Oian Han

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I am a Ph.D. student in the Department of Computer Science at Dartmouth College, where I work at Dartmouth College Security and Artificial Intelligence Laboratory, advised by Prof. V.S. Subrahmanian. I received my Bachelor's Degree from the Department of Electronic Engineering at Tsinghua University in 2016. That year, my dissertation entitled "Hardware Design and Implementation of a Discrete Multi-channel Optically Controlled Oscillator System" won Tsinghua University's Distinguished Dissertation Award.

My research lies at the intersection of cybersecurity and artificial intelligence (AI). Specifically, I create innovative and robust technologies to help people combat cybercrime using machine learning. Examples include developing general-purpose tools for Android malware detection and analysis. Moreover, our research results on Android malware are recognized by Google Android Security Team and our research group was invited twice for a talk at Google HQ, Mountain View. I also use game theory to build strategies to predict whether severe zero-day vulnerabilities will be exploited or disclosed by nations, and how long to exploit the vulnerability if they decide to exploit. Most recently, I lead an effort to develop a general framework for adversarial malware generation using deep learning, a unified and validated set of guidelines for designing Android malware which can evade anti-virus engines. The generated samples can be used to enhance AI-based malware detection systems.



EDUCATION

DARTMOUTH COLLEGE

SEPT. 2016 – JUN. 2021 (EXPECTED)

Hanover NH

Ph.D. candidate, Department of Computer Science

TSINGHUA UNIVERSITY AUG. 2012 - JUL. 2016

Beijing, China

Bachelor of Engineering, Department of Electronic Engineering



PROFESSIONAL EXPERIENCE

Now

- Research Assistant, Dartmouth College Security and Artificial Intelligence Laboratory, Hanover, NH, United States
- Sept. 2017
- > Proposed novel Suspicion Score & Rank features based on PageRank
- > Found previously unlabeled banking Trojans and rooting malware
- > Designed Ensemble Clustering and Classification algorithm synthesized training data to reduce imbalance ratio on datasets

Python Scikit-learn Networkx Keras

Sept. 2019

Research Intern, Deutsche Telekom Innovation Laboratories, Be'er Sheva, Israel

Jun. 2019

- > Designed Android-centric attack on well-known Android malware classifiers using static features
- > Proposed mechanisms to enhance robustness of anti-virus engines based on deep learning and reduce impact of adversary attack

Python PyTorch Scikit-learn Pandas

Aug. 2017

Research Assistant, Dartmouth HCI Laboratory, Hanover, NH, United States

Sept. 2016

- > Designed 3D printed smart-ring prototype > Implemented the Smart Ring control system using Python and Arduino
- > Used the prototype to control the cursor and play Angry Birds

Python Arduino 3D printing

Sept. 2015 Jun. 2015

Research Assistant, Nanyang Technological University, Singapore

- > Developed flight path monitoring device based on Radio Frequency using Linux GNU Radio Companion and RTL-SDR
- > Implemented Gardner synchronous phase-locked loop algorithm into simulated GMSK communication system

