Qian 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

Sept. 2017

Research Assistant, DARTMOUTH COLLEGE SECURITY AND ARTIFICIAL INTELLIGENCE LABORATORY, Hanover, NH, United States
> 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
Jun. 2019

Research Intern, DEUTSCHE TELEKOM INNOVATION LABORATORIES, Be'er Sheva, Israel
> 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
Sept. 2016

Research Assistant, DARTMOUTH HCI LABORATORY, Hanover, NH, United States
> 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`

🎓 Publications

Generating Fake Documents using Probabilistic Logic Graphs
Q. Han, C. Molinaro, A. Picariello, G. Sperlì, V.S. Subrahmanian, Y. Xiong
Under Review, IEEE Transactions on Dependable and Secure Computing

A Data-Driven Characterization of Modern Android Spyware   Apr. 2020
F. Pierazzi, G. Mezzour, Q. Han, M. Colajanni, V.S. Subrahmanian
ACM Transactions on Management Information Systems (TMIS'20)
[https://dl.acm.org/doi/abs/10.1145/3382158]

Android Malware Detection via (Somewhat) Robust Irreversible Feature Transformations   Feb. 2020
Q. Han, V.S. Subrahmanian and Y. Xiong
IEEE Transactions on Information Forensics and Security (TFIS'20)
[https://ieeexplore.ieee.org/document/9013026]

Disclose or Exploit ? A Game Theoretic Approach to Strategic Decision Making in Cyber Warfare   Jan. 2020
H. Chen, Q. Han, S. Jajodia, R. Lindelauf, V.S. Subrahmanian, Y. Xiong (authors listed in alphabetic order, as a major contributor)
IEEE System Journals (ISJ'20)
[https://ieeexplore.ieee.org/document/8967205]

DBank : Predictive Behavioral Analysis of Recent Android Banking Trojans   Apr. 2019
C. Bai, Q. Han, G. Mezzour, F. Pierazzi, and V.S. Subrahmanian (authors listed in alphabetic order, as a major contributor)
IEEE Transactions on Dependable and Secure Computing (TDSC'19)
[https://ieeexplore.ieee.org/document/8684321]

Frictio : Passive Kinesthetic Force Feedback for Smart Ring Output   Jul. 2017
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]

Low-complexity LSQR-based linear precoding for massive MIMO systems   Sept. 2015
T. Xie, Z. Lu, Q. Han, J. Quan, B. Wang
In Proceedings of the 2015 IEEE 82nd Vehicular Technology Conference (VTC'15-Fall)
[https://ieeexplore.ieee.org/document/7391016]

Simultaneous Multi-Channel Reconstruction for TDS-OFDM Systems   Sept. 2015
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]

Spectrum-efficiency parametric channel estimation scheme for massive MIMO systems   Jun. 2014
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]

📑 Invited Talks

Clustering and Classification Methods for Predicting Malicious Android Apps   Oct. 2018
Q. Han and V.S. Subrahmanian
Conference on Android Security,Local Research Day, Google HQ, Mountain View, CA

Behavioral Analysis and Automated Detection of Android Banking Trojans   Jul. 2018
Q. Han, C. Bai and V.S. Subrahmanian
Android Security Team, Google HQ, Mountain View, CA

🎓 Awards

2020	Symantec Research Labs Graduate Fellowship Winners Fellowship Award Finalists
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

Mandarin ● ● ● ● ●
English ● ● ● ● ●

✚ Skills

- > **Programming language** : Python, Java, MATLAB
- > **Operating systems** : Mac OS X, Linux, Windows
- > **Tools and Frameworks** : LaTeX, 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	AAMAS 2020, IEEE Systems Journal 2019, 2020, IEEE Intelligent Systems 2018, IEEE VTC 2015
Student Volunteer	2015 IEEE 82nd Vehicular Technology Conference
Student Organization Leadership	President of Dartmouth College Chinese Students and Scholars Association