

Hao Chen

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Research interests

Computer security, machine learning, mobile computing

Education

University of California <i>PhD in Computer Science</i>	Berkeley, USA 1998-08 – 2004-06
Southeast University <i>MS in Biomedical Engineering</i>	Nanjing, China 1991-09 – 1994-06
Southeast University <i>BS in Biomedical Engineering</i>	Nanjing, China 1988-09 – 1991-06

Appointments

Department of Computer Science, University of California <i>Professor</i>	Davis, CA, USA 2016-07 – present
Department of Computer Science, University of California <i>Associate Professor</i>	Davis, CA, USA 2010-07 – 2016-06
Department of Computer Science, University of California <i>Assistant Professor</i>	Davis, CA, USA 2004-07 – 2010-06

Honors and awards

UC Davis <i>Outstanding Engineering Faculty Award</i>	2010
NSF <i>CAREER Award</i>	2007

Teaching

- Undergraduate courses.....
- Computer Security
 - Data Structures and Programming
 - Introduction to Software Development
- Graduate courses.....
- Computer Security

o Software Security

Students

Doctoral: Liang Cai, Jonathan Crussell, Benjamin Davis, Clint Gibler, Francis Hsu, Gabriel Maganis, Yuan Niu, Ryan Stevens, Matthew Van Gundy

Master: Jeremy Erickson, Eric Gustafson, Kristen Kennedy, Denys Ma, Radmillo Racic, Jonathan Vronsky

Services

Chair of program committee.....

MoST: IEEE Mobile Security Technologies 2012, 2013

Member of program committee.....

CCS: ACM Conference on Computer and Communications Security 2017–2018

CNS: IEEE Conference on Communications and Network Security 2013–2017

ASIACCS: ACM Asia Conference on Computer and Communications Security 2006, 2016–2018

MoST: IEEE Mobile Security Technologies 2012–2017

INFOCOM: IEEE International Conference on Computer Communications 2016

S&P: IEEE Symposium on Security and Privacy 2009, 2015

MobiSys: International Conference on Mobile Systems, Applications, and Services 2015

CANS: International Conference on Cryptology and Network Security 2015

ACSAC: Annual Computer Security Applications Conference 2012–2013

WWW: World Wide Web Conference 2012

WiSec: ACM Conference on Wireless Network Security 2011, 2016

NDSS: Network and Distributed System Security Symposium 2006, 2008–2011

SecureComm: International Conference on Security and Privacy in Communication Networks 2007–2012

W2SP: IEEE Web 2.0 Security and Privacy 2009–2011, 2013

ICDCS: International Conference on Distributed Computing Systems 2008

Security: Usenix Security Symposium 2007

Funding

Science and Technology Center for Secure Computing (ISTC-SC) **\$150 000**
Intel, PI 2013-10 – 2017-09

Research Investments in the Sciences and Engineering (RISE) **\$860 000**
UC Davis, co-PI 2012-09 – 2015-08

Designing New Authentication Mechanisms using Hardware Capabilities in Advanced Mobile Devices **\$500 000**
NSF CNS-1018964, PI 2010-08 – 2014-07

Practical Privacy Preserving Technologies **\$300 000**
NSF CNS-0831547, co-PI 2008-11 – 2012-10

Leveraging Cellular Networks for Web Authentication <i>University of California MICRO, PI</i>	\$11 250 2008-08 – 2009-12
CAREER: Securing Broadband Cellular Data Networks <i>NSF CNS-0644450, PI</i>	\$400 000 2007-07 – 2013-06
Helix: A Self-Regenerative Architecture for the Incorruptible Enterprise <i>AFOSR, PI</i>	\$1 646 000 2007-05 – 2012-04
Institute for Information Infrastructure Protection Fellowship <i>I3P, PI</i>	\$150 000 2005-09 – 2007-08
CT-ISG: Reasoning about Composable Intrusion Detection Systems <i>NSF CNS-0524826, PI</i>	\$179 110 2005-10 – 2006-09
NeTS-NBD: Automatic Validation, Optimization, and Adaptation of Distributed Firewalls for Network Performance and Security <i>NSF CNS-0520320, co-PI</i>	\$400 000 2005-09 – 2008-08
Gift <i>Sprint, PI</i>	\$60 000 2007, 2008
Gift <i>Microsoft, PI</i>	\$5 000 2007
Gift <i>Intel, co-PI</i>	\$150 000 2005

