mobile Computing and Networking (MobiCom)*, September, 2006. Los Angeles, CA. (acceptance rate=11.7%)
 49. Wesam Lootah, William Enck, and Patrick McDaniel. TARP: Ticket-Based Address Resolution Protocol, *21st Annual Computer Security Applications Conference (ACSAC)*, 95–103, December, 2005. Tuscon, AZ. (acceptance rate=19.2%)
 50. William Enck, Patrick Traynor, Patrick McDaniel, and Thomas La Porta. Exploiting Open Functionality in SMS-Capable Cellular Networks, *Proceedings of the 12th ACM Conference on Computer and Communications Security (CCS)*, 393–404, November, 2005. Alexandria, VA. (acceptance rate=15.0%)
 51. Heesook Choi, William Enck, Jaesheung Shin, Patrick McDaniel, and Thomas La Porta. Secure Reporting of

Traffic Forwarding Activity in Mobile Ad Hoc Networks, *MobiQuitous 2005*, July, 2005. San Diego, CA. (acceptance rate=35%)

Workshop Publications

52. Benjamin Andow, Adwait Nadkarni, Blake Bassett, William Enck, and Tao Xie. A Study of Grayware on Google Play, *Proceedings of the IEEE Mobile Security Technologies workshop (MoST)*, May, 2016. (acceptance rate=28.6%)
53. Qian Liu, Anne Collins McLaughlin, Benjamin Watson, William Enck, and Agnes Davis. Multitasking Increases Stress and Insecure Behavior on Mobile Devices, *Proceedings of the International Annual Meeting of the Human Factors and Ergonomics Society (HFES)*, 1110-1114, October, 2015.
54. Jason Gionta, Ahmed Azab, William Enck, Peng Ning, and Xiaolan Zhang. DACSA: A Decoupled Architecture for Cloud Security Analysis, *Proceedings of the 7th Workshop on Cyber Security Experimentation and Test (CSET)*, August, 2014. (acceptance rate=40.0%)
55. Vasant Tendulkar, and William Enck. An Application Package Configuration Approach to Mitigating Android SSL Vulnerabilities, *Proceedings of the IEEE Mobile Security Technologies workshop (MoST)*, May, 2014. (acceptance rate=36.7%)
56. David Barrera, William Enck, and Paul C. van Oorschot. Meteor: Seeding a Security-Enhancing Infrastructure for Multi-market Application Ecosystems, *Proceedings of the IEEE Mobile Security Technologies workshop (MoST)*, May, 2012. (acceptance rate=39.3%)
57. Kevin Butler, William Enck, Harri Hursti, Stephen McLaughlin, Patrick Traynor, and Patrick McDaniel. Systemic Issues in the Hart InterCivic and Premier Voting Systems: Reflections Following Project EVEREST, *Proceedings of the USENIX/ACCURATE Electronic Voting Technology (EVT) Workshop*, July, 2008. (acceptance rate=44.1%)
58. William Enck, Sandra Rueda, Yogesh Sreenivasan, Joshua Schiffman, Luke St. Clair, Trent Jaeger, and Patrick McDaniel. Protecting Users from "Themselves", *Proceedings of the 1st ACM Computer Security Architectures Workshop*, November, 2007. Alexandria, VA. (acceptance rate=30%)

Invited Papers

59. William Enck. Defending Users Against Smartphone Apps: Techniques and Future Directions, *Proceedings of 7th International Conference on Information Systems Security (ICISS)*, December, 2011. Kolkata, India. (Invited).
60. Luke St. Clair, Lisa Johansen, William Enck, Matthew Pirretti, Patrick Traynor, Patrick McDaniel, and Trent Jaeger. Password Exhaustion: Predicting the End of Password Usefulness, *Proceedings of 2nd International Conference on Information Systems Security (ICISS)*, December, 2006. Kolkata, India. (Invited).

Columns

61. Patrick McDaniel, and William Enck. Not So Great Expectations: Why Application Markets Haven't Failed Security, *IEEE Security and Privacy Magazine*, 8(5):76-78, September/October, 2010. (Secure Systems issue column).
62. William Enck, and Adwait Nadkarni. What if the FBI tried to crack an Android phone? We attacked one to find out, *The Conversation*, March, 2016.

