SAMEER G KULKARNI

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Assistant Professor
Department of Computer Science and Engineering
IIT Gandhinagar

EDUCATION

Doctor of Philosophy, Computer Science	Mar 2015 - Jul 2018
University of Göttingen, Göttingen, Germany	**Summa Cum Laude**
Master of Science, Computer Engineering	Aug 2008 - May 2010
University of Southern California, Los Angeles, USA	**GPA: 3.76/4.0**
Bachelor of Engineering, Computer Science & Engineering	Aug 2000 - June 2004
National Institute of Engineering, Mysore, India (VTU)	**First Class with Distinction**

RESEARCH INTERESTS

Network Function Virtualization	Software Defined Networking	Cloud Computing
Power & Performance Optimizations	Network Security and Data Reliability	Green Computing
Virtual Machines & Virtualization	Embedded and Portable Devices	Distributed Systems

PUBLICATIONS

Journals

- **Kulkarni, S.G.**, Liu, G., Ramakrishnan, K.K., Arumaithurai, M. Wood, T. and Fu, X. "RE-INFORCE: Achieving Efficient Failure resiliency for Network Function Virtualization based Services". in IEEE/ACM Transactions on Networking, vol. 28, no. 2, pp. 695-708, April 2020, doi: 10.1109/TNET.2020.2969961.

- **Kulkarni, S.G.**, Zhang, W., Hwang, J., Rajagopalan, S., Ramakrishnan, K.K., Wood, T., Arumaithurai, M. and Fu, X. "NFVnice: Dynamic Backpressure and Scheduling for NFV Service Chains". in IEEE/ACM Transactions on Networking, vol. 28, no. 2, pp. 639-652, April 2020, doi: 10.1109/TNET.2020.2969971.

Conference and Workshop Papers

- **Kulkarni, S.G.**, Ramakrishnan, K.K. and Wood, T. "Managing State for Failure Resiliency in Network Function Virtualization.". In Proceedings of the 26th International Symposium on Local and Metropolitan Area Networks (LANMAN '20).

- Feng, Y., Panda, S., **Kulkarni, S.G.**, Ramakrishnan, K.K. and Duffield, N. "A SmartNIC Accelerated Monitoring Platform for In-band Network Telemetry.". In Proceedings of the 26th International Symposium on Local and Metropolitan Area Networks (LANMAN '20).

- Qi, S., **Kulkarni, S.G.**, and Ramakrishnan, K.K. "Understanding Container Netork Interface Plugins: Design Considerations and Performance.". In Proceedings of the 26th International Symposium on Local and Metropolitan Area Networks (LANMAN '20).

- Li, J., **Kulkarni, S.G.**, and Ramakrishnan, K.K. "Understanding Open Source Serverless Platforms: Design Considerations and Performance". In Proceedings of the 5th International Workshop on Serverless Computing (WOSC '19). Association for Computing Machinery, New York, NY, USA, 37–42.

- Mohammadkhan, A., Panda, S., **Kulkarni, S.G.**, Ramakrishnan, K.K. and Bhuyan, L. "P4NFV: P4 Enabled NFV systems with SmartNICs". 2019 IEEE Conference on Network Function Virtualization and Software Defined Networks (NFV-SDN), Dallas, TX, USA, 2019, pp. 1-7, doi: 10.1109/NFV-SDN47374.2019.9040000.

- **Kulkarni, S.G.**, Ramakrishnan, K.K. and Wood, T. Living on the Edge: Serverless Computing and the cost of Failure Resiliency. 2019 IEEE International Symposium on Local and Metropolitan Area Networks (LANMAN), Paris, France, 2019, pp. 1-6, doi: 10.1109/LANMAN.2019.8846970.

- **Kulkarni, S.G.**, Liu, G., Ramakrishnan, K.K., Arumaithurai, M. Wood, T. and Fu, X. (2018). REINFORCE: Achieving Efficient Failure resiliency for Network Function Virtualization based Services. In Proceedings of the 14th International Conference on emerging Networking EXperiments and Technologies (CoNEXT 2018), ACM, (pp. 41-53).

- **Kulkarni, S.G.**, Zhang, W., Hwang, J., Rajagopalan, S., Ramakrishnan, K.K., Wood, T., Arumaithurai, M. and Fu, X. (2017). NFVnice: Dynamic Backpressure and Scheduling for NFV Service Chains. In Proceedings of the Conference of the ACM Special Interest Group on Data Communications (SIGCOMM 2017), ACM, pp. 71-84, Los Angeles, USA, August 2017.

- **Kulkarni, S.G.**, Arumaithurai, M., Ramakrishnan, K.K. and Fu, X. (2017). REARM: Renewable energy based resilient deployment of Virtual Network Functions. In Proceedings of 26th European Conference on Networks and Communications (EuCNC 2017), IEEE, pp. 1-6, Oulu, Finland, June 2017.

- Tasiopoulos, A., **Kulkarni, S.G.**, Arumaithurai, M., Psaras, I., Ramakrishnan, K.K., Fu, X. and Pavlou, G. (2017). DRENCH: A Semi-Distributed Resource Management Framework for NFV based Service Function Chaining. In Proceedings of IFIP Networking 2017 Conference (Networking 2017), pp. 1-9, Stockholm, Sweden, June 2017. (Joint First Author)

- **Kulkarni, S.G.**, Arumaithurai, M., Ramakrishnan, K.K. and Fu, X. (2017). Neo-NSH: Towards scalable and efficient dynamic service function chaining of elastic network functions. In Proceedings of 20th Conference on Innovations in Clouds, Internet and Networks (ICIN 2017), IEEE, pp. 308-312, Paris, France, March 2017.