Publications

- [1] Peng Chen and Hao Chen. “Angora: efficient fuzzing by principled search”. In: *IEEE Symposium on Security & Privacy*. San Francisco, CA, USA, May 21–23, 2018.
- [2] Yuan Zhang, Jiarun Dai, Xiaohan Zhang, Sirong Huang, Zhemin Yang, Min Yang, and Hao Chen. “Detecting third-party libraries in Android applications with high precision and recall”. In: *IEEE International Conference on Software Analysis, Evolution, and Reengineering (SANER)*. Campobasso, Italy, Mar. 20–23, 2018.
- [3] Weili Han, Chang Cao, Hao Chen, Dong Li, Zheran Fang, Wenyuan Xu, and Xiaoyang Wang. “senDroid: auditing sensor access in Android system-wide”. In: *IEEE Transactions on Dependable and Secure Computing* (2017).
- [4] Dongyu Meng and Hao Chen. “MagNet: a two-pronged defense against adversarial examples”. In: *ACM Conference on Computer and Communications Security*. CCS. Dallas, TX, Oct. 30–Nov. 3, 2017.
- [5] Yuanyi Wu, Dongyu Meng, and Hao Chen. “Evaluating private modes in desktop and mobile browsers and their resistance to fingerprinting”. In: *IEEE Conference on Communications and Network Security (CNS)*. Las Vegas, NV, Oct. 9–11, 2017.
- [6] Jonathan Vronsky, Ryan Stevens, and Hao Chen. “SurgeScan: enforcing security policies on untrusted third-party Android libraries”. In: *The 14th IEEE Conference on Advanced and Trusted Computing (ATC)*. San Francisco, CA, Aug. 4–8, 2017.
- [7] Yuan Zhang, Min Yang, Guofei Gu, and Hao Chen. “Rethinking permission enforcement mechanism on mobile systems”. In: *IEEE Transactions on Information Forensics & Security* 11.10 (2016), pp. 2227–2240.

- [8] Peng Chen and Hao Chen. "Security analysis of personal unmanned aerial vehicles". In: *International Conference on Security and Privacy in Communication Networks (SECURECOMM)*. Guangzhou, China, Oct. 10–12, 2016.
- [9] Zhengyang Qu, Guanyu Guo, Zhengyue Shao, Vaibhav Rastogi, Yan Chen, Hao Chen, and Wangjun Hong. "AppShield: enabling multi-entity access control cross platforms for mobile app management". In: *International Conference on Security and Privacy in Communication Networks (SECURECOMM)*. Guangzhou, China, Oct. 10–12, 2016.
- [10] Zheran Fang, Weili Han, Dong Li, Zeqing Guo, Danhao Guo, X. Sean Wang, Zhiyun Qian, and Hao Chen. "revDroid: code analysis of the side effects after dynamic permission revocation of Android apps". In: *ACM Asia Conference on Computer and Communications Security (ASIACCS)*. Xi'an, China, May 30–June 3, 2016.
- [11] Ryan Stevens, Jonathan Crussell, and Hao Chen. "On the origin of mobile apps: network provenance for Android applications". In: *6th ACM Conference on Data and Application Security and Privacy (CODASPY)*. New Orleans, LA, Mar. 9–11, 2016.
- [12] Jonathan Crussell, Clint Gibler, and Hao Chen. "AnDarwin: scalable detection of Android application clones based on semantics". In: *IEEE Transactions on Mobile Computing* 14.10 (2015), pp. 2007–2019.
- [13] Ryan Stevens and Hao Chen. "Predictive eviction: a novel policy for optimizing TLS session cache performance". In: *IEEE Global Communications Conference: Communications and Information System Security (GLOBECOM)*. San Diego, CA, Dec. 6–10, 2015.
- [14] Yuan Zhang, Min Yang, Guofei Gu, and Hao Chen. "FineDroid: enforcing permissions with system-wide application". In: *International Conference on Security and Privacy in Communication Networks (SECURECOMM)*. Dallas, TX, Oct. 26–29, 2015.
- [15] Fangda Cai, Hao Chen, Yuanyi Wu, and Yuan Zhang. "AppCracker: widespread vulnerabilities in user and session authentication in mobile apps". In: *IEEE Mobile Security Technologies (MoST)*. San Jose, CA, May 21, 2015.
- [16] Jonathan Crussell, Ryan Stevens, and Hao Chen. "MAdFraud: investigating ad fraud in Android applications". In: *12th International Conference on Mobile Systems, Applications and Services (MobiSys)*. Bretton Woods, NH, USA, June 16–19, 2014.
- [17] Daniel Defreez, Bhargava Shastry, Hao Chen, and Jean-Pierre Seifert. "A first look at firefox OS security". In: *IEEE Mobile Security Technologies (MoST)*. San Jose, CA, May 17, 2014.
- [18] Claire Le Goues, Anh Nguyen-Tuong, Hao Chen, Jack W. Davidson, Stephanie Forrest, Jason D. Hiser, John C. Knight, and Matthew Van Gundy. "Moving target defenses in the Helix self-regenerative architecture". In: *Moving Target Defense II: Application of Game Theory and Adversarial Modeling*. Ed. by Sushil Jajodia et al. Springer-Verlag New York, 2013, pp. 117–149.
- [19] Daryl Posnett, David Kavalier, Clint Gibler, Hao Chen, Prem Devanbu, and Vladimir Filkov. "Using and asking: APIs used in the Android market and asked about in StackOverflow". In: *5th International Conference on Social Informatics (SocInfo)*. Kyoto, Japan, Nov. 25–27, 2013.
- [20] Jonathan Crussell, Clint Gibler, and Hao Chen. "Scalable semantics-based detection of similar Android applications". In: *18th European Symposium on Research in Computer Security (ESORICS)*. Egham, U.K., Sept. 9–13, 2013.
- [21] Benjamin Davis and Hao Chen. "Retrofitting Android apps". In: *11th International Conference on Mobile Systems, Applications and Services (MobiSys)*. Taipei, Taiwan, June 25–28, 2013.

