Raymond Cheng

Contact Information

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Education

University of Washington, Seattle, WA — Apr 2011 - present
Ph.D. Candidate in Computer Science — GPA: 3.84/4.00
- Thesis: *Self-Scaling Web Services in the Browser*
- Advisor: Prof. Tom Anderson and Prof. Arvind Krishnamurthy

Massachusetts Institute of Technology, Cambridge, MA — Aug 2009 - Aug 2010
M.Eng. in Electrical Engineering and Computer Science — GPA: 4.8/5.0
- Thesis: *WhanauSIP - A Secure Peer-to-Peer Communications Platform*
- Advisor: Prof. Frans Kaashoek and Dr. Chris Lesniewski-Laas

Massachusetts Institute of Technology, Cambridge, MA — Aug 2005 - Jun 2009
B.S. in Electrical Engineering and Computer Science — GPA: 4.6/5.0
B.S. in Physics

Delaware Valley High School, Milford, PA — Aug 2001 - Jun 2005
Valedictorian (class size of 377) — GPA: 4.9/4.0

Research Statement

My research interests are in distributed systems and security, with a focus on systems design and evaluation. I am interested in building novel systems that broaden the rights held by Internet users. These projects include privacy-preserving systems that give users better control over their data, and anti-censorship systems that spread digital freedom of speech to citizens around the world.

Awards and Honors

- Madrona Runner-Up Prize for Best Poster for "FreeDOM: a New Baseline for the Web" — Oct 2012
- Wissner-Slivka Graduate Fellowship — Sep 2011 - Jun 2012
- CSE544 - Best Databases Class Project — Jun 2012
- Sigma Xi Scientific Research Honor Society — May 2009 - Present
- Stokes Undergraduate Scholarship — Aug 2005 - Jun 2009

Refereed Conference Proceedings

[1] **Cheng, R.**, Hong, Ji., Kyrola, A., Miao, Y., Weng, X., Wu, M., Yang, F., Zhou, L., Zhao, F., and Chen, E. *Kineograph: Taking the Pulse of a Fast-Changing and Connected World.* Eurosys 2012: ACM SIGOPS Conference on Systems. 15.16% acceptance rate.

Refereed Workshop Publications

[2] **Cheng, R.**, Scott, W., Krishnamurthy, A., and Anderson, T. *FreeDOM: a New Baseline for the Web.* The Eleventh ACM Workshop on Hot Topics in Networks (HotNets XI). 2012. 19.17% acceptance rate.

Theses

[3] Cheng, R. *Kineograph: Taking the Pulse of a Fast-Changing and Connected World.* Advised by Lidong Zhou. University of Washington, CSE Qualifying Exam, April 2012.

[4] Cheng, R. *WhanauSIP - A Secure Peer-to-Peer Communications Platform.* Advised by Frans Kaashoek. Massachusetts Institute of Technology M.Eng. thesis, August 2010.

[5] Cheng, R. *Whanaungatanga and P2P-SIP: Sybil-Proof Distributed Hash Table Implementation and its Role in P2P-SIP Telephony.* Advised by Frans Kaashoek. Massachusetts Institute of Technology Undergraduate thesis, May 2009.

Invited Talks and Conference Presentations

[6] **FreeDOM: a New Baseline for the Web**
- HotNets XI. Redmond, WA. Oct 2012

[7] **Kineograph: Taking the Pulse of a Fast-Changing and Connected World**
- Eurosys 2012. Bern, Switzerland. Apr 2012
- Stanford MobiSocial Seminar. Palo Alto, CA. Apr 2012
- Palantir. Palo Alto, CA. May 2012

[8] **Donor Appreciation Speech**
- UW CSE Fellowship Luncheon. Seattle, WA. Apr 2012

Patents

[9] Yang, F., Zhou, L., Wu, M., Kyrola, A., **Cheng, R.**, Miao, Y., Weng, X., and Hong, J. *Platform for Continuous Graph Update and Computation.* Microsoft Research, submitted 2011.

Professional Experience

Google New York, NY
Search Quality, Michael Schueppert and Mayur Thakur Jun 2012 - Sep 2012
- Developed a new ranking algorithm, SolocoRank, that leverages social media to rank physical establishments such as restaurants and bars. When compared to the state of the art at Google, I was able to demonstrate a 50% improvement in the number of search queries that returned better results for restaurants and bars in New York City. Furthermore, SolocoRank was able to accurately predict the Zagat score (0-30 scale) of an establishment to within +/-1 point, 44% of the time. Paper currently under submission.

Microsoft Research Asia Beijing, China
System Research Group, Dr. Lidong Zhou Apr 2011 - Aug 2011
- Began the Kineograph research project at Microsoft, a continuous graph computation engine. I designed a system that could provide real-time graph analysis of social data with better freshness guarantees, such that new data from Twitter streams would be reflected in our results within 1-2 minutes. Kineograph served as a platform for other applications of interest, such as user ranking and approximate shortest paths, incrementally updating results as new data was fed into the system. Under my direction, the project opened new possibilities within the group and the team grew to include five other interns and fulltime employees. The paper was accepted into the Eurosys 2012 conference.
- Started the MSRA dance club. Taught weekly classes to interns and employees, culminating in a performance to the organization. The club continued to exist after my departure.

