Susmit Shannigrahi

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Research Interests	Internet Architectures, Distributed Systems, Data Science for Networking, Large Scale Content Delivery, 5G Mobile Networks, Edge Computing, and IoT

Education

Colorado State University
Present. **Ph.D. Candidate** in *Computer Science*,
Dissertation: **The Future of Networking is the Future of Large Data**
Expected Graduation - Fall 2018
Committee chair: Prof. Christos Papadopoulos

2013. Master of *Computer Science*

Jadavpur University
2009. Master of Science in *Computer Science*
Thesis: **Fast BGP Convergence Following Link/Router Failure**
Thesis Supervisor: Prof. Swapan Kumar Ray

West Bengal University of Technology
2007. Bachelor of Computer Science and Engineering

Appointments

2013-Present. Research Assistant, Colorado State University, CO
- ▶ Investigated architectural shortcomings of existing data management systems and TCP/IP networks.
- ▶ Addressed these problems using novel network protocols such as Information Centric Network (ICN) and Software Defined Networking (SDN).
- ▶ Encouraged early adoption of ICN in scientific communities; developed software has been deployed at CERN, CalTech, CSU, Clemson, LBNL, and other institutes

2017. Research Intern, CableLabs, Louisville, CO
- ▶ Investigated the design challenges of a future 5G mobile network.
- ▶ Used Named Data Networking (NDN) to build a next-generation mobility plane.
- ▶ Published a research paper demonstrating novel features such as lossless handover, simultaneous use of WiFi and 5G links, and improved application throughput.

2013. Research Scientist Intern, Lawrence Berkeley National Lab, Berkeley, CA
- ▶ Investigated the limitations of the TCP/IP network architecture for high speed, high volume scientific data transport.

▶ Developed a bit-torrent like data transfer application using ICN to address these limitations.
▶ Received the internal "most innovative work" award.

2011-2016. System Administrator, NetSec Lab, Colorado State University, CO
2010-2013 Teaching Assistant, Colorado State University, CO
2009. Programmer Analyst, Cognizant Technology Solutions, Kolkata, India
2008. Teaching Assistant, Data Communication and Networking Lab,
        Jadavpur University, Kolkata, India

Publications

Refereed Articles

1. S. Shannigrahi, C. Fan, G. White, **Bridging the ICN Deployment Gap with IPoC: An IP-over-ICN protocol for 5G Networks**. ACM SIGCOMM 2018 Workshop on Networking for Emerging Applications and Technologies (NEAT), 2018

2. H. Lim, A. Ni, D. Kim, Y. Ko, S. Shannigrahi, C. Papadopoulos, **Ndn construction for big science: Lessons learned from establishing a testbed**. Accepted for publication in IEEE Network, 2018

3. S. Shannigrahi, C. Fan, C. Papadopoulos, **SCARI: A Strategic Caching and Reservation Protocol for ICN**. Under review, 2018

4. S. Shannigrahi, C. Fan, C. Papadopoulos, **NDN-SCI - Building a Large Scientific Data Management Framework using Named Data Networking**. Under review, 2018

5. S. Shannigrahi, C. Fan, C. Papadopoulos, **Named Data Networking Strategies for Improving Large Scientific Data Transfers**. IEEE ICC 2018 Workshop on Information-Centric Networking Solutions for Real-World Applications (ICN-SRA), 2018

6. S. Shannigrahi, C. Fan, C. Papadopoulos, **Request aggregation, caching, and forwarding strategies for improving large climate data distribution with NDN: a case study**. Proceedings of the 4th ACM Conference on Information-Centric Networking, 2017

7. S. Shannigrahi, C. Fan, S. DiBenedetto, C. Olschanowsky, C. Papadopoulos, H. Newman, **Managing scientific data with named data networking**. Proceedings of the Fifth International Workshop on Network-Aware Data Management (NDM), 2015

8. S. Shannigrahi, C. Papadopoulos, E. Yeh, H. Newman, A. Jerzy Barczyk, R. Liu, A. Sim, A. Mughal, I. Monga, J. Vlimant, o., **Named Data Networking in Climate Research and HEP Applications**. Journal of Physics: Conference Series, IOP Publishing, 2015

9. C. Olschanowski, S. Shannigrahi, C. Papadopoulos, **Supporting climate research using named data networking**. Local & Metropolitan Area Networks (LANMAN), IEEE 20th International Workshop on, 2014

10. S. Kumar Ray, S. Shannigrahi, **Fast BGP convergence following link/router failure**. International Conference on Distributed Computing and Networking, 2010

In Preparation

1. Susmit Shannigrahi, Chengyu Fan, Christos Papadopoulos, **What's in a Name? Design Trade-offs of Content Naming in ICN Networks**

2. Susmit Shannigrahi, Alex Feltus, Christos Papadopoulos, **Integrating Information Centric Networking with the iRods Genomics Data Management System**