- [22] Clint Gibler, Ryan Stevens, Jon Crussell, Hao Chen, Hui Zang, and Heesook Choi. "Characterizing Android application plagiarism and its impact on developers". In: *11th International Conference on Mobile Systems, Applications and Services (MobiSys)*. Taipei, Taiwan, June 25–28, 2013.
- [23] Eric Gustafson, Kristen Kennedy, and Hao Chen. "Quantifying the effects of removing permissions from Android applications". In: *IEEE Mobile Security Technologies (MoST)*. San Francisco, CA, May 23, 2013.
- [24] Ryan Stevens, Jonathan Ganz, Prem Devanbu, Hao Chen, and Vladimir Filkov. "Asking for (and about) permissions used by Android apps". In: *10th Working Conference on Mining Software Repositories (MSR)*. San Francisco, CA, May 18–19, 2013.
- [25] Matthew Van Gundy and Hao Chen. "Noncespaces: using randomization to defeat cross-site scripting attacks". In: *Computers & Security* 31.4 (2012), pp. 612–628.
- [26] Jonathan Crussell, Clint Gibler, and Hao Chen. "Attack of the clones: detecting cloned applications on Android markets". In: *17th European Symposium on Research in Computer Security (ESORICS)*. Pisa, Italy, Sept. 10–12, 2012.
- [27] Liang Cai and Hao Chen. "On the practicality of motion based keystroke inference attack". In: *5th International Conference on Trust & Trustworthy Computing (TRUST)*. Vienna, Austria, June 13–15, 2012.
- [28] Clint Gibler, Jon Crussell, Jeremy Erickson, and Hao Chen. "AndroidLeaks: automatically detecting potential privacy leaks in Android applications on a large scale". In: *5th International Conference on Trust & Trustworthy Computing (TRUST)*. Vienna, Austria, June 13–15, 2012.
- [29] Gabriel Maganis, Elaine Shi, Hao Chen, and Dawn Song. "Opaak: using mobile phones to limit anonymous identities online". In: *10th International Conference on Mobile Systems, Applications and Services (MobiSys)*. Low Wood Bay, Lake District, United Kingdom, June 26–28, 2012.
- [30] Benjamin Davis, Hao Chen, and Matthew Franklin. "Privacy-Preserving alibi systems". In: *7th ACM Symposium on Information, Computer and Communications Security (ASIACCS)*. Seoul, South Korea, May 1–3, 2012.
- [31] Benjamin Davis, Ben Sanders, Armen Khodaverdian, and Hao Chen. "I-ARM-Droid: a rewriting framework for in-app reference monitors for Android applications". In: *IEEE Mobile Security Technologies (MoST)*. San Francisco, CA, May 24, 2012.
- [32] Ryan Stevens, Clint Gibler, Jon Crussell, Jeremy Erickson, and Hao Chen. "Investigating user privacy in Android ad libraries". In: *IEEE Mobile Security Technologies (MoST)*. San Francisco, CA, May 24, 2012.
- [33] Francis Hsu, Hao Chen, and Sridhar Machiraju. "WebCallerID: leveraging cellular networks for Web authentication". In: *Journal of Computer Security* 19.5 (2011).
- [34] Liang Cai and Hao Chen. "TouchLogger: inferring keystrokes on touch screen from smartphone motion". In: *6th USENIX Workshop on Hot Topics in Security (HotSec 11)*. San Francisco, CA, Aug. 9–9, 2011.
- [35] Yuan Niu and Hao Chen. "Gesture authentication with touch input for mobile devices". In: *3rd International Conference on Security and Privacy in Mobile Information and Communication Systems (MobiSec)*. Aalborg, Denmark, May 17–19, 2011.

