

# Scott Freitas

Currently a Ph.D. student at Georgia Tech, studying machine learning in the department of Computational Science and Engineering advised by Polo Chau.

Research interests include **machine learning** and large scale **graph mining**, with application to cybersecurity, healthcare and finance.

Recent awards include NSF Graduate Research Fellowship (2018) and Outstanding Computer Science Masters student at ASU (2018).

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 Curriculum Vitae (PDF)

 Github  
 LinkedIn

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## Education

- Present — **Ph.D. in Machine Learning**  
Aug. 2018 Georgia Institute of Technology, Atlanta, GA  
Advisor: Duen Horng (Polo) Chau  
Anticipated Graduation: Spring 2022
- May 2018 **M.S. in Computer Science**  
Summer 2017 Arizona State University, Tempe, AZ  
Advisor: Hanghang Tong, Thesis: "Mining Marked Nodes in Large Graphs"  
Overall GPA: 4.00/4.00
- May 2017 — **B.S. in Computer Science**  
Aug. 2015 Arizona State University, Tempe, AZ  
Overall GPA: 3.98/4.00
- May 2014 — **B.S.E. in Electrical Engineering**  
Aug. 2010 Arizona State University, Tempe, AZ  
Overall GPA: 3.64/4.00

## Honors and Awards

- 2019 Raytheon Research Fellowship  
Awarded for my PhD work in adversarial machine learning
- 2018 — 2023 NSF Graduate Research Fellowship  
National Science Foundation recognizes and supports outstanding graduate students in STEM fields
- 2018 **Outstanding Computer Science Masters Student (ASU)**  
Awarded to single master student demonstrating exemplary performance
- 2017 **Best Demo Award, Runner Up at CIKM '17**  
For "Rapid Analysis of Network Connectivity"
- 2017 **CIKM Travel Grant**  
Funding from NSF and SIGWEB to present at CIKM

- 2016 — 2017 **FURI Grant**  
Undergraduate research grant awarded for work in network connectivity
- 2016 — 2017 **Arizona Graduate Scholar Award**  
Merit scholarship awarded to select number of master students
- 2010 — 2014 **Provost's Scholarship**  
Merit scholarship awarded to select number of incoming undergraduate students

## Industry Research Experience

- Summer 2019 **Microsoft**, Seattle, WA  
*Research Intern, Windows Defender: Advanced Threat Protection*  
Mentor: Andrew Wicker, Joshua Neil  
Developed graph based approach to quantifying and mitigating vulnerability to adversarial attacks on networks
- Summer 2013 **Naval Air Warfare Center**, Point Mugu, California  
*Research Intern, Naval Research Enterprise Internship Program (NREIP)*  
Mentor: Balaji Iyer  
Explored methods of preventing electromagnetic interference from coupling into superconducting receivers

## Academic Research Experience

- Present — **Georgia Institute of Technology**, Atlanta, GA  
Aug. 2018 *Graduate Research Assistant, School of Computational Science and Engineering*  
Advisor: Duen Horng (Polo) Chau  
Member of the Polo Club of Data Science where we innovate scalable, interactive, and interpretable tools that amplify human's ability to understand and interact with billion-scale data and machine learning models
- May 2018 — **Arizona State University**, Tempe, AZ  
Summer 2017 *Graduate Research Assistant, School of Computing, Informatics, and Decision Systems Engineering*  
Advisor: Hanghang Tong  
Conducted research in graph based connectivity analysis to improve local graph partitioning. Developed web-based prototype for explainable ranking in complex multi-layered networks.
- Summer 2017 **Arizona State University**, Tempe, AZ  
*Summer Research Assistant, School of Computing, Informatics, and Decision Systems Engineering*  
Mentor: Ross Maciejewski  
Developed interactive augmented reality (AR) graph models in the Microsoft HoloLens.
- May 2017 — **Arizona State University**, Tempe, AZ  
Jan. 2016 *Undergraduate Research Assistant, School of Computing, Informatics, and Decision Systems Engineering*  
Mentor: Hanghang Tong  
Developed fast graph mining algorithms for network connectivity analysis, and award winning web platform for visualization and analysis.

