Alexander Marder, PhD

Assistant Research Scientist

Center for Applied Internet Data Analysis (CAIDA)
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RESEARCH INTERESTS:

- Increasing the security and resilience of the Internet by identifying weak points in the Internet infrastructure and connectivity
- Using data science to reveal and measure performance characteristics of Internet paths between users and popular or critical applications
- Cross-layer analysis of Internet application resilience and identifying common failure modes for distributed and replicated applications

EDUCATION:

Ph.D. University of Pennsylvania — December 2019
PhD Computer and Information Sciences
Thesis: "Sharp Snapshots of the Internet's Graph with HONE"
Advisor: Jonathan M. Smith, PhD

M.S. University of Pennsylvania — May 2014
Computer and Information Sciences

B.S. Brandeis University — May 2012
BS Computer Science
Thesis: "Course Recommender System"
Advisor: Timothy J. Hickey

GRANTS:

Computer and Information Science and Engineering CRII — May 2021 – May 2023

RESEARCH EXPERIENCE:

Assistant Research Scientist — November 2020 – Present
CAIDA / UCSD, La Jolla, California

- Designed and conducted a cross-layer measurement study to reveal the infrastructure dependencies in US residential access networks and examined the security of residential access networks to intentional physical attacks against the infrastructure (ongoing)
- Wrote and awarded NSF CRII grant funding current research to reveal router- and network-level paths between users and applications hosted in public cloud providers, and geolocate where traffic enters and exits cloud networks (ongoing)
- Trained a custom machine learning algorithm to automatically extract information from natural language that operators use to convey information about infrastructure deployments

- Developed skills to infer physical infrastructure from network-level measurements, and apply machine learning to infer network deployment characteristics

Postdoctoral Fellow September 2019 – October 2020

CAIDA / UCSD, La Jolla, California
Advisors: kc claffy and Alex C. Snoeren

- Designed and implemented a new technique to scaleably infer when two IP addresses belong to the same router
- Designed a technique to recognize when a measured path traversed a virtual network
- Developed skills to conduct new large-scale Internet measurements

Research Assistant August 2014 – August 2019

University of Pennsylvania, Philadelphia, PA
Advisor: Jonathan M. Smith

- Devised and implemented two constraint satisfaction algorithms to infer network boundaries from Internet path measurements
- Released (and continue to maintain) the latter implementation; currently used for CAIDA's semi-annual Internet Topology Data Kit dataset releases
- Developed skills to process large quantities of data, along with the skills to recognize useful information and account for misleading information

PUBLICATIONS: Peer-Reviewed

Matthew Luckie, Bradley Huffaker, **Alexander Marder**, Zachary Bischof, and kc claffy. "Learning to Extract Geographic Information from Internet Router Hostnames" Conference on emerging Networking EXperiments and Technologies (CoNEXT). 2021

Zesen Zhang, **Alexander Marder**, Ricky Mok, Bradley Huffaker, Matthew Luckie, kc claffy, and Aaron Schulman. "Inferring Regional Access Network Topologies: Methods and Applications" Internet Measurement Conference. 2021. [long]

Alexander Marder, kc claffy, Alex C. Snoeren. "Inferring Cloud Interconnections: Validation, Geolocation, and Routing Behavior" Passive and Active Measurement Conference. 2021.

Matthew Luckie, **Alexander Marder**, Marianne Fletcher, Bradley Huffaker, kc claffy. "Learning to Extract and Use ASNs in Hostnames" Internet Measurement Conference. 2020. [short]

Alexander Marder. "Alias Pruning by Path Length Estimation (APPLE)" Passive and Active Measurement Conference. 2020.

Alexander Marder, Matthew Luckie, Bradley Huffaker, kc claffy. "vrfinder: Finding Outbound Addresses in Traceroute" SIGMETRICS. 2020.

Alexander Marder, Matthew Luckie, Amogh Dhamdhere, Bradley Huffaker, kc claffy, Jonathan M. Smith. "Pushing the Boundaries with bdrmapIT: Mapping Router Ownership at Internet Scale" Internet Measurement Conference. 2018. [long]

Alexander Marder, Jonathan M. Smith. "MAP-IT: Multipass Accurate Passive Inferences from Traceroute" Internet Measurement Conference. 2016. [long]

INVITED TALKS:

Alexander Marder. "How do Clouds Use IXPs?" Euro-IX Meeting. December 2020.

TEACHING EXPERIENCE:

Mentor Fall 2019 – Spring 2020

Course: Early Research Scholars Program
Computer Science Department, University of California, San Diego

- Mentored undergraduate students as part of a course designed to increase underrepresented minority completion of the computer science major
- Helped the students conduct a research project investigating allegedly stolen IP address space from African networks
- Taught students important research and Internet data science techniques

Teaching Assistant Fall 2017 – Spring 2018

Course: Senior Project
Computer and Information Science Department, University of Pennsylvania

- Helped groups of seniors select and scope an academic yearlong project
- Met with groups regularly throughout the year to advise and assess progress
- Graded projects at the end of the year and selected groups to represent the department at the School of Engineering and Applied Sciences competition

Teaching Assistant Spring 2014

Course: Introduction to Computer Systems
Computer and Information Sciences, University of Pennsylvania

- Graded assignments and tests
- Held weekly office hours

Teaching Assistant Fall 2013

Course: Technology and Policy
Law School and School of Engineering and Applied Sciences, University of Pennsylvania

- Graded assignments for undergraduate engineering students
- Interacted with students during weekly office hours

PROFESSIONAL SERVICE:

National Science Foundation
Proposal Review Panel 2022

Program Committee
Internet Measurement Conference 2021
Passive and Active Measurement Conference 2020