HYOJOON (JOON) KIM

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RESEARCH INTEREST

My research focuses on making computer networks easier to monitor, understand, troubleshoot, and configure. I enjoy designing fast and accurate mechanisms that analyze real-world traffic and extract useful information for network practitioners. I am passionate about designing and implementing better tools and systems for next-generation applications and networks.

EDUCATION

Georgia Institute of Technology, Atlanta, GA **Aug. 2015**
Ph.D., Computer Science
Thesis: *Facilitating Dynamic Network Control with Software-Defined Networking*
Advisor: Dr. Nick Feamster

Georgia Institute of Technology, Atlanta, GA **May 2010**
M.S., Computer Science
Master Project: *Resonance: Dynamic Access Control for Enterprise Networks*
Advisor: Dr. Nick Feamster

University of Wisconsin-Madison, Madison, WI **Aug. 2005**
B.S., Computer Science

WORK EXPERIENCE

Princeton University, Princeton, NJ **Jun. 2015 – Present**
Associate Research Scholar, Department of Computer Science Apr. 2020 – Present

- Research projects on measurement, security, and programmable networks [2, 3, 4, 5, 6, 7, 13, 14, 15, 16, 17]

Cyber Infrastructure Engineer, Princeton Institute for Computational Science and Engineering Jun. 2015 – Present

- Key member of the campus-wide network modernization project at Princeton
- Design and deployment of software-defined networking applications on the campus network

Hewlett-Packard Research Labs, Palo Alto, CA **Aug. 2014 – Jan. 2015 (part-time)**
Research Intern, Networking and Mobility Group **Jan. 2014 – May 2014, May 2012 – Aug. 2012**

- Design and implementation of a fast failover system in software-defined networks [19]

Future Systems, Inc., Seoul, South Korea **Sep. 2005 – Apr. 2008**
Research Engineer, Research & Development Division

- Development and maintenance of company's Intrusion Prevention System (IPS)
- Research and development of High-Availability function with VRRP protocol

RESEARCH PROPOSALS AND GRANTS

Tools for Programming Distributed Data-plane Measurements

- https://www.nsf.gov/awardsearch/showAward?AWD_ID=2223515
- Sponsor: National Science Foundation
- Principal Investigator(s): David Walker (PI), **Hyojoon Kim (Co-PI)**, Jennifer Rexford (Co-PI)
- Total Award Amount: $600,000
- Start and End Date: September 1, 2022 – August 31, 2024

PUBLICATIONS

Google Scholar link:
https://scholar.google.com/citations?user=DUEglv4AAAAJ&hl=en

Conferences and Journals

[1] Liang Wang, **Hyojoon Kim**, Prateek Mittal, and Jennifer Rexford. "RAVEN: Stateless Rapid IP Address Variation for Enterprise Networks". In: *Privacy Enhancing Technologies Symposium (PETS)*. 2023.

[2] Sherry Bai, **Hyojoon Kim**, and Jennifer Rexford. "Passive OS Fingerprinting on Commodity Switches". In: ***IEEE International Conference on Network Softwarization (NetSoft)***. 2022.

[3] Oliver Michel, Satadal Sengupta, **Hyojoon Kim**, Ravi Netravali, and Jennifer Rexford. "Enabling Passive Measurement of Zoom Performance in Production Networks". In: ***ACM Internet Measurement Conference (IMC)***. 2022.

[4] Satadal Sengupta, **Hyojoon Kim**, and Jennifer Rexford. "Continuous In-network Round-trip Time Monitoring". In: ***ACM SIGCOMM***. 2022.

[5] Francesco Bronzino, Paul Schmitt, Sara Ayoubi, **Hyojoon Kim**, Renata Teixeira, and Nick Feamster. "Traffic Refinery: Cost-Aware Data Representation for Machine Learning on Network Traffic". In: ***ACM SIGMETRICS***. 2021.