Pike Online Internet Service Provider Milford, PA
Megabyte Systems Nov 2001 - Aug 2005
- Built custom computers for sale as part of the hardware department.

- Worked in the technical support office, interacting with thousands of customers over the telephone to solve basic computer and dial-up Internet issues. For major issues, I also performed software and hardware repairs in person.
- Laid out the weekly local newspaper publication, the *Tri-State News*.
- Designed websites for local businesses.

Teaching Experience

UW Computer Science and Engineering — Seattle, WA
Computer Systems (CSE550) Teaching Assistant — Sep 2012 - Dec 2012
Lecturer: Arvind Krishnamurthy

UW Bioengineering Department — Seattle, WA
Neural Engineering (BIOEN498C) Teaching Assistant — Sep 2011 - Dec 2011
Lecturer: Albert Folch

Organizations

- Student Aviation Pilot — Sep 2010 - present
- ACM Student member — Oct 2011 - present
- Electronic Frontier Foundation member — Oct 2011 - present
- USENIX member — Sep 2012 - present
- UW Science and Engineering Business Association member — Sep 2011 - present
- MIT Imobilare Dance Group — Aug 2005 - Aug 2010
- MIT Ridonkulous — Dec 2009 - May 2010
- MIT Dance Troupe — Aug 2005 - May 2007
- MIT College Democrats Secretary — Aug 2005 - May 2007
- MIT Chinese Students Club — Aug 2005 - May 2006
- MIT Society of Physics Students — Aug 2005 - Aug 2010
- MIT Techfair IT Committee — Jan 2006

Service

Mentorship Program Coordinator
UW Science and Engineering Business Association (SEBA) — May 2012 - Present

- Managed the UW SEBA mentorship program, the largest science and engineering mentorship program on campus. I coordinated meetings with nearly 30 influential professionals and businessmen in the Seattle area, and facilitated discussions between mentors and over 100 student participants.

New Graduate Student Orientation Organizer
UW Computer Science and Engineering Department — Aug 2012

- Co-organized the orientation for 50 incoming PhD students in the department. The two-day event consisted of a series of talks and social events.

Imobilare Dance Group President — Aug 2005 - Aug 2010

- As president, I led the group expansion from 2 members, to over 20 dedicated performers.
- Along with a partner, we created and managed one of the largest annual freestyle dance competitions in Boston for 3 years, Breakonomics.
- Managed the largest weekly open breakdance practice session in the city.
- Choreographed over 5 pieces for performance, including an opening for a Lupe Fiasco concert.
- Taught weekly lessons to new aspiring student dancers.

MIT Dance Troupe Aug 2005 - May 2007

- Served on the executive board and as a webmaster.
- Designed a content management system from scratch for use in dancer auditions and site administration.

Block Rocks My Socks Aug 2004 - Jun 2005

- Started a student-run organization that performs peer tutoring services for advanced math and science in high school.

Programming Languages

C, C++, C#, Java, Python, Scala, Clojure, Matlab, PHP, Javascript, Scheme, Chapel, LabWindows, Visual Basic

Relevant Coursework

Systems and Networking: CSE544 Databases, CSE548 Architecture, CSE550 Computer Systems, 6.824 Distributed Systems Engineering, 6.828 Operating Systems Engineering, 6.829 Computer Networks, 6.033 Computer Systems Engineering, 6.004 Computation Structures
Applications: CSE546 Machine Learning, 6.833 Human Intelligence Enterprise, CSE510 Human-Computer Interaction, 6.034 Artificial Intelligence
Theory: 6.854 Advanced Algorithms
Programming Systems: 6.001 Structure and Interpretation of Computer Programs
Electrical Engineering: 6.002 Circuits and Electronics, 6.003 Signals and Systems, 6.111 Modern Optics Laboratory, 6.012 Microelectronics
Math: 18.03 Differential Equations, 18.06 Linear Algebra, 18.440 Probability
Physics: 8.03 Vibrations and Waves, 8.033 Relativity, 8.04 Quantum Mechanics, 8.044 Statistical Physics, 8.07 Electromagnetism II, 8.13 Experimental Physics I,

References

Dr. Tom Anderson (tom@cs.washington.edu)

- Robert E. Dinning Professor, Computer Science and Engineering, University of Washington
- ⋆ *Dr. Anderson is my current PhD co-advisor*

Dr. Arvind Krishnamurthy (arvind@cs.washington.edu)

- Associate Professor, Computer Science and Engineering, University of Washington
- ⋆ *Dr. Krishnamurthy is my current PhD co-advisor*

Dr. Lidong Zhou (lidongz@microsoft.com)

- Principal Researcher, System Research Group, Microsoft Research
- ⋆ *Dr. Zhou supervised my Kineograph at MSRA in 2011.*

Additional references available upon request

Projects

Independent

Raymondcheng.net Jun 2007 - present

- Created a personal website to reflect my preferred computing environment, black and white terminals. Personal content is served using through virtual files. The website also contains the ability to issue web commands, much like Mozilla Ubiquity.

