

LIANJIIE CAO

<http://www.cs.purdue.edu/homes/cao62>

Purdue University, 305 N. University Street, West Lafayette, IN 47907

(765) 637-1974 ◊ cao62@purdue.edu

RESEARCH INTERESTS

Computer Networks, Distributed Systems, Cloud Computing.

EDUCATION

Purdue University August 2011 - December 2017 (Expected)
Ph.D. in Computer Science West Lafayette, IN

Advisor: Professor Sonia Fahmy

George Mason University September 2008 - August 2011
M.S. in Electrical and Computer Engineering Fairfax, VA

Advisor: Professor Brian Mark

Huazhong University of Science & Technology, September 2004 - June 2008
B.E. in Control Science and Engineering Wuhan, China

EXPERIENCE

Purdue University, Research Assistant August 2011 - Present

· **High Fidelity Network Emulation Project**

Designed a plug-in system to improve experimental fidelity of network emulation by quantifying network processing ability of physical machines, and developing “Waterfall” algorithm (based on METIS) to separate and map a network emulation experiment onto a heterogeneous cluster. This work was published on IEEE ICCCN 2017 as an invited paper.

· **Phishing and Malware Attacks Analysis Project**

Analyzed over 1 billion HTTP requests/responses on the campus network of Purdue University collected by our monitoring system to understand behavior patterns of attackers and victims, and proposed several suggestions to protect users from phishing and malware attacks. This work was published on PAM 2013.

Hewlett Packard Labs, Research Associate Intern May 2014 - May 2017

· **Elastic Resource Allocation for NFV Project**

Designed a decoupled framework to automatically detect VNF scaling events using neural network models, and make resource flexing plans by leveraging chaining relations of SFCs. This work was published on USENIX HotCloud 2017.

· **Performance Study of VNF Containerization Project**

Studied and compared performance of three VNFs running in VMs and containers, and reported guidelines for building an elastic microservice architecture for NFV deployments. This work was published and selected as best paper runner-up on IEEE NFV-SDN 2016.

· **VNF Performance Characterization Project**

Developed a framework to systematically characterize VNF performance by monitoring resource utilization and exploring performance impact of virtualization choices, and provided corresponding deployment suggestions to meet user requirements. This work was granted the best paper award on IEEE NFV-SDN 2015, incorporated by NFV BU of Hewlett Packard Enterprise into customer on-boarding solutions, demonstrated at [Mobile World Congress \(MWC\) Shanghai 2016](#) and covered by [SDxCentral](#).

Hewlett Packard Enterprise, SDN Engineering Intern May 2013 - December 2013

· Simulated OpenStack network nodes and compute nodes to test the scalability of HPE data center networking solutions.

George Mason University, Research Assistant September 2008 - August 2010

· **Master Thesis: A Rate-based Congestion Control Overlay System**

Developed a new congestion control mechanism based on single-trip delay and fuzzy logic rules for overlay system using *Click modular router*, and evaluated the system on *Emulab*.

AWARDS

- Best Paper Runner-up, IEEE NFV-SDN 2016
- Best Paper Award, IEEE NFV-SDN 2015
- Outstanding Bachelor Thesis of Hubei, China 2008

PATENTS

Puneet Sharma, **Lianjie Cao**, Vinay Saxena, “System for Elastic Resource Flexing for Network Function Virtualization,” US Patent. (To be filed)

Puneet Sharma, **Lianjie Cao**, Vinay Saxena, Vasu Sankhavaram, Badrinath Natarajan, “Determining Virtual Network Function Configurations,” US Patent. (Filed)

PUBLICATIONS

Lianjie Cao, Xiangyu Bu, Sonia Fahmy, Siyuan Cao, “Towards High Fidelity Network Emulation,” In Proceedings of IEEE International Conference on Computer Communications and Networks (ICCCN), 2017.

Lianjie Cao, Puneet Sharma, Sonia Fahmy, Vinay Saxena, “ENVI: Elastic resource flexing for Network function Virtualization,” In Proceedings of the 9th USENIX Workshop on Hot Topics in Cloud Computing (HotCloud), 2017.

Amit Sheoran, Xiangyu Bu, **Lianjie Cao**, Puneet Sharma, and Sonia Fahmy, “An Empirical Case for Container-driven Fine-grained VNF Resource Flexing,” In Proceedings of IEEE Conference on Network Function Virtualization & Software Defined Networks (NFV-SDN), 2016. **Best Paper Runner-up**

Lianjie Cao, Puneet Sharma, Sonia Fahmy, and Vinay Saxena, “NFV-VITAL: A Framework for Characterizing the Performance of Virtual Network Function,” In Proceedings of IEEE Conference on Network Function Virtualization & Software Defined Networks (NFV-SDN), 2015. **Best Paper Award**

Lianjie Cao, Thibaut Provost, and Ramana Kompella, “PhishLive: A View of Phishing and Malware Attacks from an Edge Router,” In Proceedings of the 14th International Conference on Passive and Active Measurement (PAM), 2013.

TEACHING EXPERIENCE

Teaching Assistant, George Mason University

Introduction to Engineering (ENGR 107), Digital Communications (ECE 463), Electric Circuit Analysis (ECE 280), Mobile Communication System (TCOM 606)

Instructor, George Mason University
Communication Lab (ECE 461)

PROFESSIONAL SERVICE

Technical Program Committee: IARIA INTERNET 2017, IARIA AFIN 2017

Reviewer: IEEE Sensors Journal

External Reviewer: SOSR, CoNEXT, INFOCOM

TECHNICAL SKILLS

Programming Languages: C/C++, Python, Bash, Java, Matlab, R, NS2, LaTeX, HTML

Tools: OpenStack, Open vSwitch, Mininet, Emulab