DEEPAK NADIG

Ph.D. Candidate, IEEE WCP®
Dept. of Comupter Science & Engineering
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1 Contact Information

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2 Research Interests

Softwarized Networks (SDN/NFV/Programmable data planes), Cybersecurity, IoT, Data-Intensive Science, AI/ML Applications to Networking, Edge/Cloud Computing, Big Data Analytics and Smart Agriculture.

3 Education

University of Nebraska-Lincoln, Lincoln, Nebraska, USA
Ph.D., Computer Engineering−Computer Science, (May 2021, Expected)
- Dissertation Topic: Application-awareness and SDN
- Advisor: Dr. Byrav Ramamurthy
- Committee: Dr. Lisong Xu, Dr. Mehmet Can Vuran, Dr. Yi Qian

Visvesvaraya Technological University (R.V. College of Engineering), India
M.Tech., Digital Communication Engineering, 2007
- First Class with Distinction
- Thesis: Design and Deployment of DTN Architectures and Protocols for Interplanetary Communication Systems
- Advisor: Dr. A.G. Ananth

Visvesvaraya Technological University (Kalpataru Institute of Technology), India
B.E., Electronics & Communication Engineering, 2004

4 Honors and Awards

- **Best-In-Session Paper Award**, 2019 IEEE INFOCOM Conference, Paris, France, 2019.
- **Fellow, 2019 Milton E. Mohr Awards Program**, College of Engineering, University of Nebraska-Lincoln, Nebraska, USA, 2019.
- **Outstanding Graduate Student Research Award (2018 - 2019)**, Dept. of CSE, University of Nebraska-Lincoln, Nebraska, USA, 2019.
- **2019 College of Engineering Graduate Student Conference Travel Grant Recipient**, College of Engineering, University of Nebraska-Lincoln, USA, 2019.

- **Fellow, Preparing Future Faculty (PFF) Program**, Graduate Studies, University of Nebraska-Lincoln, USA, 2018 – 2019.
- **NSF Student Travel Grant Recipient (2017 – 2019)**, To participate in the ACM Intl. Workshop on Security in Software Defined Networks & Network Function Virtualization
- **Best Paper Award**, Received the best paper award at the *2017 IEEE ANTS*, Conference (Acceptance rate: 30%), Odisha, India, 2017.
- **Graduate Research Assistantship**, January 2016 to present, Dept. of CSE, University of Nebraska-Lincoln, Nebraska, USA, 2016.
- **NSF GENI/GEC24 Travel Grant Recipient**, March 8–9, 2016, Arizona State University, Tempe, Arizona, USA, 2016.
- **Graduate Teaching Assistantship**, August–December 2015, Dept. of CSE, University of Nebraska-Lincoln, Nebraska, USA, 2015.
- **Certificate of Merit**, Ranked 1/18 in the Master's Program, R.V College of Engineering, Bangalore, India, 2007.
- **Certificate of Excellence**, For work done as a Research Intern at Indian Space Research Organization (ISRO), Bangalore, India, 2007.
- **Best Student Paper Award**, Emerging Trends in Wireless Networks, 14th Annual Symposium, IEEE Bangalore Section, Bangalore, India, 2005.
- **Best Student Paper Award**, KSHITIJ' 2003 – National Symposium, IEEE Student Branch, BEC, Karnataka, India, 2003.
- **Best Student Paper Award**, SYRITZ" – A National Level Symposium, NICE, TamilNadu, India, 2003.
- **Best Student Paper Award**, ISTE Student Chapter – A State Level Symposium, KIT, Karnataka, India, 2003.

5 Professional Experience

University of Nebraska-Lincoln, USA **Jan 2016 – Present**
Research Assistant, Dept. of Computer Science & Engineering
- Currently working on NSF-Funded Project on Intelligent Optical Networks using Virtualization and Software-Defined Control
- Previously worked on NSF-Funded Project on Innovating Network Cyberinfrastructure through Openflow and Content Centric Networking in Nebraska

ALLO Communications, USA **May 2019 – Aug 2019**
Research Intern, Allo Research
- Worked on analyzing distributed denial-of-service (DDoS) attacks, threat detection and modeling. Also worked on developing an SDN prototype for provisioning MEF network services.

Argonne National Laboratory, USA **May 2017 – Aug 2017**
Research Aide, Mathematics and Computer Science
- Worked on evaluating various high-performance data transfers tools such as GridFTP, XDD, FDT and mdtmFTP for WAN data movement.

University of Nebraska-Lincoln, USA **Aug 2015 - Dec 2015**
Graduate Teaching Assistant, Dept. of Computer Science & Engineering

- Involved in the assessment process; provided effective, timely, & appropriate feedback to students to support their learning.