- [36] Liang Cai, Kai Zeng, Hao Chen, and Prasant Mohapatra. "Good neighbor: ad hoc pairing of nearby wireless devices by multiple antennas". In: *Annual Network and Distributed System Security Symposium (NDSS)*. San Diego, CA, Feb. 6–9, 2011.
- [37] Radmilo Racic, Denys Ma, Hao Chen, and Xin Liu. "Exploiting and defending opportunistic scheduling in cellular data networks". In: *IEEE Transactions on Mobile Computing* 9 (2010), pp. 609–620. ISSN: 1536-1233.
- [38] Benjamin Davis and Hao Chen. "DBTaint: cross-Application information flow tracking via databases". In: *USENIX Conference on Web Application*. Boston, MA, June 23–24, 2010.
- [39] Liang Cai, Sridhar Machiraju, and Hao Chen. "CapAuth: a capability-based handover scheme". In: *IEEE INFOCOM 2010: The 27th Conference on Computer Communications*. San Diego, CA, Mar. 15–19, 2010.
- [40] Ian Goldberg, Berkant Ustaoglu, Matthew Van Gundy, and Hao Chen. "Multi-party off-the-record messaging". In: *Proceedings of the 16th ACM Conference on Computer and Communications Security (CCS)*. Chicago, IL, Nov. 9–13, 2009.
- [41] Francis Hsu and Hao Chen. "Secure file system services for Web 2.0 applications". In: *Proceedings of the The ACM Cloud Computing Security Workshop (CCSW 2009)*. Chicago, IL, Nov. 13–13, 2009.
- [42] Liang Cai, Gabriel Maganis, Hui Zang, and Hao Chen. "Mitigating DoS attacks on the paging channel by efficient encoding in page messages". In: *Proceedings of the 5th International Conference on Security and Privacy in Communication Networks (SecureComm)*. Athens, Greece, Sept. 14–18, 2009.
- [43] Liang Cai, Sridhar Machiraju, and Hao Chen. "Defending against sensor-sniffing attacks on mobile phones". In: *The First ACM SIGCOMM Workshop on Networking, Systems, Applications on Mobile Handhelds (MobiHeld)*. Barcelona, Spain, Aug. 17–17, 2009.
- [44] Shaozhi Ye, Felix Wu, Raju Pandey, and Hao Chen. "Noise injection for search privacy protection". In: *Proceedings of the 2009 IEEE International Conference on Privacy, Security, Risk and Trust (PASSAT)*. Vancouver, Canada, Aug. 29–31, 2009.
- [45] Justin Becker and Hao Chen. "Measuring privacy risk in online social networks". In: *Web 2.0 Security and Privacy (W2SP)*. Oakland, CA, May 21–21, 2009.
- [46] Matthew Van Gundy and Hao Chen. "Noncespaces: using randomization to enforce information flow tracking and thwart cross-Site scripting attacks". In: *Proceedings of the 16th Annual Network and Distributed System Security Symposium (NDSS)*. San Diego, CA, Feb. 8–11, 2009.
- [47] G Mishherghi, Lihua Yuan, Zhendong Su, Chen-Nee Chuah, and Hao Chen. "A general framework for benchmarking firewall optimization techniques". In: *IEEE Transactions on Network and Service Management* 5.4 (Dec. 2008), pp. 227–238.
- [48] Steven Crites, Francis Hsu, and Hao Chen. "OMash: enabling secure web mashups via object abstractions". In: *Proceedings of the 15th ACM Conference on Computer and Communications Security (CCS)*. Alexandria, VA, Oct. 27–31, 2008, pp. 99–107.
- [49] Yuan Niu, Francis Hsu, and Hao Chen. "iPhish: phishing vulnerabilities on consumer electronics". In: *Proceedings of Usability, Psychology, and Security 2008*. San Francisco, CA, Apr. 14–14, 2008.
- [50] Sridhar Machiraju, Hao Chen, and Jean Bolot. "Distributed authentication for low-cost wireless networks". In: *Proceedings of the Ninth Workshop on Mobile Computing Systems and Applications (HotMobile)*. Napa Valley, CA, Feb. 25–26, 2008, pp. 55–59.