Android Studio GNU MATLAB

OIAN HAN - CV 1



A Data-Driven Characterization of Modern Android Spyware F. Pierazzi, G. Mezzour, Q. Han, M. Colajanni, V.S. Subrahmanian Under Revision, ACM Transactions on Management Information Systems	Aug. 2019
GENERATING FAKE DOCUMENTS USING PROBABILISTIC LOGIC GRAPHS Q. Han, C. Molinaro, A. Picariello, G. Sperlì, V.S. Subrahmanian, Y. Xiong Under Revision, IEEE Transactions on Dependable and Secure Computing	Jun. 2019
Android Rooting Malware Detection via Robust Irreversible Feature Transformations Q. Han, V.S. Subrahmanian and Y. Xiong Under Revision, IEEE Transactions on Information Forensics and Security	Jun. 2019
DISCLOSE OR EXPLOIT? A GAME THEORETIC APPROACH TO STRATEGIC DECISION MAKING IN CYBER WARFARE H. Chen, Q. Han, S. Jajodia, R. Lindelauf, V.S. Subrahmanian, Y. Xiong (authors listed in alphabetic order) IEEE System Journals, To appear	Apr. 2019
DBANK: PREDICTIVE BEHAVIORAL ANALYSIS OF RECENT ANDROID BANKING TROJANS C. Bai, Q. Han, G. Mezzour, F. Pierazzi, and V.S. Subrahmanian (authors listed in alphabetic order) IEEE Transactions on Dependable and Secure Computing (TDSC'19)	Apr. 2019
https://ieeexplore.ieee.org/document/8684321	
FRICTIO: PASSIVE KINESTHETIC FORCE FEEDBACK FOR SMART RING OUTPUT T. Han, Q. Han, M. Annett, F. Anderson, D. Huang, and X. Yang In Proceedings of the ACM Symposium on User Interface Software and Technology (UIST'17) [https://dl.acm.org/citation.cfm?id=3126594.3126622]	JUL. 2017
Low-complexity LSQR-based linear precoding for massive MIMO systems T. Xie, Z. Lu, Q. Han, J. Quan, B. Wang In Proceedings of the 2015 IEEE 82nd Vehicular Technology Conference (VTC'15-Fall)	SEPT. 2015
https://ieeexplore.ieee.org/document/7391016 SIMULTANEOUS MULTI-CHANNEL RECONSTRUCTION FOR TDS-OFDM SYSTEMS Q. Han, W. Shen, and B. Wang In Proceedings of the 2015 IEEE 82nd Vehicular Technology Conference (VTC'15-Fall) https://ieeexplore.ieee.org/document/7391139	SEPT. 2015
SPECTRUM-EFFICIENCY PARAMETRIC CHANNEL ESTIMATION SCHEME FOR MASSIVE MIMO SYSTEMS Z. Gao, C. Zhang, C. Dai, Q. Han 2014 IEEE International Symposium on Broadband Multimedia Systems and Broadcasting (BMSB'14) [https://ieeexplore.ieee.org/document/6873562]	Jun. 2014
Invited Talks	
CLUSTERING AND CLASSIFICATION METHODS FOR PREDICTING MALICIOUS ANDROID APPS Q. Han and V.S. Subrahmanian Conference on Android Security,Local Research Day, Google HQ, Mountain View, CA	OCT. 2018

BEHAVIORAL ANALYSIS AND AUTOMATED DETECTION OF ANDROID BANKING TROJANS

Q. Han and V.S. Subrahmanian Android Security Team, **Google HQ**, Mountain View, CA JUL. 2018



2019 Dartmouth College Graduate Student Council Student Professional Development Support Fund

2019 Dartmouth College Graduate Alumni Research Award

2019 Dartmouth College Neukom Prize for Outstanding Graduate Research

2016 Tsinghua University's Distinguished Dissertation Award

2015 First Prize of Chinese National College Students Science and Technology Innovation Project

2015 Tsinghua University Overseas Summer Research Fund

2014 Tsinghua University Science and Technology Innovation Scholarship

LANGUAGES



- Programming language: Python, Java, MATLAB
 Operating systems: Mac OS X, Linux, Windows
- > Tools and Frameworks : LTEX, Git, PyTorch, Keras, Android, Pandas, Scikit-learn, Networkx

TEACHING ASSISTANT EXPERIENCE

2017 Spring Human-Computer Interaction, COSC 167, Dartmouth College
 2017 Winter Smartphone Programming, COSC 165, Dartmouth College
 2016 Fall Numerical & Computational Tools, COSC 170, Dartmouth College

■ SERVICE AND LEADERSHIP

Reviewer IEEE Systems Journal, IEEE Intelligent Systems, IEEE Vehicular Technology Conference

Student Volunteer 2015 IEEE 82nd Vehicular Technology Conference

Student Organization Leadership President of Dartmouth College Chinese Students and Scholars Association

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