General Rotors Aug 2008 - Dec 2008

- Designed an application streaming protocol for Python applications.

Pokerbot Dec 2007 - Jan 2008

- Implemented a bot to play online poker. The bot was designed to read screens and use the mouse pointer to emulate a human's behavior without detection. It successfully won fake money in online tables, but was never tested with real currency.

Private Tutor Sep 2011 - present

Tastybit.es Jan 2012 - present

University of Washington Seattle, Washington

FreeDOM, Prof. Tom Anderson and Prof. Arvind Krishnamurthy Apr 2012 - present

- Proposed a next generation P2P operating system in the browser. The system is designed to make it easy for web developers to build distributed P2P web services that are self-scaling. The paper was accepted into the 2012 HotNets XI workshop.

Unblock, Prof. Tom Anderson and Prof. Arvind Krishnamurthy Sept 2011 - present

- Built a network simulator for the Unblock anti-censorship system, a novel social routing overlay with stronger blocking-resistant properties, compared to existing systems. My simulator evaluated the protocol at scale against active censor adversaries and network churn. Paper currently under submission.

CSE544, Prof. Dan Suciu Apr 2012 - Jun 2012

- Built WebDB - a distributed P2P database that runs entirely in the browser.
- Best class project award in CSE544 - Databases

CSE510 , Prof. James Fogarty, Apr 2012 - Jun 2012

- Built HistViz, a Chrome extension for visualizing browser history in a rich graph based on the current tab's context

CSE546, Prof. Luke Zettlemoyer Jan 2012 - Mar 2012

- Used SVM classifiers to deanonymize Twitter data. We showed that an anonymous tweet could be tagged with a specific user handle out of a group of 10 users with less than 15% testing error.

CSE548, Prof. Mark Oskin Sep 2011 - Dec 2011

- Designed a side channel attack to communicate between virtual machines on a single host by timing operations on the processor's branch predictor. This technique was implemented and compared to known side channel attacks on shared caches.
- Developed Porcupine, an x86 instruction fuzzer that generates structured random instruction sequences with the goal to detect processor bugs on Intel chips

Massachusetts Institute of Technology Cambridge, MA

PDOS Group (CSAIL), Prof. Frans Kaashoek Jan 2009 - Aug 2010

- Developed WhanauSIP, a P2P communications protocol that is resilient to censorship, eavesdropping, and forgery for my M.Eng. thesis. WhanauSIP used a Sybil-proof distributed hash table to achieve its security guarantees. The protocol implementation was globally tested using the PlanetLab framework.

Genesis Group (CSAIL), Prof. Patrick Winston Jan 2008 - May 2008

- Created a representation expert system in the Gauntlet AI system that understands force relationships between entities in natural language stories.
- Designed an expert system in the Gauntlet AI system that can store stories in a representation that supports quick recollection and unsupervised discovery of abstract concepts

Optics & Quantum Electronics (RLE), Prof. Franz Kaertner Jan 2007 - Dec 2007

- Aided in the construction and performance measurements of a high-precision femtosecond optical pulse synchronization system

Tangible Media Group (Media Lab), Prof. Richard Fletcher Sep 2005 - Feb 2007

- Designed the embedded circuit board and firmware for a self-sufficient inkless printer, powered by solar power and photochromic paper for use in third-world nations.

6.854, Prof. David Karger Aug 2009 - Dec 2009

- Developed a distributed splay tree implementation, optimized for balancing network load in a cluster.

6.829, Prof. Hari Balakrishnan Jan 2008 - May 2008

- Developed an open source content distribution network software package that can be deployed on a private infrastructure, including software for DNS redirection and anycast.

Delaware Valley High School Milford, PA

Mr. Steve Rhule Aug 2004 - Jun 2005

- Studied the properties of sonoluminescence, the ability to convert acoustic pressure into electromagnetic energy. Data was measured on a homemade apparatus.
- Developed a program to optimize solutions to the traveling salesman problem using genetic algorithms.

Mr. Kevin DeVizia *Aug 2003 - Jun 2004*

- Researched public-key cryptography, specifically the RSA Algorithm, and developed a new cryptographic scheme based on geometry. This research presentation was awarded the top state award at the Pennsylvania Junior Academy of Science.

Mr. Kevin DeVizia *Aug 2002 - Jun 2003*

- Researched non-zero game theory and applied its theories to predict the Iraq War. This research was awarded the top regional prize at the Northeast conference of the Pennsylvania Junior Academy of Science.
- Tested the effectiveness of anti-reflective polyelectrolyte multilayers on glass tubes in collaboration with MIT laboratories.

Press

Congratulations to the winners of the Madrona Prize and the Peoples Choice Awards!
http://news.cs.washington.edu/2012/10/24/congratulations-to-the-winners-of-the-madrona-prize-and-the-peoples-choice-awards/