

# QIAO ZHANG

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EDUCATION	<b>University of Washington</b> Ph.D. in Computer Science and Engineering Advisor: Tom Anderson, Arvind Krishnamurthy GPA: 3.9/4.0	Seattle, WA July 2013 -
	<b>Williams College</b> B.A. with <i>summa cum laude</i> in Computer Science and Physics GPA: 3.99/4.0	Williamstown, MA June 2013
	<b>California Institute of Technology</b> Visiting student GPA: 4.0/4.0	Pasadena, CA Oct 2011 - June 2012

INTERESTS      Datacenter Networking, Distributed Systems, Machine Learning Systems

TAs              Deep Learning System (UW CSE 599G1), Operating Systems (UW CSE 451), Computer Networks (UW CSE 461)

RESEARCH      **Overt ECMP for Reliability and Performance**

Modern large-scale data center networks employ Clos topology with ECMP as the routing protocol. ECMP has a few well-known deficiencies: it does not handle the asymmetry introduced by failures in the network well; it makes fault localization difficult due to load balancing through hash functions. Our key observation is that ECMP hash functions are not random but deterministic and often can be reverse engineered by network operators. Knowledge of ECMP hash functions makes source routing in a large-scale data center network possible, enabling fine-grained fault localization as well as effective load balancing in the presence of failures. This work is in progress.

## **One Tunnel is (often) Enough**

The Internet is vulnerable to outages, black holes, hijacking and denial of service. With collaborators at UW Networking lab, we design and implement an incrementally deployable yet complete solution that allows ISPs to sell reliability and security as a service to customers sending mission-critical traffic. I implemented a fault-tolerant ISP edge network in software on commodity PCs providing TaaS API to end-hosts, and deployed and evaluated the ISP performance on VICCI research cluster. Potential customers can establish circuits and route packets reliably in an end-to-end fashion through our ISP. This work is accepted at SIGCOMM 2014.

## **A Non-invasive Tongue Machine Interface**

With collaborators at UW, I developed TongueSee, a non-intrusive tongue machine interface that can recognize a rich set of tongue gestures using electromyography signals from the surface of the skin and machine learning algorithms. I designed and tested a set of time-domain features and an anytime classification algorithm that can reliably classify six tongue gestures with an accuracy of 94.17% using data from eight EMG sensors. In addition, our preamble design achieves a low false positive probability of 0.000358 per second. This work is accepted at SIGCHI 2014.

PUBLICATIONS **Qiao Zhang**, Vincent Liu, Hongyi Zeng, Arvind Krishnamurthy. *High-Resolution Measurement of Data Center bursts*. IMC 2017.

Danyang Zhuo, **Qiao Zhang**, Xin Yang, Vincent Liu *Canaries in the network*. HotNets 2016.

Danyang Zhuo, **Qiao Zhang**, Tom Anderson, Arvind Krishnamurthy, Vincent Liu *Rack-level congestion control*. HotNets 2016.

Danyang Zhuo, **Qiao Zhang**<sup>a</sup>, Dan Ports, Arvind Krishnamurthy and Tom Anderson *Machine Fault Tolerance for Reliable Datacenter Systems*. APSYS 2014.

Simon Peter, Umar Javed, **Qiao Zhang**, Doug Woos, Tom Anderson, and Arvind Krishnamurthy. *One Tunnel is Enough*. SIGCOMM 2014.

**Qiao Zhang**, Shyam Gollokota, Ben Taskar, Rajesh Rao. *A Non-invasive Tongue Machine Interface*. CHI 2014.

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<sup>a</sup>first two authors equal in contribution

HONORS AND AWARDS	<b>Wilma Bradley Endowed Fellowship</b>	2013-2014
	<b>Phi Beta Kappa</b>	2012
	<b>National Mathematics Olympiad (Singapore) Silver Medal</b>	2008
	<b>National Physics Olympiad (Singapore) Bronze Medal</b>	2007

WORK EXPERIENCE	<b>Microsoft Research</b>	Redmond, WA
	Research Intern	June 2017 - now
	<b>Facebook</b>	Menlo Park, CA
	Research Collaborator	Oct 2016 - June 2016
	<b>Facebook</b>	Menlo Park, CA
	Software Engineering Intern on Net Systems Team	July - Oct 2016
	<b>Google</b>	Mountain View, CA
	Software Engineering Intern on Platforms Networking Team	Sept - Dec 2015
<b>Google</b>	Mountain View, CA	
Software Engineering Intern on MapReduce Team	June - August 2014	
<b>UW Computer Science and Engineering</b>	Seattle, WA	
Research Assistant	July 2013 - now	
<b>Williams College Physics Department</b>	Williamstown, MA	
Research Assistant	June - Aug 2012	

GITHUB REPOS	Deep Learning System Lab 1 on AutoDiff	<a href="https://github.com/dlsys-course/assignment1">github.com/dlsys-course/assignment1</a>
	Deep Learning System Lab 2 on GPU Executor	<a href="https://github.com/dlsys-course/assignment2">github.com/dlsys-course/assignment2</a>
	Other repos	<a href="https://github.com/zhangqiaorjc">github.com/zhangqiaorjc</a>

PROGRAMMING SKILLS	Fluent in <b>C/C++</b> , <b>Python</b> , <b>Java</b>
	Familiar with <b>C#</b> , <b>MySQL</b>