- [51] Radmilo Racic, Denys Ma, Hao Chen, and Xin Liu. "Exploiting opportunistic scheduling in cellular data networks". In: *Proceedings of the 15th Annual Network and Distributed System Security Symposium (NDSS)*. San Diego, CA, Feb. 10–13, 2008, pp. 333–345.
- [52] Matthew Van Gundy, Hao Chen, Zhendong Su, and Giovanni Vigna. "Feature omission vulnerabilities: thwarting signature generation for polymorphic worms". In: *Proceedings of the 23rd Annual Computer Security Applications Conference (ACSAC)*. Miami Beach, FL, Dec. 10–14, 2007, pp. 74–83.
- [53] Yi-Min Wang, Ming Ma, Yuan Niu, and Hao Chen. "Spam double-funnel: connecting web spammers with advertisers". In: *Proceedings of the 16th International World Wide Web Conference (WWW)*. Banff, Canada, May 8–12, 2007.
- [54] Yuan Niu, Yi-Ming Wang, Hao Chen, Ming Ma, and Francis Hsu. "A quantitative study of forum spamming using context-based analysis". In: *Proceedings of the 14th Annual Network and Distributed System Security Symposium (NDSS)*. San Diego, CA, Feb. 28–Mar. 2, 2007, pp. 79–92.
- [55] Francis Hsu, Hao Chen, Thomas Ristenpart, Jason Li, and Zhendong Su. "Back to the future: a framework for automatic malware removal and system repair". In: *Proceedings of 22rd Annual Computer Security Applications Conference (ACSAC)*. Miami Beach, FL, Dec. 11–15, 2006.
- [56] Radmilo Racic, Denys Ma, and Hao Chen. "Exploiting MMS vulnerabilities to stealthily exhaust mobile phone's battery". In: *Proceedings of the Second IEEE Communications Society / CreateNet International Conference on Security and Privacy in Communication Network (SecureComm)*. Baltimore, MD, Aug. 28–Sept. 1, 2006.
- [57] Lihua Yuan, Jianning Mai, Zhendong Su, Hao Chen Chuah, Chen-Nee, and Prasant Mohapatra. "FIREMAN: a toolkit for FIREwall Modeling and ANalysis". In: *Proceedings of 2006 IEEE Symposium on Security and Privacy*. Berkeley, CA, May 21–24, 2006, pp. 199–213.
- [58] Benjamin Schwarz, Hao Chen, David Wagner Morrison, Geoff, Jacob West, Jeremy Lin, and Wei Tu. "Model checking an entire Linux distribution for security violations". In: *Proceedings of the 2005 Annual Computer Security Applications Conference (ACSAC)*. Tucson, Arizona, Dec. 5–9, 2005.
- [59] Hao Chen and Jonathan Shapiro. "Using build-integrated static checking to preserve correctness invariants". In: *Proceedings of the 11th ACM Conference on Computer and Communications Security (CCS)*. Washington, DC, Nov. 25–29, 2004, pp. 288–297.
- [60] Hao Chen, Drew Dean, and David Wagner. "Model checking one million lines of C code". In: *Proceedings of the 11th Annual Network and Distributed System Security Symposium (NDSS)*. San Diego, CA, Feb. 4–6, 2004, pp. 171–185.
- [61] Hao Chen and David Wagner. "MOPS: an infrastructure for examining security properties of software". In: *Proceedings of the 9th ACM Conference on Computer and Communications Security (CCS)*. Washington, DC, Nov. 18–22, 2002, pp. 235–244.
- [62] Hao Chen, David Wagner, and Drew Dean. "Setuid demystified". In: *Proceedings of the 11th USENIX Security Symposium*. San Francisco, CA, Aug. 5–9, 2002, pp. 171–190.
- [63] Susan Dumais, Edward Cutrell, and Hao Chen. "Optimizing search by showing results in context". In: *Proceedings of the ACM SIGCHI Conference on Human Factors in Computing Systems (CHI)*. Seattle, WA, Apr. 2001, pp. 277–284.
- [64] Susan Dumais, Edward Cutrell, and Hao Chen. "Classified displays of web search results". In: *Proceedings of the 11th ASIST SIG/CR Classification Research Workshop*. Nov. 2000, pp. 87–90.

