

### Interests

Embedded System Security, Operating System Security, Trusted/Confidential Computing

### Work

- 2019.08– **Assistant Professor**, *Purdue University*, West Lafayette, IN, Department of Computer Science.  
System Security
- 2018.05– **Security Research Engineer Intern**, *Fortanix*, Mountain View, CA, Runtime Encryption.  
2018.08 Intel SGX for Containers
- 2017.05– **Security Research Engineer Intern**, *Samsung Research America (SRA)*, Mountain View, CA, KNOX Security.  
2017.08 Android USB Security
- 2009.07– **Software Engineer**, *Nokia R&D*, Qingdao, China, Linux Control Platform (LCP).  
2012.08 Software Development for Linux
- 2008.12– **Software Engineer Intern**, *Nokia R&D*, Qingdao, China, Linux Control Platform (LCP).  
2009.06 Software Development for Linux
- 2006.03– **POS Tester Intern**, *Hisense R&D*, Qingdao, China, POS Testing.  
2006.04 POS Testing

### Education

- 2014.09– **Ph.D.**, *University of Florida*, Gainesville, FL, Computer & Information Science & Engineering.  
2019.07 System Security and Trusted Computing
- 2012.09– **Ph.D. student**, *University of Oregon*, Eugene, OR, Computer & Information Science.  
2014.08 Machine Learning and Systems Security
- 2006.09– **ME**, *Ocean University of China*, Qingdao, China, Electrical Engineering.  
2009.06 Digital Signal Processing and Machine Learning
- 2002.09– **BS**, *Qingdao University of Technology*, Qingdao, China, Electrical & Information Science.  
2006.06 Electrical Engineering

### Publications

#### Journals:

- 5 **ProXray: Protocol Model Learning and Guided Firmware Analysis**; Farhaan Fowze, [Dave \(Jing\) Tian](#), Grant Hernandez, Kevin Butler, Tuba Yavuz; *IEEE Transactions on Software Engineering (TSE'19)*, 2019
- 4 **Towards Automated Firmware Analysis in the IoT Era**; Grant Hernandez, [Dave \(Jing\) Tian](#), Farhaan Fowze, Tuba Yavuz, Patrick Traynor, Kevin Butler; *IEEE Security & Privacy*, 2019
- 3 **Characterizing the Security of the SMS Ecosystem with Public Gateways**; Bradly Reaves, Luis Vargas, Nolen Scaife, [Dave Tian](#), Logan Blue, Patrick Traynor, Kevin Butler; *ACM Transactions on Privacy and Security (TOPS)*, 2018
- 2 **Securing ARP/NDP From the Ground Up**; [Dave \(Jing\) Tian](#), Kevin R. B. Butler, Joseph I. Choi, Patrick D. McDaniel, Padma Krishnaswamy; *IEEE Transactions on Information Forensics and Security (TIFS)*, 2017
- 1 **Taming the Costs of Trustworthy Provenance through Policy Reduction**; Adam Bates, [Dave \(Jing\) Tian](#), Grant Hernandez, Thomas Moyer, Kevin R. B. Butler, Trent Jaeger; *ACM Transactions on Internet Technology (TOIT)*, 2017

#### Conferences:

- 18 **BigMAC: Fine-Grained Policy Analysis of Android Firmware**; Grant Hernandez, [Dave \(Jing\) Tian](#), Anurag Swarnim Yadav, Byron J. Williams, Kevin Butler; *USENIX Security Symposium*, 2020; Acceptance Rate = TBD%
- 17 **Examining DES-based Cipher Suite Support within the TLS Ecosystem**; Vanessa Frost, [Dave Tian](#), Christie Ruales, Vijay Prakash, Kevin Butler, Patrick Traynor; *ACM ASIA Conference on Computer and Communications Security (ASIACCS'19)*, 2019; Acceptance Rate = 22% short paper

*Purdue University, Department of Computer Science  
305 N. University Street, West Lafayette, IN 47907*