SOLUTT Corporation, India **Jan 2010 – Aug 2015**
Director, Technology & Research
- Instrumental in heading Networking/Wireless Operations at SOLUTT.
- Worked on multiple projects focusing on PHY/MAC layer Design, LTE, LTE-A, cdma2000, and IEEE 802.11 Multigigabit technologies.
- Experience in evaluating Antenna/RF Systems, Channel Models (incl. WINNER, SCM, 802.11TGn) and Traffic Engineering.
- Actively engaged in the design, development and delivery of advanced training programs, workshops and seminars. Trained over 600 Engineers in network design, LTE & LTE-A, UMTS, IEEE 802.11 & 16, and cdma2000 1x/EVDO.
- Established learning management frameworks and e-learning platforms for delivering online content, deploying secure real-time assessments, feedback and analytics to create the SOLUTT Virtual Learning Environment.

Cambridge Institute of Technology, Bangalore, India **Aug – Dec 2011**
Visiting Faculty
- Taught Graduate Courses in Computer Science. Initiated a Project on Development of Opportunistic Grids for HPC.

B.M.S. Institute of Technology, India **Jan - Dec 2009**
Faculty of Engineering
- Taught Undergraduate Courses in Communication Engineering.
- Actively involved with FOSS/LUG to promote Open Source Software for Solving Engineering Problems.

R.V. College of Engineering, India **Aug 2007 - Jun 2008**
Faculty of Engineering
- Taught Graduate & Undergraduate Courses in Telecommunications Engineering.

Indian Space Research Organization (ISRO), India **Aug 2006 - Jun 2007**
Research Intern, U R Rao Satellite Centre (URSC) (formerly ISAC)
- Worked on Design/Development of Architectures, Protocols & Testbeds for Interplanetary Communication Systems at the Digital Systems Group of Telecommand Division.

6 Publication Record

(Note that some of my earlier works were published under Deepak Nadig Anantha.)

6.1 Manuscripts Under Preparation

M1 **D. Nadig** and B. Ramamurthy, "Generalized Service Performance Measures for Multi-Cluster Distributed Service Mesh Architectures," Under Review at a Tier-1 Networking Conference.

M2 M. Lunar et al. **D. Nadig** et al., "One Link to Rule Them All: Web-based WirelessExperimentation for Multi-vendor RemotelyAccessible Indoor/Outdoor Testbeds," Under Review, *2021 IEEE INFOCOM CNERT: Computer and Networking Experimental Research using Testbeds*.

M3 **D. Nadig**, B. Hu, and B. Ramamurthy, "Optimized Service Delivery in Distributed Multilayer Optical/SDN Service Mesh Architectures," To be submitted to the *2021 IEEE Conference on Network Softwarization (NetSoft)*, Toyko, Japan.

M4 S. El Alaoui, **D. Nadig**, and B. Ramamurthy, "Routing Optimization in Edge-enabled Smart Agriculture," Under Preparation.

M5 **D. Nadig** and B. Ramamurthy, "Augmenting Network Perimeter Security using Probabilistic Latent Variable Models for Malicious URL Detection and Classification," Under Preparation.

M6 **D. Nadig** and B. Ramamurthy, "Towards Application-Centric Networks: A survey of Application-Awareness in Software Defined Networks," Under Preparation.

M7 **D. Nadig** and B. Ramamurthy, "An Automated Threat Intelligence Management Architecture for Software Defined Networks," Under Preparation.

6.2 Journal Articles

J1 **D. Nadig**, B. Ramamurthy, and B. Bockelman, "SNAG: SDN-managed Network Architecture for GridFTP Transfers," Under Review (2nd Round), Submitted to the *IEEE/ACM Transactions on Networking*, (Impact Factor: 3.315).

J2 **D. Nadig**, B. Ramamurthy, and B. Bockelman, "APRIL: An Application-Aware, Predictive and Intelligent Load Balancing Solution for Data-Intensive Science," Under Review (1st Round), Submitted to the *IEEE/ACM Transactions on Networking*, (Impact Factor: 3.315).

J3 **D. Nadig**, B. Ramamurthy, B. Bockelman, "Optimized Service Chain Mapping and reduced flow processing with Application-Awareness," Under Review (1st Round), Submitted to *Computer Networks*, Elsevier, (Impact Factor: 3.111).

J4 M. Alhowaidi, **D. Nadig**, B. Hu, B. Ramamurthy and B. Bockelman, "Cache Management for Large Data Transfers and Multipath Forwarding Strategies in Named Data Networking using SDN," Under Review (2nd Round), Submitted to *Computer Networks*, Elsevier, (Impact Factor: 3.111).