- [65] Susan Dumais and Hao Chen. "Hierarchical classification of web content". In: *Proceedings of the 23rd ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR)*. Athens, Greece, July 2000, pp. 256–263.
- [66] Hao Chen and Susan Dumais. "Bringing order to the web: automatically categorizing search results". In: *Proceedings of the ACM SIGCHI Conference on Human Factors in Computing Systems (CHI)*. The Hague, The Netherlands, Apr. 2000, pp. 145–152.
- [67] Hao Chen and Tin K. Ho. "Evaluation of decision forests on text categorization". In: *Proceedings of the SPIE Conference on Document Recognition and Retrieval VII*. Vol. 3967. San Jose, CA, Jan. 2000, pp. 191–199.
- [68] Hao Chen, Jianying Hu, and Richard Sproat. "Integrating geometrical and linguistic analysis for e-mail signature block parsing". In: *ACM Transactions on Information Systems* 17.4 (Oct. 1999), pp. 343–366.
- [69] Richard Sproat, Jianying Hu, and Hao Chen. "emu: an e-mail preprocessor for text-to-speech". In: *1998 Workshop on Multimedia Signal Processing*. IEEE Signal Processing Society. Redondo Beach, CA, Dec. 1998, pp. 239–244.
- [70] Hao Chen, Jianying Hu, and Richard Sproat. "E-mail signature block analysis". In: *Proceedings of the 14th International Conference on Pattern Recognition (ICPR)*. Brisbane, Australia, Aug. 1998, pp. 1153–1156.
- [71] Hao Chen, Oscar E. Agazzi, and Ching Y. Suen. "Piecewise linear modulation model of handwriting". In: *Proceedings of the 4th International Conference on Document Analysis and Recognition (ICDAR)*. Ulm, Germany, Aug. 1997, pp. 363–367.

Patents

- [1] Sridhar Machiraju, Jean Bolot, and Hao Chen. "Distributed wireless device association with basestations". US 9 503 895. Nov. 22, 2016.
- [2] Sridhar Machiraju, Jean Bolot, and Hao Chen. "Distributed wireless device association with basestations". US 8 873 752. Oct. 28, 2014.
- [3] Hui Zang, Liang Cai, Hao Chen, and Gabriel Maganis. "Method for increasing the number of concurrent page records sent to mobile stations". US 8 639 275. Jan. 28, 2014.
- [4] Hui Zang, Liang Cai, Hao Chen, and Gabriel Maganis. "Method for increasing the number of concurrent page records sent to mobile stations". US 8 509 821. Aug. 13, 2013.
- [5] Sridhar Machiraju, Francis Hsu, and Hao Chen. "Cellular authentication for authentication to a service". US 8 442 527. May 14, 2013.
- [6] Jianying Hu, Richard Sproeat, and Hao Chen. "E-mail signature block analysis". US 6 373 985. Apr. 16, 2002.
- [7] Jianying Hu, Richard Sproeat, and Hao Chen. "E-mail signature block segmentation". US 6 360 010. Mar. 19, 2002.