- 16 **A Hybrid Approach to Secure Function Evaluation using SGX**; Joseph Choi, Dave Tian, Grant Hernandez, Christopher Patton, Benjamin Mood, Thomas Shrimpton, Kevin Butler, Patrick Traynor; ACM ASIA Conference on Computer and Communications Security (ASIACCS'19), 2019; Acceptance Rate = 17%
- 15 **A Practical Intel SGX Setting for Linux Containers in the Cloud**; Dave (Jing) Tian, Joseph Choi, Grant Hernandez, Patrick Traynor, Kevin Butler; ACM Conference on Data and Application Security and Privacy (CODASPY'19), 2019; Acceptance Rate = 23.5%
- 14 **LBM: A Security Framework for Peripherals within the Linux Kernel**; Dave (Jing) Tian, Grant Hernandez, Joseph Choi, Vanessa Frost, Peter Johnson, Kevin Butler; IEEE Symposium on Security and Privacy (S&P'19), 2019; Acceptance Rate = 12.5%
- 13 **ATtention Spanned: Comprehensive Vulnerability Analysis of AT Commands Within the Android Ecosystem**; Dave (Jing) Tian, Grant Hernandez, Joseph Choi, Vanessa Frost, Christie Ruales, Patrick Traynor, Hayawardh Vijaykumar, Lee Harrison, Amir Rahmati, Mike Grace, Kevin Butler; USENIX Security Symposium, 2018; Acceptance Rate = 19.1%
- 12 **SoK: "Plug & Pray" Today – Understanding USB Insecurity in Versions 1 through C**; Dave (Jing) Tian, Nolen Scaife, Deepak Kumar, Michael Bailey, Adam Bates, Kevin Butler; IEEE Symposium on Security and Privacy (S&P'18), 2018; Acceptance Rate = 11.5%
- 11 **FirmUSB: Vetting USB Device Firmware using Domain Informed Symbolic Execution**; Grant Hernandez, Farhaan Fowze, Dave Tian, Tuba Yavuz, Kevin Butler; ACM Conference on Computer and Communications Security (CCS'17), 2017; Acceptance Rate = 18.1%
- 10 **CPAC: Securing Critical Infrastructure with Cyber-Physical Access Control**; Sriharsha Etigowni, Dave Tian, Grant Hernandez, Kevin Butler, Saman Zonouz; Annual Computer Security Applications Conference (ACSAC'16), 2016; Acceptance Rate = 22.8%
- 9 **ProvUSB: Block-level Provenance-Based Data Protection for USB Storage Devices**; Dave (Jing) Tian, Adam Bates, Kevin Butler, Raju Rangaswami; ACM Conference on Computer and Communications Security (CCS'16), 2016; Acceptance Rate = 16.5%
- 8 **Making USB Great Again with USBFILTER**; Dave (Jing) Tian, Nolen Scaife, Adam Bates, Kevin Butler, Patrick Traynor; USENIX Security Symposium, 2016; Acceptance Rate = 15.5%
- 7 **Detecting SMS Spam in the Age of Legitimate Bulk Messaging**; Bradley Reaves, Logan Blue, Dave Tian, Patrick Traynor, Kevin Butler; ACM Conference on Security and Privacy in Wireless and Mobile Networks (WiSec'16), 2016; Acceptance Rate = 35.0%
- 6 **Sending out an SMS: Characterizing the Security of the SMS Ecosystem with Public Gateways**; Bradley Reaves, Nolen Scaife, Dave Tian, Logan Blue, Patrick Traynor, Kevin Butler; IEEE Symposium on Security and Privacy (S&P'16), 2016; Acceptance Rate = 13.3%
- 5 **Defending Against Malicious USB Firmware with GoodUSB**; Dave (Jing) Tian, Adam Bates, Kevin Butler; Annual Computer Security Applications Conference (ACSAC'15), 2015; Acceptance Rate = 24.3%
- 4 **Trustworthy Whole-System Provenance for the Linux Kernel**; Adam Bates, Dave Tian, Kevin Butler, Thomas Moyer; USENIX Security Symposium, 2015; Acceptance Rate = 15.7%
- 3 **More Guidelines Than Rules: CSRF Vulnerabilities from Noncompliant OAuth 2.0 Implementations**; Ethan Shernan, Henry Carter, Dave Tian, Patrick Traynor, Kevin Butler; International Conference on Detection of Intrusions and Malware & Vulnerability Assessment (DIMVA'15), 2015; Acceptance Rate = 22.7%
- 2 **Securing ARP from the Ground Up**; Jing (Dave) Tian, Kevin R.B. Butler, Patrick D. McDaniel, Padma Krishnaswamy; ACM Conference on Data and Application Security and Privacy (CODASPY'15), 2015; Acceptance Rate = 33.3%
- 1 **Securing SSL Certificate Validation through Dynamic Linking**; Adam Bates, Joe Pletcher, Tyler Nichols, Braden Hollembaek, Jing (Dave) Tian, Abdulrahman Alkhelaifi, Kevin R. B. Butler; ACM Conference on Computer and Communications Security (CCS'14), 2014; Acceptance Rate = 19.5%