[6] **Hyojoon Kim**, Xiaoqi Chen, Jack Brassil, and Jennifer Rexford. "Experience-Driven Research on Programmable Networks". In: ***ACM SIGCOMM Computer Communication Review (CCR)***. 2021.

[7] Jason Kim, **Hyojoon Kim**, and Jennifer Rexford. "Analyzing Traffic by Domain Name in the Data Plane". In: ***ACM Symposium on SDN Research (SOSR)***. 2021.

[8] Marshini Chetty, **Hyojoon Kim**, Srikanth Sundaresan, Sam Burnett, Nick Feamster, and W Keith Edwards. "uCap: An Internet Data Management Tool For The Home". In: ***ACM CHI***. 2015.

[9] **Hyojoon Kim**, Joshua Reich, Arpit Gupta, Muhammad Shahbaz, Nick Feamster, and Russ Clark. "Kinetic: Verifiable Dynamic Network Control". In: ***USENIX NSDI***. 2015.

[10] Sarthak Grover, Mi Seon Park, Srikanth Sundaresan, Sam Burnett, **Hyojoon Kim**, Bharath Ravi, and Nick Feamster. "Peeking Behind the NAT: An Empirical Study of Home Networks". In: ***ACM Internet Measurement Conference (IMC)***. 2013.

[11] **Hyojoon Kim** and Nick Feamster. "Improving Network Management with Software Defined Networking". In: ***IEEE Communications Magazine***. 2013.

[12] **Hyojoon Kim**, Theophilus Benson, Aditya Akella, and Nick Feamster. "The Evolution of Network Configuration: A Tale of Two Campuses". In: ***ACM Internet Measurement Conference (IMC)***. 2011.

Workshops

[13] Satadal Sengupta, **Hyojoon Kim**, and Jennifer Rexford. "Fine-Grained RTT Monitoring Inside the Network". In: ***IETF Internet Architecture Board Workshop: Measuring Network Quality for End-Users***. 2021.

[14] Liang Wang, **Hyojoon Kim**, Prateek Mittal, and Jennifer Rexford. "Programmable in-network obfuscation of DNS traffic". In: *NDSS: DNS Privacy Workshop*. 2021.

[15] Xiaoqi Chen, **Hyojoon Kim**, Javed M Aman, Willie Chang, Mack Lee, and Jennifer Rexford. "Measuring TCP Round-Trip Time in the Data Plane". In: ***ACM SIGCOMM Workshop on Secure Programmable Network Infrastructure (SPIN)***. 2020.

[16] Xiaoqi Chen and **Hyojoon Kim**. "Measuring Queues in Campus Network via Link Tapping". In: ***Stanford University Workshop on Buffer Sizing***. 2019.

[17] **Hyojoon Kim** and Arpit Gupta. "ONTAS: Flexible and Scalable Online Network Traffic Anonymization System". In: ***ACM SIGCOMM Workshop on Network Meets AI & ML (NetAI)***. 2019.

[18] Andreas Voellmy, **Hyojoon Kim**, and Nick Feamster. "Procera: A Language for High-Level Reactive Network Control". In: ***ACM Hot Topics in Software Defined Networks (HotSDN)***. 2012.

Posters & Demos

[19] **Hyojoon Kim**, Mike Schlansker, Jose Renato Santos, Jean Tourrilhes, Yoshio Turner, and Nick Feamster. "CORONET: Fault tolerance for Software Defined Networks". In: ***IEEE International Conference on Network Protocols (ICNP)***. 2012.

[20] Theophilus Benson, **Hyojoon Kim**, Aditya Akella, and Nick Feamster. "Network Configuration Analysis". In: ***USENIX NSDI***. 2011.

[21] **Hyojoon Kim**, Srikanth Sundaresan, Marshini Chetty, Nick Feamster, and W Keith Edwards. "Communicating with Caps: Managing Usage Caps in Home Networks". In: ***ACM SIGCOMM***. 2011.