6.3 Conference Proceedings (Peer-Reviewed)

C1 **D. Nadig**, S. El Alaoui, B. Ramamurthy and S. Pitla, "ERGO: A Scalable Edge Computing Architecture for Infrastructureless Agricultural Internet of Things," Under Review, Submitted to the *2021 IEEE International Conference on Communications (ICC)*.

C2 M. Alhowaidi, **D. Nadig**, and B. Ramamurthy, "Cache Management for Large Data Transfers in Named Data Networking using SDN," *2019 IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS)*, Goa, India, 2019, pp. 1-4, doi: 10.1109/ANTS47819.2019.9118137.

C3 S. Nayak, **D. Nadig** and B. Ramamurthy, "Analyzing Malicious URLs using a Threat Intelligence System," *2019 IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS)*, Goa, India, 2019, pp. 1-4, doi: 10.1109/ANTS47819.2019.9118051.

C4 **D. Nadig**, B. Ramamurthy, B. Bockelman, and D. Swanson, "APRIL: An Application-Aware, Predictive and Intelligent Load Balancing Solution for Data-Intensive Science," in *IEEE INFOCOM 2019 - IEEE Conference on Computer Communications*, Apr. 2019, pp. 1909–1917, doi: 10.1109/INFOCOM.2019.8737537.

C5 **D. Nadig**, B. Ramamurthy, B. Bockelman, and D. Swanson, "Large Data Transfer Predictability and Forecasting using Application-Aware SDN," in *2018 IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS)*, Dec. 2018, pp. 1–6, doi: 10.1109/ANTS.2018.8710165.

C6 **D. Nadig**, E. Jung, R. Kettimuthu, I. Fosterz, S. V. N. Rao, and B. Ramamurthy, "Comparative Performance Evaluation of High-performance Data Transfer Tools," in *2018 IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS)*, Dec. 2018, pp. 1–6, doi: 10.1109/ANTS.2018.8710071.

C7 M. Alhowaidi, **D. Nadig**, B. Ramamurthy, B. Bockelman, and D. Swanson, "Multipath Forwarding Strategies and SDN Control for Named Data Networking," in *2018 IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS)*, Dec. 2018, pp. 1–6, doi: 10.1109/ANTS.2018.8710068.

C8 **D. Nadig**, B. Ramamurthy, B. Bockelman, and D. Swanson, "Optimized Service Chain Mapping and reduced flow processing with Application-Awareness," in *2018 4th IEEE Conference on Network Softwarization and Workshops (NetSoft)*, Jun. 2018, pp. 303–307, doi: 10.1109/NETSOFT.2018.8459912.

C9 **D. Nadig**, B. Ramamurthy, B. Bockelman, and D. Swanson, "Differentiated Network Services for Data-Intensive Science using Application-aware SDN," in *2017 IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS)*, Dec. 2017, pp. 1–6, doi: 10.1109/ANTS.2017.8384105.

6.4 Workshops (Peer-Reviewed)

W1 **D. Nadig**, Z. Zhang, B. Ramamurthy, B. Bockelman, G. Attebury, and D. Swanson, "SNAG: SDN-managed Network Architecture for GridFTP Transfers," in *Proceedings of the Third Workshop on Innovating the Network for Data-Intensive Science, INDIS*, 2016, vol. 16.

6.5 Workshops (Invited)

W2 **D. Nadig** and B. Ramamurthy, "Securing Large-scale Data Transfers in Campus Networks: Experiences, Issues, and Challenges," in *Proceedings of the ACM International Workshop on Security in Software Defined Networks & Network Function Virtualization*, New York, NY, USA, 2019, pp. 29–32, doi: 10.1145/3309194.3309444.

W3 **D. Nadig**, B. Ramamurthy, B. Bockelman, and D. Swanson, "Identifying Anomalies in GridFTP Transfers for Data-Intensive Science Through Application-Awareness," in *Proceedings of the 2018 ACM International Workshop on Security in Software Defined Networks & Network Function Virtualization*, New York, USA, 2018, pp. 7–12, doi: 10.1145/3180465.3180469.

W4 **D. Nadig** and B. Ramamurthy, "ScienceSDS: A Novel Software Defined Security Framework for Large-scale Data-intensive Science," in *Proceedings of the ACM International Workshop on Security in Software Defined Networks & Network Function Virtualization*, New York, NY, USA, 2017, pp. 13–18, doi: 10.1145/3040992.3040999.