Patents:

- 1 **Method and Apparatus For Vetting Universal Serial Bus Device Firmware**; United States Patent Application 20190286817

## Service

Organizing  
Committee

- Midwest Security Workshop (MSW): '20

Program  
Committee

- USENIX Security: '19
- NDSS Bar: '20
- ESORICS: '20

Conference

External

Review

- IEEE S&P: '16,'17,'18,'20
- USENIX Security: '14,'15,'17,'18,'20
- ISOC NDSS: '16,'17,'18,'19
- ACM CCS: '14,'15,'16
- USENIX OSDI: '16
- ACM AsiaCCS: '15,'17,'18
- USENIX Woot: '16
- ACSAC: '16
- PETS: '15
- IEEE MOST: '15
- IEEE CNS: '17

Journal

Review

- Security and Communication Networks (SCN): '18
- Journal of Network and Systems Management (JONS): '18
- IEEE Internet of Things Journal (IoT): '19

## Invited Talks

- Nov 2018 Defending Operating Systems from Malicious Peripherals, Pennsylvania State University, Host: Patrick McDaniel
- Nov 2018 Defending Operating Systems from Malicious Peripherals, University of Illinois Urbana-Champaign, Host: Adam Bates
- Feb 2019 Defending Operating Systems from Malicious Peripherals, Drexel University, Host: Dario Salvucci
- Feb 2019 Defending Operating Systems from Malicious Peripherals, Duke University, Host: Benjamin Lee
- Feb 2019 Defending Operating Systems from Malicious Peripherals, Purdue University, Host: Dongyan Xu
- Feb 2019 Defending Operating Systems from Malicious Peripherals, Virginia Tech, Host: Matthew Hicks
- Mar 2019 Defending Operating Systems from Malicious Peripherals, University of California Santa Cruz, Host: Owen Arden
- Mar 2019 Defending Operating Systems from Malicious Peripherals, University of Texas Dallas, Host: Murat Kantarcioglu
- Mar 2019 Defending Operating Systems from Malicious Peripherals, Georgetown University, Host: Clay Shields

## Awards

- 2019 IEEE Symposium on Security and Privacy Student Travel Grant, IEEE
- 2019 Distinguished Poster Award, The 9th ACM Conference on Data and Application Security and Privacy
- 2018 Second Place Award, SEC Academic Conference (Cybersecurity) Student Poster Presentation
- 2017 Best Poster Award, FICS Annual Research Conference
- 2017 Gartner Group Info Tech Scholarship, University of Florida
- 2016 Best Poster Award, FICS Annual Research Conference
- 2015 ACSAC Student Conferenceship Award, ACSA
- 2015 CISE Travel Grant, University of Florida
- 2015 USENIX Security Student Grant, USENIX
- 2014 Gartner Group Graduate Fellowship, University of Florida
- 2011 Alcatel-Lucent R&D Well Done Award, Alcatel-Lucent
- 2009 Alcatel-Lucent R&D Innovation Award, Alcatel-Lucent
- 2009 Comprehensive Award of Excellent Graduate Scholarship, Ocean University of China
- 2009 Excellent Graduate Student Scholarship, Ocean University of China
- 2006 Full Graduate Scholarship, Ocean University of China
- 2004 Outstanding Student Cadre Scholarship, Qingdao Technological University

## Teaching

- 2019.08– **Lecturer**, *Dept. of Computer Science, Purdue University*, West Lafayette, IN.
- CS59000-OSS Operating System Security (Fall 2019)
  - CS52800 Network Security (Spring 2020)
  - CS59100 CERIAS Security Seminar (Spring 2020)
- 2018.09– **Guest Lecturer**, *Dept. of Computer & Information Science & Engineering, University of Florida*, Gainesville, FL.
- 2019.07
- CNT 5410 Computer and Network Security (Fall 2018)
  - CIS 5370 Computer and Information Security (Spring 2019)
- 2012.09– **Graduate Teaching Fellow**, *Dept. of Computer & Information Science, University of Oregon*, Eugene, OR.
- 2013.06
- CIS 122 Intro to Programming & Problem Solving Using Python (Fall 2012, Winter 2013, Lab)
  - CIS 415 Operating Systems (Spring 2013, Lab)