Poster Abstracts

63. Wei Yang, Xusheng Xiao, Rahul Pandita, William Enck, and Tao Xie. Improving Mobile Application Security via Bridging User Expectations and Application Behaviors, *Proceedings of the Symposium and Bootcamp on the Science of Security (HotSoS) Poster Session*, April, 2014.
64. Agnes Davis, Ashwin Shashidharan, Qian Liu, William Enck, Anne McLaughlin, and Benjamin Watson. Insecure Behaviors on Mobile Devices under Stress, *Proceedings of the Symposium and Bootcamp on the Science of Security (HotSoS) Poster Session*, April, 2014.
65. Qian Liu, Juhee Bae, Benjamin Watson, and William Enck. Modeling and Sensing Risky User Behavior based on Mobile Devices, *Proceedings of the Symposium and Bootcamp on the Science of Security (HotSoS) Poster Session*, April, 2014.

Tech Reports

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66. Razvan Deaconescu, Luke Deshotels, Mihai Bucicoiu, William Enck, Lucas Davi, and Ahmad-Reza Sadeghi. SandBlaster: Reversing the Apple Sandbox, August, 2016. arXiv:1608.04303.
 67. Adwait Nadkarni, Anmol Sheth, Udi Weinsberg, Nina Taft, and William Enck. GraphAudit: Privacy Auditing for Massive Graph Mining, Technical Report TR-2014-10, North Carolina State University, Department of Computer Science, Raleigh, NC. August, 2014.
 68. William Enck, and Patrick McDaniel. Federated Information Flow Control for Mobile Phones, Technical Report NAS-TR-0136-2010, Network and Security Research Center, Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA. July, 2010.
 69. William Enck, Machigar Ongtang, and Patrick McDaniel. Mitigating Android Software Misuse Before It Happens, Technical Report NAS-TR-0094-2008, Network and Security Research Center, Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA. Sep, 2008. Updated Nov 2008.
 70. Lisa Johansen, Kevin Butler, William Enck, Patrick Traynor, and Patrick McDaniel. Grains of SANs: Building Storage Area Networks from Memory Spots, Technical Report NAS-TR-0060-2007, Network and Security Research Center, Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA. January, 2007.

Miscellaneous

71. William Enck. 17th USENIX Security Symposium Conference Summaries, USENIX ;login Magazine, Dec, 2008.
72. Patrick McDaniel, Kevin Butler, William Enck, Harri Hursti, Stephen McLaughlin, Patrick Traynor, Matt Blaze, Adam Aviv, Pavol Cerny, Sandy Clark, Eric Cronin, Gaurav Shah, Micah Sherr, Giovanni Vigna, Richard Kemmerer, David Balzarotti, Greg Banks, Marco Cova, Viktoria Felmetzger, William Robertson, Fredrik Valeur, Joseph Lorenzo Hall, and Laura Quilter. EVEREST: Evaluation and Validation of Election-Related Equipment, Standards and Testing, December, 2007.
73. William Enck. 16th USENIX Security Symposium Conference Summaries, USENIX ;login Magazine, Dec, 2007.

