

EDUCATION **Princeton University**, Princeton, New Jersey Sep 2014 – Present
PhD candidate in Computer Science
Information Controls Fellowship, Fellowship in Natural Sciences and Engineering

University of Virginia, Charlottesville, Virginia Aug 2009 – May 2013
B.A. in Computer Science and Mathematics, *Highest Distinction*
Echols Scholar, Intermediate Honor, Dean's List of Distinguished Students

PUBLICATIONS Birge-Lee, H., **Sun, Y.**, Edmundson, A., Rexford, J., Mittal, P. “Using BGP to Acquire Bogus TLS Certificates.” 10th Workshop on Hot Topics in Privacy Enhancing Technologies (HotPETS 2017) [Best talk award]

Sun, Y., Edmundson, A., Feamster, N., Chiang, M., Mittal, P. “Counter-RAPTOR: Safeguarding Tor Against Active Routing Attacks.” 38th IEEE Symposium on Security and Privacy (IEEE Security & Privacy 2017) [13% acceptance rate]

Sun, Y., Edmundson, A., Vanbever, L., Li, O., Rexford, J., Chiang, M., Mittal, P.. “RAPTOR: Routing Attacks on Privacy in Tor.” 24th USENIX Security Symposium (USENIX Security 2015). [15% acceptance rate]

Sun, Y., Skadron K.. “Prefix Scan and Minimum Spanning Tree with OpenCL.” University of Virginia, Dept. of Computer Science. Tech Report CS-2013-02.

Su, P., Park, B., Lee, J., **Sun, Y.** “Proof-of-Concept Study for a Roadway Reservation System: Integrated Traffic Management Approach.” Transportation Research Record: Journal of the Transportation Research Board 2381 (2013), 1-8.

**RESEARCH
EXPERIENCE**

Tempest: Temporal Dynamics in Anonymity Systems

Collaborators: Aaron Johnson, Ryan Wails, Naval Research Laboratory

Explore the impact of temporal dynamics on anonymity systems. Study multiple connections, network churn and client mobility overtime and evaluate their impacts on Tor with various relay selection algorithms, and network-level anonymity protocols such as HORNET and PHI.

* *In Submission*

Counter-RAPTOR: Safeguarding Tor Against Active Routing Attacks

*Collaborators: Anne Edmundson, Nick Feamster, Mung Chiang, Prateek Mittal
Princeton University*

Design and build countermeasures to defend against active routing attacks on Tor. We propose a new relay selection algorithm to proactively protect Tor users from being affected in an active attack, and build a live BGP monitoring system that reactively detects routing anomalies involving Tor relays in real time.

* Y. Sun, A. Edmundson, N. Feamster, M. Chiang and P. Mittal. “Counter-RAPTOR: Safeguarding Tor Against Active Routing Attacks.” *IEEE S&P 2017*.

RAPTOR: Routing Attacks on Privacy in Tor

Collaborators: Anne Edmundson, Laurent Vanbever, Oscar Li, Jennifer Rexford, Mung Chiang, Prateek Mittal, Princeton University

Present a suite of new attacks, called Raptor attacks, that can be launched by Autonomous Systems (ASes) to compromise user anonymity over the Tor network.

* Y. Sun, A. Edmundson, L. Vanbever, O. Li, M. Chiang, J. Rexford and P. Mittal. "RAPTOR: Routing Attacks on Privacy in Tor." *USENIX Security 2015*.

Using BGP to Acquire Bogus TLS Certificates

Collaborators: Henry Birge-Lee, Anne Edmundson, Jennifer Rexford, Prateek Mittal Princeton University

Explore the impact of BGP hijack and interception attacks on the domain verification process of obtaining a certificate. We demonstrate the attacks in real world, and propose two counter-measures using monitoring approaches that have low false positive rates.

* H. Birge-Lee, Y. Sun, A. Edmundson, J. Rexford and P. Mittal. "Using BGP to Acquire Bogus TLS Certificates." *HotPETs 2017*.