## Book Review

- 2013.12– **Technical Reviewer**, *Packt Publishing*, Birmingham, UK.
- Present
- Mastering Python Regular Expressions
  - Python 3 Text Processing with NLTK 3 Cookbook
  - Building Probabilistic Graphical Models with Python
  - Mastering Probabilistic Graphical Models with Python
  - Embedded Linux Projects Using Yocto Project Cookbook
  - Yocto for Raspberry Pi
  - LLVM Cookbook

## Certifications

- 2011 AIX certification (AN10, AN12), IBM
- 2010 Project Management, ChoiZe Management Consulting
- 2010 Linux Debugging and Performance, JOHN BRYCE
- 2008 Sun Certified Java Programmer (SCJP), Sun Microsystems
- 2008 Solaris OS Architecture, Sun ERI & OpenTech
- 2008 Solaris 10 Admin Training, Sun Developer Network (China) & Unix-Center
- 2007 Sun Studio Hands-on Training with Unix/Linux Commands, Sun Developer Network (China) & Unix-Center
- 2004 National Computer Rank Examination (NCRE), Rank 2, C programming, China Education Ministry
- 1998 Microcomputer Operation Certification for Adult (DOS, Foxbase), Pute Computer Training Center of Qingdao Technological University

## Media Coverage

- ESET "ESET discovers Attor, a spy platform with curious GSM fingerprinting", <https://www.welivesecurity.com/2019/10/10/eset-discovers-attor-spy-platform/>
- Firmware Security "USB Fuzzing: A USB Perspective", <https://firmwaresecurity.com/2019/07/20/usb-fuzzing-a-usb-perspective/>
- Hacker News "USB Fuzzing: A USB Perspective", <https://news.ycombinator.com/item?id=20478548>
- LWN.net "Revenge of the modems", <https://lwn.net/Articles/766766/>
- Wired "Exploiting Decades-Old Telephone Tech to Break into Android Devices", <https://www.wired.com/story/at-commands-android-vulnerability/>
- Threatpost "AT Command Hitch Leaves Android Phones Open to Attack", <https://threatpost.com/at-command-hitch-leaves-android-phones-open-to-attack/136938/>
- UF News "Smartphone security risk compared to 'having a ghost user on your phone'", <http://news.ufl.edu/articles/2018/08/smartphone-security-risk-compared-to-having-a-ghost-user-on-your-phone.php>
- independent florida alligator "What the hack: UF research reveals smartphones can be hacked via USB", [https://www.alligator.org/news/what-the-hack-uf-research-reveals-smartphones-can-be-hacked/article\\_4480693e-aced-11e8-b68e-675760f71388.html](https://www.alligator.org/news/what-the-hack-uf-research-reveals-smartphones-can-be-hacked/article_4480693e-aced-11e8-b68e-675760f71388.html)
- Bleeping Computer "Smartphones From 11 OEMs Vulnerable to Attacks via Hidden AT Commands", <https://www.bleepingcomputer.com/news/security/smartphones-from-11-oems-vulnerable-to-attacks-via-hidden-at-commands/>
- How-To Geek "How to Protect Yourself From Public USB Charging Ports", <https://www.howtogeek.com/364032/how-to-protect-yourself-from-public-usb-charging-ports/>