PUBLIC SPEAKING

INVITED TALKS

1. Towards Practical Information Flow Control in Modern Operating Systems, *University of Florida*, Gainesville, FL, June, 2016.
2. Towards Practical Information Flow Control in Modern Operating Systems, *Royal Holloway, University of London*, Egham, Surrey, UK, April, 2016.
3. Android Security Modules, *Qualcomm Mobile Security Summit*, San Diego, CA, April, 2015.
4. Access Control in Modern Operating Systems, *TU Darmstadt*, Darmstadt, Germany, November, 2013.
5. WHYPER: Towards Automating Risk Assessment of Mobile Applications, *IBM*, Research Triangle Park, NC, October, 2013.
6. Smartphone Security, *Qualcomm*, Santa Clara, CA, May, 2013.
7. Smartphone Security: Concerns and Defenses, *The US Department of Justice and US Department of State West African Cybersecurity and Cybercrime Workshop*, Accra, Ghana, January, 2013.
8. Smartphone Security: Concerns and Defenses, *Black Data Processing Associates (BDPA), Triangle Chapter*, RTP, NC, November, 2012.
9. Defending Users Against Smartphone Apps: Techniques and Future Directions, *University of North Carolina, Chapel Hill*, Chapel Hill, NC, November, 2012.
10. Defending Users Against Smartphone Apps: Techniques and Future Directions, *Purdue University*, West Lafayette, IN, September, 2012.
11. Smartphone Security: Concerns and Defenses, *The US Department of Justice and US Department of State West African Cybersecurity and Cybercrime Workshop*, Dakar, Senegal, September, 2012.
12. Analysis Techniques for Mobile Operating System Security, *State of North Carolina OITS Security Liaisons Meeting*, Raleigh, NC, June, 2012.
13. Defending Users Against Smartphone Apps: Techniques and Future Directions, *University of Washington*, Seattle, WA, April, 2012.
14. Analysis Techniques for Mobile Operating System Security, *Raleigh ISSA Chapter*, Raleigh, NC, April, 2012.
15. Defending Users Against Smartphone Apps: Techniques and Future Directions, *Keynote - International Conference on Information Systems Security (ICISS)*, Kolkata, India, December, 2012.
16. Analysis Techniques for Mobile Operating System Security, *Georgetown University*, Washington, DC, March, 2011.
17. Analysis Techniques for Mobile Operating System Security, *University of Southern California*, Los Angeles, CA, February, 2011.
18. Analysis Techniques for Mobile Operating System Security, *University of Maryland*, College Park, MD, February, 2011.
19. Analysis Techniques for Mobile Operating System Security, *Naval Postgraduate School*, Monterey, CA, February, 2011.
20. Analysis Techniques for Mobile Operating System Security, *Polytechnic Institute of New York University*, New York, NY, January, 2011.
21. Analysis Techniques for Mobile Operating System Security, *Carleton University*, Ottawa, ON, Canada, January, 2011.
22. Analysis Techniques for Mobile Operating System Security, *North Carolina State University*, Raleigh, NC, November, 2010.
23. TaintDroid: An Information-Flow Tracking System for Realtime Privacy Monitoring on Smartphones, *University of Pennsylvania*, Philadelphia, PA, October, 2010.
24. Enhanced Security Policy Frameworks for Android, *Carleton University*, Ottawa, ON, CA, March, 2010.
25. On Lightweight Mobile Phone Certification, *University of Delaware*, Newark, DE, March, 2010.
26. On Lightweight Mobile Phone Certification, *University of Notre Dame*, South Bend, IN, October, 2009.
27. Understanding Android's Security Framework, *University of Washington*, Seattle, WA, July, 2009.
28. Understanding Android's Security Framework, *Georgia Institute of Technology*, Atlanta, GA, January, 2009.

PRESENTATIONS

29. Expectation Context, *Google Security Research Summit*, Mountain View, CA, March, 2015. (short presentation).
30. Enhancing the Security and Access Control of Modern Operating Systems, *NSF SaTC PI Meeting*, Arlington, VA, January, 2015. (poster presentation).
31. A Study of Android Application Security, *20th USENIX Security Symposium*, San Francisco, CA, August, 2011.
32. TaintDroid: An Information-Flow Tracking System for Realtime Privacy Monitoring on Smartphones, *9th USENIX Symposium on Operating Systems Design and Implementation (OSDI)*, Vancouver, BC, Canada, October, 2010.
33. On Lightweight Mobile Phone Certification, *16th ACM Conference on Computer and Communications Security (CCS)*, Chicago, IL, November, 2009.
34. Lightweight Information Tracking for Mobile Phones, *18th USENIX Security Symposium, Works in Progress Session*, Montreal, QC, CA, August, 2009.
35. Defending Against Attacks on Main Memory Persistence, *24th Annual Computer Security Applications Conference (ACSAC)*, Anaheim, CA, December, 2008.
36. PinUP: Pinning User Files to Known Applications, *24th Annual Computer Security Applications Conference (ACSAC)*, Anaheim, CA, December, 2008.
37. PinUP: Pinning User Files to Known Applications, *17th USENIX Security Symposium, Poster Session*, San Jose, CA, August, 2008.
38. Systematic Issues in the Hart InterCivic and Premier Voting Systems: Reflections Following Project EVEREST, *USENIX/ACCURATE Electronic Voting Technology Workshop*, San Jose, CA, July, 2008.
39. Protecting User Files by Reducing Application Access, *16th USENIX Security Symposium, Works in Progress Session*, Boston, MA, August, 2007.
40. PRESTO: A tool for Configuration Management at a Massive Scale, *USENIX Annual Technical Conference*, Santa Clara, CA, June, 2007.
41. PRESTO: A tool for Configuration Management at a Massive Scale, *Workshop on Programmable Routers for the Extensible Services of TOMorrow (PRESTO)*, Princeton, NJ, May, 2007.
42. Mitigating DoS Through Basic TPM Operations, *14th USENIX Security Symposium, Works in Progress Session*, Baltimore, MD, August, 2005.

