Qi Alfred Chen

Office: 2260 Hayward Street, University of Michigan, Ann Arbor, MI 48109 Birth date: August 21, 1990
Tel: (+01)734-834-2916 Homepage: http://web.eecs.umich.edu/~alfchen/ Email:alfchen@umich.edu

EDUCATION

- *Sept. 2012 - Now* Ph.D. candidate in Computer Science and Engineering, University of Michigan, Ann Arbor
  – *Research Area*: Network and mobile system security
  – *Advisor* : Professor Z. Morley Mao
- *Sept. 2012 - May. 2014* M.S. in Computer Science and Engineering, University of Michigan, Ann Arbor
  – *GPA*: 4.0/4.0
- *Sept. 2008 - Jun. 2012* B.S. in Department of Computer Science and Technology, Nanjing University, Nanjing, China
  – *Rank*: 3/156 *Overall GPA*: 90.16/100 *Major GPA*: 92.5/100

PUBLICATIONS

1. **Qi Alfred Chen**, Eric Osterweil, Matthew Thomas, and Z. Morley Mao, MitM Attack by Name Collision: Cause Analysis and Vulnerability Assessment in the New gTLD Era, To appear in 37th IEEE Symposium on Security and Privacy (S&P'16), San Jose, CA, May 2016.
2. Earlence Fernandes, **Qi Alfred Chen**, Justin Paupore, Georg Essl, J. Alex Halderman, Z. Morley Mao, and Atul Prakash, Android UI Deception Revisited: Attacks and Defenses, To appear in 20th International Conference on Financial Cryptography and Data Security (FC'16), Barbados, February 2016.
3. Yuru Shao, Jason Ott, **Qi Alfred Chen**, Zhiyun Qian, and Z. Morley Mao, Kratos: Discovering Inconsistent Security Policy Enforcement in the Android Framework, To appear in the 23rd Network and Distributed System Security Symposium (NDSS'16), San Diego, United States, February 2016.
4. **Qi Alfred Chen**, Zhiyun Qian, Yunhan Jia, Yuru Shao, and Z. Morley Mao, Static Detection of Packet Injection Vulnerabilities – A Case for Identifying Attacker-controlled Implicit Information Leaks, Proceedings of the 22nd ACM Conference on Computer and Communications Security (CCS'15), Denver, United States, October 2015.
5. Yunhan Jack Jia, **Qi Alfred Chen**, Z. Morley Mao, Jie Hui, Kranthi Sontineni, Alex Yoon, Samson Kwong, and Kevin Lau, Performance Characterization and Call Reliability Problem Diagnosis for Voice over LTE, Proceedings of the 21th ACM Annual International Conference on Mobile Computing and Networking (Mobicom'15), Paris, France, September 2015.
6. **Qi Alfred Chen**, Haokun Luo, Sanae Rosen, Z. Morley Mao, Karthik Iyer, Jie Hui, Kranthi Sontineni, and Kevin Lau, QoE Doctor: Diagnosing Mobile App QoE with Automated UI Control and Cross-layer Analysis, Proceedings of the 14th ACM SIGCOMM Internet Measurement Conference (IMC'14), Vancouver, Canada, November 2014.
7. **Qi Alfred Chen**, Zhiyun Qian, and Z. Morley Mao, Peeking into Your App without Actually Seeing It: UI State Inference and Novel Android Attacks, Proceedings of the 23rd USENIX Security Symposium (USENIX Security'14), San Diego, United States, August 2014.
8. Sanae Rosen, Haokun Luo, **Qi Alfred Chen**, Z. Morley Mao, Jie Hui, Aaron Drake, and Kevin Lau, Discovering Fine-grained RRC State Dynamics and Performance Impacts in Cellular Networks, Proceedings of the 20th ACM Annual International Conference on Mobile Computing and Networking (Mobicom'14), Maui, United States, September 2014.
9. Yu Stephanie Sun, Lei Xie, **Qi Alfred Chen**, Sanglu Lu, and Daoxu Chen, Efficient Route Guidance in Vehicular Wireless Networks, Proceedings of IEEE Wireless Communications and Networking Conference (WCNC'14), Istanbul, Turkey, April 2014.
10. **Wanchun Dou***, **Qi Chen***, and Jinjun Chen, A Confidence-Based Filtering Method for DDoS Attack Defense in Cloud Environment, Future Generation Computer Systems (FGCS), Volume 29, Issue 7, Pages 1838-1850, September 2013. (Indexed by SCI, Impact Factor 2.639). *(* co-first authors)*

11. **Qi Chen**, Wenmin Lin, Shui Yu, and Wanchun Dou, CBF: A Packet Filtering Method for DDoS Attack Defense in Cloud Environment, Proceedings of the 9th IEEE International Conference on Dependable, Autonomic and Secure Computing (DASC'11), Sydney, Australia, December 2011.