- Slashdot "Smartphones from 11 OEMs, Including Google, Samsung, HTC, Lenovo and Sony, Vulnerable to Attacks Via Hidden AT Commands", <https://mobile.slashdot.org/story/18/08/26/1910246/smartphones-from-11-oems-including-google-samsung-htc-lenovo-and-sony-vulnerable-to-attacks-via-hidden-at-commands>
- Hacker News "ATtention Spanned: Comprehensive Android Vulnerability Analysis of AT Commands", <https://news.ycombinator.com/item?id=17837035>
- Security Affairs "Android mobile devices from 11 vendors are exposed to AT Commands attacks", <https://securityaffairs.co/wordpress/75683/hacking/at-commands-attacks-android.html>
- Fudzilla "Android at the mercy of AT Commands", <https://www.fudzilla.com/news/mobile/47037-android-at-the-mercy-of-at-commands>
- Tech Worm "Android smartphones can be hacked with AT commands attacks", <https://www.techworm.net/2018/08/android-smartphones-hacked-at-commands-attacks.html>
- Fossbytes "How These Android Smartphone Can Be Hacked With Simple AT commands", <https://fossbytes.com/android-smartphone-can-be-hacked-with-at-commands/>
- Kim Komando Show "Modern smartphones vulnerable to old-school attack", <https://www.komando.com/happening-now/483269/modern-smartphones-vulnerable-to-old-school-attack>
- Hacker Combat "Open AT Commands: a Huge Loophole Exploit in Android Revealed", <https://hackercombat.com/open-at-commands-a-huge-loophole-exploit-in-android-revealed/>
- SecurePoint "Vulnerability Found in Major Manufacturers of Android Phones", <https://www.securepointtech.com/2018/09/07/vulnerability-found-in-major-manufacturers-of-android-phones/>
- Hybrid Techcar "Smartphones are vulnerable to hacking commands for ancient modems", <https://hybridtechcar.com/2018/08/28/smartphones-are-vulnerable-to-hacking-commands-for-ancient-modems/>
- Android Community "New security risk for smartphones brings you a 'ghost user'", <https://androidcommunity.com/new-security-risk-for-smartphones-brings-you-a-ghost-user-20180827/>
- SANS "AT Commands", <https://isc.sans.edu/podcastdetail.html?id=6140>
- golem.de "Android-Smartphones durch Modem-Befehle verwundbar", <https://www.golem.de/news/at-commands-android-smartphones-durch-modem-befehle-verwundbar-1808-136205.html>
- Tproger "11 manufacturers of Android smartphones have discovered a vulnerability to AT-commands", <https://tproger.ru/news/at-commands-deface-smartphones/>
- habr "Attackers can get full remote access to the Android device through a public USB charging port", <https://habr.com/company/crossover/blog/421295/>
- Niebezpiecznik "Miliony smartfonów można zhackować ukrytymi komendami AT", <https://niebezpiecznik.pl/post/miliony-smartfonow-mozna-zhackowac-ukrytymi-komendami-at/>
- Helpnetsecurity "USBFILTER: Packet-level firewall for blocking USB-based threats", <https://www.helpnetsecurity.com/2016/08/12/usbfilter-blocking-threats/>
- ePlace Solutions "USB Related Cyber Attacks and How to Defend Against Them", <https://blog.eplaceinc.com/cyber/2016/09/08/usb-devices-exposing-organizations/>
- BankInfo Security "A New Way to Mitigate USB Risks", <https://www.bankinfosecurity.com/make-usb-great-again-a-9350>
- RedesZone "USBfilter, un concepto de firewall para los puertos USB", <https://www.redeszone.net/2016/08/16/usbfilter-concepto-firewall-los-puertos-usb/>
- Hacker News "No one, not even the Secret Service, should randomly plug in a strange USB stick", <https://news.ycombinator.com/item?id=19609239>
- Serman "La revolución USB contra los malware", <https://serman.com/blog-recuperacion-datos/la-revolucion-usb-contra-los-malware/>

## Students

- Ph.D. Students Taegyu Kim (2019, co-advised with Prof. Dongyan Xu), Arslan Khan (2019, co-advised with Prof. Dongyan Xu), Kyungtae Tim (2019, co-advised with Prof. Byoungyoung Lee), Ertza Warraich (2020)
- Master Students Benjamin Nwachukwu (2019)
- Undergrads Steven Dellamore (2019)
- Committees Jianliang Wu (2019), Le Yu (2019), Rohit Bhatia (2019)
- Interns

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## Links

My web <https://davejingtian.org>  
My code <https://github.com/daveti>  
AT command <https://atcommands.org/>  
Provenance <https://linuxprovenance.org/>  
FW analysis <https://firmware-analysis.org/>  
OS Sec <https://ossec.home.blog>  
Network Sec <https://netsec.travel.blog>  
Purdue Sec <https://pursec.cs.purdue.edu>