## Publications

### **REST: Robust and Efficient Neural Networks for Sleep Monitoring in the Wild**

Rahul Duggal\*, Scott Freitas\*, Cao Xiao, Duen Horng (Polo) Chau, Jimeng Sun  
*WWW 2020 (WWW). Taipei, Taiwan, 2020.*

[Project](#) [PDF](#) [BibTeX](#) \* Authors contributed equally

### **D2M: Dynamic Defense and Modeling of Adversarial Movement in Networks**

Scott Freitas, Andrew Wicker, Duen Horng (Polo) Chau, Joshua Neil  
*SDM 2020 (SDM). Cincinnati, Ohio, 2020.*

[Project](#) [PDF](#) [BibTeX](#)

### **Extracting Knowledge For Adversarial Detection and Defense in Deep Learning**

Scott Freitas, Shang-Tse Chen, Duen Horng (Polo) Chau

KDD Workshop: Learning and Mining for Cybersecurity (LEMINGS). Anchorage, Alaska, 2019.

[Project](#) [PDF](#) [BibTeX](#)

### Local Partition in Rich Graphs

Scott Freitas, Nan Cao, Yinglong Xia, Duen Horng (Polo) Chau, Hanghang Tong  
*IEEE International Conference on Big Data (Big Data)*. Seattle, Washington, 2018.

[Project](#) [Demo](#) [PDF](#) [BibTeX](#)

### X-Rank: Explainable Ranking in Complex Multi-Layered Networks

Jian Kang\*, Scott Freitas\*, Haichao Yu, Yinglong Xia, Hanghang Tong  
*ACM International Conference on Information and Knowledge Management (CIKM)*. Turin, Italy, 2018.

[Project](#) [Demo](#) [PDF](#) [BibTeX](#) \* Authors contributed equally

### Rapid Analysis of Network Connectivity

Scott Freitas, Hanghang Tong, Nan Cao, Yinglong Xia  
*ACM International Conference on Information and Knowledge Management (CIKM)*. Singapore, 2017.

[Project](#) [Demo](#) [PDF](#) [Video](#) [Code](#) [BibTeX](#) [Best Demo Paper, Runner up](#)

## Talks

### D<sup>2</sup>M: Dynamic Defense and Modeling of Adversarial Movement in Networks

Aug. 2019 Microsoft Advanced Threat Protection Research Expo

### Mining Marked Nodes in Large Graphs

Dec. 2018 Microsoft Advanced Threat Protection Group  
May 2018 ASU Thesis

### Local Partition in Rich Graphs

Dec. 2018 IEEE International Conference on Big Data

### Rapid Analysis of Network Connectivity

Nov. 2017 ACM International Conference on Information and Knowledge Management (CIKM)

### Network Connectivity Analysis and Visualization in Large Graphs

April 2017 Keynote Speaker: ASU Fulton Undergraduate Research Initiative (FURI)  
Nov. 2016 ASU FURI Research Symposium

## Press

Feb. 2019 "Raytheon Awards Two ML@GT Students Graduate Research Assistantships",  
July 2018 "NSF Graduate Research Fellow wants to use computer science to solve society's toughest problems",

## Teaching

Fall 2013 **Undergraduate Teaching Assistant**  
*Arizona State University, Tempe, AZ*  
Fulton Undergraduate Research Experience (FSE 294), Instructor: Joshua Lyon  
Designed and taught introductory lesson plans to new engineering students

## Grants and Funding

2019 — 2023 **Guaranteeing AI Robustness against Deception (GARD)**  
DARPA Research Grant  
Co-PIs: Duen Horng (Polo) Chau, Jason Martin, Cory Cornelius  
Funded: Project selected  
Contributed adversarial defense technique

- 2018 **Amazon AWS Research Grant**  
Adversarial Re-Training and Model Vaccination for Robust Deep Learning  
Co-PIs: Nilaksh Das, Haekyu Park, Duen Horng (Polo) Chau  
Funded: \$5,000 AWS cloud credits
- 2019 **Raytheon Research Fellowship**  
Extracting Knowledge For Adversarial Detection and Defense  
Funded: \$25,000
- 2018 — 2023 **NSF Graduate Research Fellowship Program (GRFP)**  
Multi-level Interdiction and Assistance Modeling for Natural Disasters  
Funded: Full tuition + \$102,000
- 2016 — 2017 **FURI Grant**  
Network Connectivity Analysis and Visualization in Large Graphs  
Funded: \$3,000

## Technology Skills

**OS:** Ubuntu, Unix Command Line, Windows

**Programming:** Python, Matlab, Java, C#, C++

**Web and Writing:** .NET Core, ASP.NET, HTML, CSS, JavaScript, D3, Bootstrap, LaTeX, Git

**Machine Learning:** Keras, TFLearn, Pytorch, Tensorflow, SciPy, Numpy, OpenCV, Pandas, Scikit-learn, NetworkX

## Service

### Reviewer

ACM SIGKDD Conference on Knowledge Discovery and Data Mining (**KDD**) 2019

International Conference on Machine Learning (**ICML**) 2019