TUTORIALS

43. Intro to Securing Android Applications, *Raleigh Chapter of ISSA*, Raleigh, NC, December, 2014.
44. Text Analysis for Security, *ACM Conference on Computer and Communications Security (CCS)*, Scottsdale, AZ, November, 2014. Joint tutorial with Tao Xie.
45. Intro to Developing Android Applications, *Raleigh Chapter of ISSA*, Raleigh, NC, October, 2014.
46. Understanding Android's Security Framework, *15th ACM Conference on Computer and Communications Security (CCS)*, Alexandria, VA, October, 2008. Joint tutorial with Patrick McDaniel.

PANELS

47. Experimental Testbeds for Mobile Devices and Large-scale Testing on Mobile Devices, *Workshop on Cyber Security Experimentation and Test (CSET), co-located with the USENIX Security Symposium*, Washington, DC, August, 2015.
48. Building Security into Modern Mobile Platforms, *Federal Trade Commission (FTC) public forum on Mobile Security: Potential Threats and Solutions*, Washington D.C., June, 2013.
49. Mobile Security Issues, *The US Department of Justice and US Department of State West African Cybersecurity and Cybercrime Workshop*, Accra, Ghana, January, 2013.
50. Mobile Security Issues, *The US Department of Justice and US Department of State West African Cybersecurity and Cybercrime Workshop*, Dakar Senegal, September, 2012.

RESEARCH GRANTS

- Title: **Correct Enforcement of Access Control Policy in Modern Operating Systems**
Sponsor: **ARO**
Award #: W911NF-16-1-0299
Total Award: \$411,895
Duration: 3 years (May 9, 2016 - May 8, 2019)
Single PI
- Title: **Enhancing Network-level Defenses with End-Host Context**
Sponsor: **NSA LAS DO6**
Total Award: \$82,262
Duration: 1 year (January 1, 2016 - December 31, 2016)
Single PI
- Title: **TWC: Medium: Collaborative: Improving Mobile-Application Security via Text Analytics**
Sponsor: **NSF SaTC**
Award #: 1513690
NCSU Amount: \$308,000
Duration: 3 years (July 1, 2015 - June 30, 2018)
NCSU PI; PI: Tao Xie (UIUC); co-PIs: Carl Gunter (UIUC), ChengXiang Zhai (UIUC)
- Title: **CAREER: Secure OS Views for Modern Computing Platforms**
Sponsor: **NSF SaTC CAREER**
Award #: 1253346
Amount: \$400,000
Duration: 5 years (February 1, 2013 - January 31, 2018)
Single PI
- Title: **Enhancing Play Store Security and Privacy Hygiene with User Expectations**
Sponsor: **Google Research Award**
Amount: \$47,500 (NCSU)
Duration: 1 year (August 26, 2014 - August 25, 2015)
PI; Co-PI: Tao Xie (UIUC)
- Title: **Refining Security Policy for Smartphone Applications**
Sponsor: **ARO STIR**
Amount: \$49,726
Duration: 9 mo (August 15, 2014 - May 14, 2015)
Single PI
- Title: **R5: Smart Isolation in Large-scale Production Computing Infrastructures**
Sponsor: **NSA SoSL at NCSU**
Amount: \$527,450 (estimated)
Duration: 3 years (March 27, 2014 - March 27, 2017)
Co-PI; PI: Xiaohui (Helen) Gu
- Title: **TWC: Small: Collaborative: Characterizing the Security Limitations of Accessing the Mobile Web**
Sponsor: **NSF SaTC**
Award #: 1222680
Amount: \$167,000 (NCSU)
Duration: 3 years (October 1, 2012 - September 30, 2015)
NCSU PI; Grant PI: Patrick Traynor
- Title: **Attaining Least Privilege Through Automatic Partitioning of Hybrid Programs**
Sponsor: **NSA SoSL at NCSU**
Amount: \$435,127
Duration: 2.5 years (January 1, 2012 - June 24, 2014)
PI; Co-PI: Xiaohui (Helen) Gu
- Title: **Modeling the Risk of User Behavior on Mobile Devices**
Sponsor: **NSA SoSL at NCSU**
Amount: \$382,628
Duration: 1.5 years (January 1, 2013 - June 24, 2014)
Co-PI; PI: Ben Watson; Co-PI: Anne McLaughlin, Michael Rappa