6.6 Posters

P1 **D. Nadig**, S. El Alaoui, and B. Ramamurthy, "ERGO: A Scalable Edge Computing Architecture for Ag-IoT," in *3rd USENIX Workshop on Hot Topics in Edge Computing (HotEdge'20)*, New York, NY, USA, 2020.

P2 **D. Nadig** and B. Ramamurthy, "Securing Data Intensive Science Projects Through Intelligent Networks," in *2017 Midwest Big Data Hub (MBDH) All-Hands Meeting*, Omaha, USA, Oct 2017.

6.7 Thesis

1 **D. Nadig**, "Design and Deployment of DTN Architectures and Protocols for Interplanetary Communication Systems," *Master's Thesis*, RV College of Engineering, Visveswaraya Technological University, India, 2007.

6.8 Technical Reports

T1 **D. Nadig**, "A Study of Jamming in IEEE 802.11e Networks," Technical Report, Dept. of Electrical Computer Engineering, North Carolina State University, Raleigh, USA, Dec 2008

T2 **D. Nadig**, "Simulation and Analysis of Intersystem Handovers in Mobile WiMax Networks," Technical Report, Dept. of Electrical Computer Engineering, North Carolina State University, Raleigh, USA, Dec 2008

6.9 Invited Conference and Workshop Presentations

1 D. Nadig, "SDN/NFV Solutions for Data-intensive Science at UNL," at INRIA/LORIA, Nancy, France, April 2019.
2 D. Nadig, "Cache Management for Large Data Transfers in Named Data Networking using SDN," at *2019 IEEE ANTS Conference*, Goa, India, 2019.
3 D. Nadig, "Analyzing Malicious URLs using a Threat Intelligence System," at *2019 IEEE ANTS Conference*, Goa, India, 2019.
4 D. Nadig, "APRIL: An Application-Aware, Predictive and Intelligent Load Balancing Solution for Data-Intensive Science," at *IEEE INFOCOM 2019*, Paris, France, April 2019.
5 D. Nadig, "Securing Large-scale Data Transfers in Campus Networks: Experiences, Issues, and Challenges," at *ACM SDN-NFV Sec Workshop at ACM CODASPY 2019*, Richardson, Texas, USA, March 2019.
6 D. Nadig, "Large Data Transfer Predictability and Forecasting using Application-Aware SDN," in *2018 IEEE ANTS Conference*, December 2018.
7 D. Nadig, "Comparative Performance Evaluation of High-performance Data Transfer Tools," in *2018 IEEE ANTS*, December 2018.
8 D. Nadig, "Multipath Forwarding Strategies and SDN Control for Named Data Networking," in *2018 IEEE ANTS Conference*, December 2018.
9 D. Nadig, "Identifying Anomalies in GridFTP Transfers for Data-Intensive Science Through Application-Awareness," at *ACM SDN-NFV Sec Workshop at ACM CODASPY 2018*, Tempe, Arizona, USA, March 2018.
10 D. Nadig, "ScienceSDS: A Novel Software Defined Security Framework for Large-scale Data-intensive Science," at *ACM SDN-NFV Sec Workshop at ACM CODASPY 2017*, Scottsdale, Arizona, USA, March 2017.
11 D. Nadig, Z. Zhang, B. Ramamurthy, B. Bockelman, G. Attebury, and D. Swanson, "SNAG: SDN-managed Network Architecture for GridFTP Transfers," in *3rd INDIS Workshop at the 2016 Supercomputing Conference*, Salt Lake City, Utah, USA, November 2016.
12 D. Nadig, "Mathematical Modeling of Large Scale Random Networks," In *National Conference on Recent Trends in Network Security & Cryptography*, PES Institute of Technology, India, December 23, 2010.