12. Rutao Yang, **Qi Chen**, Lianyong Qi, and Wanchun Dou, A QoS Evaluation Method for Personalized Service Requests, Proceedings of International Conference on Web Information Systems and Mining (WISM'11), Taiyuan, China, September 2011.

POSTERS/DEMOS

- **Qi Alfred Chen**, Zhiyun Qian, Yunhan Jia, Yuru Shao, and Z. Morley Mao, PacketGuardian: Systematic Detection of Packet Injection Vulnerabilities using Precise Static Analysis, Poster in 24th USENIX Security Symposium (USENIX Security'15), Washington, D.C., United States, August 2015.

- **Qi Alfred Chen**, Yunhan Jia, Zhiyun Qian, and Z. Morley Mao, SystemLeakalyzer: Systematically Detecting System Side-Channels, Poster in 23rd USENIX Security Symposium (USENIX Security'14), San Diego, United States, August 2014.

- **Qi Alfred Chen**, Zhiyun Qian, Sanae Rosen, Yuanyuan Zhou, and Z. Morley Mao, When to Attack? Android UI Context Inference as an Attack Building Block, Poster in 22nd USENIX Security Symposium (USENIX Security'13), Washington, D.C., United States, August 2013.

TECHNICAL REPORTS

- Earlence Fernandes, **Qi Alfred Chen**, Georg Essl, J. Alex Halderman, Z. Morley Mao, and Atul Prakash, TIVOs: Trusted Visual I/O Paths for Android, University of Michigan Technical Report CSE-TR-586-14, August 2014.

TALKS

- Static Detection of Packet Injection Vulnerabilities – A Case for Identifying Attacker-controlled Implicit Information Leaks
  – 22nd ACM Conference on Computer and Communications Security (CCS'15), Denver, October 13, 2015

- QoE Doctor: Diagnosing Mobile App QoE with Automated UI Control and Cross-layer Analysis
  – 14th ACM SIGCOMM Internet Measurement Conference (IMC'14), Vancouver, November 5, 2014

- Peeking into Your App without Actually Seeing It: UI State Inference and Novel Android Attacks
  – 23rd USENIX Security Symposium (USENIX Security'14), San Diego, August 22, 2014

PATENTS

- **Qi Chen**, Wenmin Lin, Shui Yu, and Wanchun Dou, Packet Filtering Method for Preventing DDoS Attack in Cloud Environment, Chinese Patent, Publication Number CN102387158 A (http://www.google.com/patents/CN102387158A).

PROJECT EXPERIENCE

- *May. 2015 - now* **Cause Analysis and Vulnerability Assessment of Name Collision Attacks in the New gTLD Era**
  Adviser: Eric Osterweil (Principal Scientist, VeriSign Labs), Matthew Thomas (Data Architect, VeriSign Labs), and Professor Z. Morley Mao (University of Michigan)
  – Identify new attack vectors exposed by name collision in new gTLD era, and perform an in-depth analysis on the problem causes using both local testbed and DNS root traffic analysis;
  – Present a candidate definition and quantification method for the attack surface of the threat, and use it to systematically study the vulnerability status in the wild;
  – Based on the insights from our analysis, propose a set of remediation strategies at the registry, AS, and end user level, and use empirical data analysis to evaluate their effectiveness and deployment challenges;
  – A paper on this project is accepted to IEEE Security and Privacy (Oakland) 2016 conference.

- *June. 2014 - May. 2015* **Systematically Detecting System Side Channels with SystemLeakalyzer**
  Adviser: Professor Z. Morley Mao (University of Michigan)
  – Model side-channel attacks such as UI state inference attack and TCP sequence number inference attack as information leakage problems, and propose a tool, named SystemLeakalyzer, to systematically detect possible side channels that can enable these attacks;
  – In the design and implementation of SystemLeakalyzer, use static program analysis techniques on system source code and track whether the information targeted by side channel attacks can be leaked through publicly-accessible files;
  – Use SystemLeakakyzer to systematically detect the leakage of TCP sequence number guessing space related information in major TCP protocol implementations, which is the major enabler of state-of-the-art off-path TCP attacks. After that, defense mechanisms will be investigated in order to fix these leakages;
  – A paper on this project is published in CCS 2015 conference.

- *Jan. 2014 - May. 2014* **Diagnosing Mobile App QoE with Automated UI Control and Cross-layer Analysis**
  Advisor: Professor Z. Morley Mao (University of Michigan)
  – Design and implement QoE Doctor, a tool that supports accurate, systematic, and repeatable measurements and analysis of mobile app Quality of Experience (QoE);
  – Use the tool to automatically replay QoE-related user behavior, and systematically quantify various factors that impact app QoE, including the cellular radio link layer technology, carrier rate-limiting implementations, app design choices and user-side configuration options;
  – A paper on this project is published in IMC 2014 conference.