Extended Abstracts, Technical Reports and Internet-Drafts

1. A Afanasyev, Susmit Shannigrahi, and the NFD team, **NFD Developer's Guide**, NDN Technical Report, 2018

2. Greg White, Susmit Shannigrahi, Chengyu Fan, **Internet Protocol Tunneling over Content Centric Mobile Networks**, ICNRG Internet Draft, 2017

3. Susmit Shannigrahi, **Solving Large Scientific Data Management using Named Data Networking**, CSU Graduate Student Showcase, Fort Collins, CO, 2017

4. Susmit Shannigrahi, **SciNet: A Secure Science Data Infrastructure with Named Data Networking**, NSF Data Science Workshop, Seattle, WA, 2016

5. Susmit Shannigrahi, **Named Data Networking for Large Scientific Data Management**, Seattle, NSF Data Science Workshop, WA, 2015

6. Susmit Shannigrahi, **Evaluating Named Data Networking for Large Scientific Data**, Poster, ACM student research competition, Supercomputing, 2013

7. Susmit Shannigrahi, **Evaluating Named Data Networking for Large Scientific Data**, Poster, LBNL, CA, 2013

8. Susmit Shannigrahi, Daniel Massey, Christos Papadopoulos, **Traceroute for Named Data Networking**, NDN Technical Report, 2013

Thesis

1. Susmit Shannigrahi, **Fast BGP Convergence Following Link/Router Failure**, Masters Thesis, Jadavpur University, Kolkata, India, 2010

Grants

1. Cisco URP, "Creating a CICN based software infrastructure for distributed Genomics data management", Pending, PI: Craig Partridge, Co-PI: Susmit Shannigrahi

2. Co-author, NSF grant on "Supporting Climate Modeling Over Named Data Networking (NDN)". (Total award: $1M., Funded Over 2013-2016, PI: Christos Papadopoulos, Co-PI: Cathie Olschanowsky and David Randall.)

Awards

Awards

1. Travel award to participate in NSF Data Science Workshop, UW, Seattle, 2016

2. Travel award to participate in NSF Data Science Workshop, UW, Seattle, 2015

3. NSF travel award for attending ICNP, 2013

4. Best Innovative Poster, NDN for Scientific Data, LBNL, 2013

5. Post Graduate Scholarship from Ministry of Human Resources Development (MHRD), Government of India, 2007

Panels

1. S. Shannigrahi, L. Zhang, A. Afanasyev, T.Hasegawa, A. Grieco, T. Leng, "Real-world ICN deployments - perspective and challenges" - Kansas City, KS, ICC 2018

Workshops

1. 'NSF sponsored graduate data science workshop", UW, Seattle, WA, 2016

2. "NSF sponsored graduate data science workshop", UW, Seattle, WA, 2015

3. "Operating Innovative Networks", LBNL, Berkeley, CA, 2014

Presentations

1. Susmit Shannigrahi, **Bridging the ICN Deployment Gap with IPoC: An IP-over-ICN protocol for 5G Networks**, SIGCOMM, Budapest, Hungary, 2018

2. Susmit Shannigrahi, **NDN for Data Intensive Science - SANDIE**, NDNComm, NIST, Maryland, 2018

3. Susmit Shannigrahi, **Performance Evaluation of Named Data Networking Forwarding Daemon (NFD)**, Online Seminar, 2018

4. Susmit Shannigrahi, **NDN-Android**, ICN 2017, Berlin, DE, 2017

5. Susmit Shannigrahi, **Reqest Aggregation, Caching, and Forwarding Strategies for Improving Large Climate Data Distribution with NDN: A Case Study**, ICN 2017, Berlin, DE, 2017

6. Susmit Shannigrahi, Chengyu Fan, Christos Papadopoulos, **Named Data Networking in Scientific Applications**, Memphis, TN, 2017

7. Susmit Shannigrahi, **Revisiting Traceroute for NDN**, Online Seminar, 2017

8. Susmit Shannigrahi, **Applying NDN to large scientific data**, Online Seminar, 2016

9. Susmit Shannigrahi, **Scientific Data Applications in NDN**, Online Seminar, 2016

10. Susmit Shannigrahi, Chengyu Fan, Steve DiBenedetto, Catherine Olschanowsky and Christos Papadopoulos, **Supporting Scientific Applications with NDN**, Denver, CO, 2015

11. Susmit Shannigrahi, Christos Papadopoulos, **Managing Scientific Data with Named Data Networking** , Denver, CO, 2015

12. Susmit Shannigrahi, Chengyu Fan, **NDN for Scientific Data Applications**, Online Seminar, 2015

13. Susmit Shannigrahi, **Managing Scientific Data with NDN**, UCLA, CA, 2015

14. Susmit Shannigrahi, Christos Papadopoulos, **Supporting Climate Applications over Named Data Networking (NDN)**, NOAA, Boulder, CO, 2014