EpDNS: End-Point DNS Monitoring with Domain Name-Program Association for Security Analysis

Collaborators: Kangkook Jee, Lauri Korts-Parn, NEC Labs

Design and build a new end-point oriented system, called EpDNS, that uses DNS sensors at end-hosts to monitor DNS activities associated with the responsible programs. The system improves detection accuracy and has been deployed to Linux and Windows systems.

* *In Submission*

Prefix Scan and MST with OpenCL

Collaborator: Kevin Skadron, University of Virginia

Optimize parallel prefix scan and minimum spanning tree algorithms on GPU. Performance evaluation on Nvidia and AMD GPUs in comparison with CUDA and CLPP implementations.

* Y. Sun, K. Skadron. Prefix Scan and Minimum Spanning Tree with OpenCL. U.Va., Dept. of Computer Science, Technical Report CS-2013-02.

Roadway Reservation System

Collaborators: Peng Su, Byungkyu Park, Joyoung Lee, University of Virginia

Design and model roadway reservation system where two lanes of the freeway in the road network are controlled by reservation.

* P. Su, B. Park, J. Lee, Y. Sun. Proof-of-Concept Study for a Roadway Reservation System: Integrated Traffic Management Approach. Transportation Research Record: Journal of the Transportation Research Board 2381 (2013): 1-8.

Research Experiences for Undergraduates

Collaborator: Brian Parshall, University of Virginia

Literature review and study on algebraic and finite groups, group homomorphism and isomorphism, Nilpotent matrices.

* Under NSF Award Number: 1001900

WORK
EXPERIENCE

Research Intern, ICSI

May 2017 – Aug 2017

Analyze and detect large scale attacks that are launched using the Tor network.

Research Intern, NEC Labs

May 2016 – Aug 2016

Build DNS monitoring system and design detection techniques on DNS-based attacks.

Research Intern, Verisign Labs

Jun 2015 – Aug 2015

Measure and analyze DNS data from Tor exit relays and onion leakage at DNS servers.

ICF International

Full time Back-end Web Developer

Jul 2013 – Jun 2014

Summer Intern

Jun 2012 – Aug 2012

Develop Java/Grails web applications.

**ACADEMIC
HONORS &
AWARDS**

Selected Participant for French-American Doctoral Exchange Program Jun 2017

IEEE Student Travel Grant May 2017

Selected Participant for GREPSEC Workshop May 2017

Information Controls Fellowship - Senior Fellow 2015 – 2016

USENIX Security Grants for Women Aug 2015

Fellowship in Natural Sciences and Engineering, Princeton U. 2014 – 2015

Echols Scholar, University of Virginia 2010 – 2013

Dean's List of Distinguished Students, University of Virginia 2010 – 2012

ACM ICPC Honorable Mention, Mid-Atlantic Region Nov 2011

Intermediate Honor, University of Virginia Oct 2011

**INVITED
TALKS**

Exploiting routing attacks: deanonymizing Tor users and acquiring bogus certificates

Academia: ETH Zurich, hosted by Prof. Laurent Vanbever Sep 2017

Counter-RAPTOR: Safeguarding Tor Against Active Routing Attacks

Conference: IEEE S&P 2017, San Jose, CA May 2017

RAPTOR: Routing Attacks on Privacy in Tor

Conference: USENIX Security 2015, Washington D.C. Aug 2015*Academia:* University of Virginia, hosted by Prof. Dave Evans Nov 2015**SERVICES**

Reviewer for IEEE/ACM Transactions on Networking 2017

Reviewer for IEEE Transactions on Mobile Computing 2016

Reviewer for IEEE Communications Magazine 2016

Reviewer for CISS 2016

Session chair for Grace Hopper conference 2016

External reviewers: USENIX Security, CCS, NDSS

**TEACHING
EXPERIENCE***Teaching Assistant*, Princeton U., Computer Networks Spring 2017*Teaching Assistant*, Princeton U., Advanced Computer Networks Fall 2016*Instructor*, U.Va., Carnival of Mathematics Spring 2013*Teaching Assistant*, U.Va., Algorithms Fall 2012*Teaching Assistant*, U.Va., Discrete Math Spring 2012*Teaching Assistant*, U.Va., Intro to Computing 2010 – 2011