- *Jan. 2013 - Feb. 2014* **Android Application State Inference using Combined Side-Channels**
  Adviser: Professor Z. Morley Mao (University of Michigan)
  – Formulate the general UI state inference attack, which aims at exposing running UI state of an application, exploiting the unexpected interaction between design and implementation of GUI framework and new side channels;
  – Design and implement Activity inference attack (the Android instance of UI state inference attack), and find an accuracy of 80-90% in determining the foreground Activity for 6 out of 7 popular apps. The inference itself does not require any Android permissions;
  – Develop several attack scenarios using the UI state inference technique and demonstrate that an attacker can steal sensitive user input and sensitive camera images shot by the user when using Android apps;
  – A paper on this project is published in Usenix Security 2014 conference.

- *Jan. 2011 - Aug. 2012* **Confidence-Based Filtering Method for DDoS Attack Defense in Cloud Environment**
  Adviser: Senior Lecturer Shui Yu (Deakin University), Professor Wanchun Dou (Nanjing University)
  – Design a method, CBF, which uses association rules in data mining area to find out correlations pattern between attributes in TCP/IP header to distinguish malicious packets from legitimate ones;
  – Design a novel pattern generation algorithm to support iceberg-style data storage structure, which reduces storage requirement from 240 GBytes to less than 1 MBytes;
  – Evaluate the system with real-word traffic data set and find that CBF has high filtering speed with acceptable accuracy compared to state-of-art filtering mechanisms (less than 8% FP and FN rate);
  – Implement a DDoS defense software based on CBF for the IDS system of 2014 Youth Olympic Game in Nanjing;
  – A paper on the project is published in DASC 2011 conference, and the extended version is published in FGCS journal.

INTERNSHIP EXPERIENCE

- *May. 2015 - Oct. 2015* **VeriSign Labs, Reston, VA**
  Mentor: Eric Osterweil (Principal Scientist, VeriSign Labs), and Matthew Thomas (Data Architect, VeriSign Labs)
  – Focusing on a newly-exposed MitM attack vector by name collision problem in new gTLD era, performed the first systematic study of the underlying problem causes and the vulnerability status in the wild.

ADVANCED COURSES

Advanced Compilers, A+	Distributed Systems, A+
Computer and Network Security, A	Machine Learning, A
Advanced Computer Networks, A-	Advanced Distributed Systems, A-

Awards and Honors

2014 Rackham Travel Grant, Computer Science and Engineering, University of Michigan - Ann Arbor
2014 Usenix Security Student Travel Grant, Usenix Association
2013 Rackham Travel Grant, Computer Science and Engineering, University of Michigan - Ann Arbor
2013 Usenix Security Student Travel Grant, Usenix Association
2013 Outstanding Bachelor's Degree Thesis, Jiangsu Province (Top 0.1% of the University)
2012 3rd Place of Annual Code Optimization Contest, Computer Science and Engineering, University of Michigan - Ann Arbor
2012 Graduate Fellowship, Computer Science and Engineering, University of Michigan - Ann Arbor
2012 Top 100 Excellent Undergraduate Students of the Year, China Computer Federation (Top 100 of China)
2012 Outstanding Bachelor's Degree Thesis, Nanjing University (Top 0.2% of the University)
2011 Guo Rui Scholarship, Fourteenth China Institute of Electronics Technology Group Corporation (Top 1.3% of the Department)
2011 Model Outstanding Student, Nanjing University (Top 0.3% of the University)
2010 National Scholarship, Ministry of Education of China (Top 1.5% of the University)
2010 Outstanding Student, Nanjing University (Top 5% of the Department)
2009 Honorable Mention for 34th ACM International Collegiate Programming Contest Asia Regional (Ningbo Site)
2009 First Prize of the 7th Nanjing University ACM Local Programming Contest, Nanjing University (Top 5 of the University)
2007 First prize (National) in National Olympiad in Informatics in Provinces (NOIP), Ministry of Education of China (awarded the exemption of national college entrance exam)

Technical Skills

Language	Fluent English, Native Mandarin
Programming	C/C++, Java, Matlab, Gnuplot, Assembly, SQL, Verilog HDL, OCaml
Documentation	LaTeX, MS Office

Hobbies

Play tennis/basketball/badminton, watch movies, and travel.

References

Professor Z. Morley Mao
Department of EECS
University of Michigan
2260 Hayward Street
Ann Arbor, MI 48109
(+1) 734-763-5407
zmao@umich.edu

Professor Zhiyun Qian
Department of CSE
University of California Riverside
334 Winston Chung Hall
Riverside, CA 92507
(+1) 734-730-9457
zhiyunq@cs.ucr.edu

Professor Atul Prakash
Department of EECS
University of Michigan
2260 Hayward Street
Ann Arbor, MI 48109
(+1) 734-763-1585
aprakash@umich.edu