6.10 Invited Talks and Workshops Conducted

1 Workshop on ns3 Network Simulator, RV College of Engineering, Bangalore, India, July 2−4, 2015.
2 Workshop on Network Simulation using ns3, Nitte Meenakshi Institute of Technology, Bangalore, India, June 1−5, 2015.
3 Keynote Address, Convocation and Student Forum, VISHIST-15, Sambhram Institute of Technology, Bangalore, India, May 8, 2015.
4 Network Simulation and Modeling, SJ College of Engineering, Mysore, India, March 28, 2015.
5 Workshop on Next-Generation Network Simulation using ns3, Amrita Vishwa Vidyapeetham, Bangalore, India, February 15, 2015.
6 Workshop on ns3 and Computer Networks, Sri Venkateshwara College of Engineering, Bangalore, India, February 6−7, 2015.
7 Faculty Development Programme on ns3, Sri Venkateshwara College of Engineering, Bangalore, India, December 1−4, 2014.
8 Tools for Data Science and Analysis, Dept. of Computer Applications, PES Institute of Technology, Bangalore, India, October 28, 2014.
9 SDN: Trends in Programmable Networks, Dept. of ECE, Sapthagiri College of Engineering, Bangalore, India, October 17, 2014.
10 Antennas for Next-Generation Network Mobile Radios, Antenna Technologies, Faculty Development Program, TEQIP II, BMS College of Engineering, Bangalore, India, January 27 − February 1, 2014.
11 Simulation of Computer Networks and Systems, CMR Institute of Technology, Bangalore, India, August 17, 2013.
12 Next Generation Networks: Simulation and Modeling Perspectives, Seminar on Understanding Wireless Communication Technologies: 3G, 4G/LTE, WiMAX, PES Inst. of Technology, Bangalore, India, July 19, 2013.
13 LATEX for Mathematical Publishing, Faculty of Mathematics and Statistics, Christ University, Bangalore, India, April 27−28, 2012.
14 The Future is Open: OSS in Technology, KRITANSH Forum, Cambridge Institute of Technology, Bangalore, India, April 12, 2012.
15 Wireless Network Architectures: Evolution and Directions, BMS Institute of Technology, Bangalore, India, October 22, 2011.
16 Wireless Communication Engineering Technologies, IEEE Student Branch, Dr. Ambedkar Institute of Technology, Bangalore, India, October 1, 2011.

7 Professional Certifications

CIRTL Associate **Pending**
Center for the Integration of Research, Teaching, and Learning (CIRTL)
- Actively participant in the CIRTL network and learning community. I have participated in CIRTL courses, seminars and workshops to understand, recognize and apply principles such as evidence-based teaching, teaching-as-research, learning through diversity, and learning through communities.

IEEE WCP® **May 2014 − Present**

IEEE Certified Wireless Communications Professional

- Demonstrated expertise in Network & Service Architectures; Wireless Technologies; RF & Antenna Engineering; Standards, Policies & Regulations.

8 Service Record

8.1 External Service

- Served as a **Reviewer** for leading journals such as IEEE/ACM Transactions on Networking, IEEE IEEE Journal on Selected Areas in Communications (IEEE JSAC), Computer Networks and conferences such as IEEE INFOCOM '17, '20 & '21, IEEE Globecom '20, IEEE/ACM International Symposium on Quality of Service (IWQoS) '19, IEEE International Symposium on Local and Metropolitan Area Networks (LANMAN) '17 & '19 and IEEE Sarnoff Symposium '16. Verified peer review details are available at Publons.
- **Member**, 8th Meeting of the Board of Studies (BOS) in Electronics and Communication Engineering, SJ College of Engineering, Mysore, India, 2015.
- **Member**, Entrepreneurship Development Cell (EDC), RV College of Engineering, Bangalore, India, 2007.

8.2 University/College/Department Level Service

- **Member**, Faculty Committee, Dept. of Computer Science and Engineering, University of Nebraska-Lincoln, USA, 2020−2021.
- **Member**, Cybersecurity Faculty Search Committee, Dept. of Computer Science and Engineering, University of Nebraska-Lincoln, USA, 2019.
- **Vice President**, Computer Science and Engineering Graduate Student Association (GSA), University of Nebraska-Lincoln, USA, 2018−2019.
- **Judge**, McNair Summer Research Colloquium, University of Nebraska-Lincoln,USA, July 2018.

8.3 Professional Memberships and Affiliations

- **Member**, Institute of Electrical and Electronics Engineers (IEEE).
- **Member**, IEEE Communications Society (IEEE ComSoc).
- **Member**, National Center for Faculty Development and Diversity (NCFDD), 2019−Present.
- **Member**, IEEE GOLD SIG EXE-COM Professional Activities Group, IEEE Bangalore Section, 2011−2014.

9 Skills

- **Languages:** Python, Java
- **Stacks:** OpenStack, OPNFV, OSGi, Elastic (ELK) stack, InfluxDB/Grafana, Prometheus
- **Software-Defined Networking:** OpenFlow, ONOS, Open vSwitch, P4
- **Network Emulation/Simulation:** Mininet, LXC, ns3, Matlab/Simulink
- **Network Testbeds:** ChameleonCloud, CloudLab, DETERLab, GENI

- **SCM/DevOps:** Git, Vagrant, Docker, Kubernetes, Helm, Istio, Kubeflow
- **Machine Learning Frameworks:** scikit-learn, TensorFlow, Keras
- **Agile Methodologies:** Scrum, Kanban
- **API Development:** OpenAPI/Swagger
- **Other:** Wireshark, IPTables, VTun, LaTeX

10 References

Available immediately upon request.

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Last updated on January 12, 2021.