15. Susmit Shannigrahi, Christos Papadopoulos, **NDN-fuse**, Denver, CO, 2014

16. Susmit Shannigrahi, Christos Papadopoulos **NDN-atmos**, CSU, Fort Collins, CO, 2014

17. Susmit Shannigrahi, Steve DiBenedetto, **NDN for Scientific Data**, UCLA, CA, 2013

18. Susmit Shannigrahi, Christos Papadopoulos **NDN-traceroute**, UCLA, CA, 2012

19. Susmit Shannigrahi, Christos Papadopoulos **Benefit of CCN for large data**, UCLA, CA, 2012

20. Susmit Shannigrahi, Daniel Massey, Christos Papadopoulos, **Benefit of CCN for large data**, Boulder, CO, 2012

21. Susmit Shannigrahi, Fedora Medical Spin: In search of a comprehensive solution for the healthcare community, Bangalore, India, 2010

22. Susmit Shannigrahi, Redrawing and rewriting the Fedora Distribution process, Bangalore, India, 2009

Teaching and Mentoring

Courses Taught
2013. Teaching Assistant for CS370, "Operating Systems", 42 local students
2012. Teaching Assistant for CS470DL, "Computer Architecture", 10 online/remote students
2012. Teaching Assistant for CT320, "Network and System Administration", 30 students
2012 . Designed Assignments for Graduate Students, Using Named Data Networking over GENI, CSU and Purdue University
2011. Teaching Assistant for CS451, "Operating Systems", 66 local students
2011. Teaching Assistant for CS451DL, "Operating Systems", 20 online/remote students
2010. Teaching Assistant for CS155/156/157 , "Introduction to Unix and C Programming", 90 local students

Guest Lectures
2018. Recent advances in Named Data Networking, CS557, "Advanced Networking", Colorado State University
2018. Named Data Networking, CS557, "Advanced Networking", Colorado State University
2017. Named Data Networking and Other topics, CS557, "Advanced Networking", Colorado State University
2017. Named Data Networking, CS457, "Computer Networks", Colorado State University
2016. Named Data Networking, CS457, "Computer Networks", Colorado State University
2016. Several Lectures in CS557, "Advanced Networking", Colorado State University
2014. Several Lectures in CS557, "Advanced Networking", Colorado State University
2013. Named Data Networking in CS457, "Computer Networks", Colorado State University
2013. Several Lectures in CS370, "Operating Systems", Colorado State University
2011. Several Lectures in CS451, "Operating System", Colorado State University

Student Mentoring
2011. Ankur Sinha, Google Summer of Code, 2011
2015-2018. Tyler Scott (B.S. Student), Andres Calderon Jaramillo(M.S. Student)

Software Projects

Software Projects

- ▶ **NDN-SCI** - https://github.com/named-data/ndn-atmos - A NDN based Scientific Data Management Framework
- ▶ **IPoC** - https://github.com/named-data/IPoC - An IP over ICN protocol for 5G mobile networks
- ▶ **NFD** - https://github.com/named-data/NFD - The Named Data Networking forwarding daemon (NFD)
- ▶ **ndn-cxx** - https://github.com/named-data/ndn-cxx - A c++ library that implements the Named Data Networking primitives
- ▶ **SANDIE** - https://github.com/cmscaltech/sandie-ndn - SDN assisted NDN for Data Intensive Science

Evidence of Service/ Outreach

Academic Service

2017. Technical Program Committee Member,"NOM: Named-Oriented Mobility", INFO-COM 2017

2017. Technical Program Committee Member, Demos and Posters tracks, ACM ICN 2017

Workshop Facilitation

2017. Tutorial: Running IoT Applications over ICN, ICN 2017, Berlin, DE

2017. NDN Hackathon, University of Memphis, Memphis, TN

2016. NDN Retreat and Hackathon, CSU, Fort Collins, CO

2016. NDN Hackathon, UCSD, La Jolla, CA

Conference and Journal Reviewer

IEEE/ACM Transactions on Networking, ACM ICN, IFIP-Networking, INFOCOM-NOM, ICNP, INFOCOM, Computer Communication Review, COMSOC Journal, IEEE Future Generation Computer Systems, Transactions on Services Computing, Caching for Communication Systems and Networks.

Other Activities

Selected Professional and Non-profit activities

2011-2016. System Administrator, Network Security Lab, Colorado State University

2008-2009. System Administrator, Data Communication and Networking Lab, Jadavpur University, Kolkata, India

2007-2009. Fedora Mirror Manager, WBUT, Kolkata, India

2009-2012. Founder and contributor, Fedora Medical Special Interest group

2009-2011. Fedora Ambassadors Steering Committee Member, The Fedora Project

2005-2010. Fedora Ambassador, mentor, Fedora Freemedia leader, The Fedora Project

Non-academic articles

2009. Save Bandwidth by Setting Up a Fedora Mirror, Open Source For You Magazine