[22] **Hyojoon Kim**, Ankur Nayak, Samantha Lo, Tim Upthegrove, Nick Feamster, and Russ Clark. "OpenFlow Campus Trials: Resonance". In: ***The 7th GENI Engineering Conference (GEC7)***. 2010.

Miscellaneous

[23] Yong-Beom Park, **Hyojoon Kim**, Han-Jun Lee, Suk-Ho Baek, Il-Youp Kwak, and Seong Hwan Kim. "The Clinical Application of Machine Learning Models for Risk Analysis of Ramp Lesions in Anterior Cruciate Ligament Injuries". In: ***The American Journal of Sports Medicine***. 2022.

[24] Chul-Won Ha, Seong Hwan Kim, Dong-Hoon Lee, **Hyojoon Kim**, and Yong-Beom Park. "Predictive Validity of Radiographic Signs of Complete Discoid Lateral Meniscus in Children using Machine Learning Techniques". In: ***Journal of Orthopaedic Research®***. 2020.

TEACHING AND MENTORING EXPERIENCE

Teaching

- **Instructor: Data Storage & Transfer: Basics and Best Practices**
  Research Computing mini course (2 hours), Princeton University
  Mar. 2017, Oct. 2017, Feb. 2018, Jan. 2020, Oct. 2020, Nov. 2021, Jan. 2022
- **Teaching Assistant: Software Defined Networking (by Professor Nick Feamster)**
  Massive Open Online Courses (MOOC). Coursera. 2014

Student Mentoring/Advising

- Undergrad research and thesis (Princeton): Sherry Bai (2019), Jason Kim (2020-2021), Daniel Jubas (2020-2021)
  - Led to two conference publications [2, 7]
- Ph.D. students (Princeton): Satadal Sengupta (2019 - present), Mengying Pan (2020 - present)
  - Led to two conference publications [3, 4]

INVITED TALKS

Detecting Nation-State Routing Attacks with Network Telemetry

- Research Experience for Undergraduates (REU) Seminar. Intel/Princeton University. July 2022

Keynote Speech: Programmability in My Toolbox

- IEEE INFOCOM Computer and Networking Experimental Research using Testbeds (CNERT) Workshop. May 2022

Princeton P4 Campus

- The Programmable Switches Workshop. University of South Carolina. February 2022
- The Network Programming Initiative. May 2020.
- The Cyber Infrastructure Engineering Lunch & Learn Series. Energy Sciences Network (ESnet). February 2020

Software-Defined Border Router on Campus

- The Cyber Infrastructure Engineering Lunch & Learn Series. Host: Energy Sciences Network (ESnet). February 2020
- The 27th Korean American Scientists and Engineers Association Northeast Regional Conference. March 2018
- Internet2 Technology Exchange. October 2017

Kinetic: Verifiable Dynamic Network Control

- USENIX Networked Systems Design and Implementation (NSDI). May 2015
- North American Network Operators' Group (NANOG) 62. October 2014

The Evolution of Network Configuration: A Tale of Two Campuses

- ACM Internet Measurement Conference (IMC), November 2011
- Internet2 Fall Member Meeting. November 2010

PROFESSIONAL SERVICES

Program Committee

- Euro P4, 2022
- ACM Symposium on SDN Research (SOSR), 2021, 2022
- ACM/IEEE Symposium on Architectures for Networking and Communications Systems (ANCS), 2021

External Reviewer and Journal Review

- IEEE INFOCOM, IEEE/ACM Transactions on Networking (TON), ACM SIGCOMM Computer Communication Review (CCR), ACM Computing Surveys, IEEE Communcations Magazine, IEEE Communcations Letters

Organizing and Leadership Roles

- **Organizer**, Open Networking Foundation NG-SDN Tutorial Workshop at Princeton, 2019
- **President**, Georgia Tech Computer Science Korean Student Association, 2011–2012

REFERENCES

Dr. Nick Feamster
Neubauer Professor
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