- **Kulkarni, S.G.**, Arumaithurai, M., Tasiopoulos, A., Psaras, Y., Ramakrishnan, K.K., Fu, X. and Pavlou, G. (2016). Name enhanced sdn framework for service function chaining of elastic network functions. In Proceedings on IEEE Conference on Computer Communications Workshops (INFOCOM WKSHPS 2016), IEEE, pp. 45-46, San Francisco, CA, USA, April 2016.

- Hwang, K., **Kulkarni, S.G.** and Hu, Y. (2009). Cloud security with virtualized defense and reputation-based trust management. In Proceedings of 8th IEEE International Conference on Dependable, Autonomic and Secure Computing (DASC 2009), IEEE, pp. 717-722, Chengdu, China, December 2009.

WORK/RESEARCH EXPERIENCE

Assistant Professor, IIT Gandhinagar. [Apr 2020 - present]

Post Doctoral Researcher, University of Riverside, California. [Nov 2018 - Feb 2020]

- Carrying out research with focus on Network Function Virtualization and Cloud services.
  - Designing a smart-nic accelerated, cost-efficient traffic measurement and analysis infrastructure to detect and thwart a range of network attacks supporting high-rate traffic.
  - Optimizing the machine-learning and Inference functions through GPU acceleration and spatial multiplexing of GPU to provide cost efficient, high throughput and low-latency Inference services at Edge Cloud.

- Mentoring PhD and Masters students in Networking and Systems group.
  - Mentored 3 PhD students and 2 Masters students in various projects.

Post Doctoral Researcher, University of Göttingen. [Jul 2018 - Sep 2018]

- Study and Design for effective flash-flood management systems.

EU ITN CleanSky Early-stage Researcher, University of Göttingen.[Mar 2015 - Jul 2018]

- Carrying out research with focus on Software Defined Networking and Network Function Virtualization to build a robust and reliable network for Cloud Computing eco-system.
  - Developed a resource management framework for Network Functions to achieve optimal placement and fine-grained load balancing.
  - Developed Network Function scheduling framework to improve performance and scalability.
  - Developed a reliable and robust network function migration framework to achieve highly resilient network function chains augmenting green energy utilization.

Directed Research – University of Southern California, Los Angeles

- Addressing Security, Reliability and Trust Management for Internet Cloud [FALL 2009]
  - Literature survey and assessment of service level agreement (SLA) and security demands in the three prevalent commercial cloud service models (IAAS, PAAS, and SAAS).
  - Proposed new approach to enhance Cloud security via virtualization and virtual machine sandboxing to address Denial of Service (DoS) attacks, isolation and enhance reliability.

- Virtualization: Challenges & Opportunities in Security & Disaster recovery [SPRING 2009]
  - Literature survey on virtualization, virtual machines and challenges in security and reliability.
  - Proposed new mechanism to improve Disaster Recovery and Security management of computing systems using virtual machine redundancy and virtualization based security analysis.

INDUSTRY EXPERIENCE

Engineer Staff – Multimedia Systems, QCT, Qualcomm, San Diego. June 2010 - Feb 2015

- Developed core sound driver and middleware stack for BlackBerry smartphones on QNX and BlackBerry OS 10 platforms.

- Implemented OpenMAX-IL hardware accelerated audio decoder and encoder components on Qualcomm processors for BlackBerry and Android (KitKat & Ice cream Lollipop) product lines.

Sr. Engineer – Product Research & Design (Embedded Systems), Tata Elxsi, Bangalore. Aug 2004 - July 2008.

- Worked at Canon Inc., Japan to develop HDTV middleware system for different broadcasting standards (ATSC, DVB, and ARIB standards), using the Seine2 TC90411 and ST7109 chipsets.

- Designed and implemented Model-View-Controller (MVC) architectural pattern based advanced multimedia (plug-in) editor for the Sagem cellphones (MY X5-2 series onwards).

REASEARCH VISITS

- Nokia Bell Labs, Stuttgart, Germany (host: Dr. Volker Hilt), May 2017 - Aug 2017.

- Department of Computer Science and Engineering, University of California, Riverside, CA, USA (host: Prof. K. K. Ramakrishnan), Jul 2016 - Dec 2017.

TEACHING EXPERIENCE

- Teaching Assistant:

- Practical Course Networking Lab, University of Göttingen, Apr 2015 - July 2018.
- Software Defined Networking course, University of Göttingen, Apr 2016 - July 2018.
- Advanced SDN and NFV course, University of Göttingen, Apr 2016 - Feb 2017.

- Supervised more than 8 master students in Seminar on Internet Technology, University of Göttingeen, Apr 2015 - July 2018.

- Mentor for interns: Multimedia Audio team, Qualcomm, San Diego, CA, Jan 2013 - Feb 2015.

- CCB and Power team member: Multimedia systems API review & control board, Audio Power analysis & Optimizations, Qualcomm, San Diego, CA, Jan 2011 - Feb 2015.

- Lab coordinator: GridSec Cluster Lab, University of Southern California, Aug 2009 - May 2010.

THESIS SUPERVISION

- Martinez Gudio. NSH Routing: Implementation of Network Service Headers to realize the service chain by steering traffic across the VNFs. Master Thesis, July 2017 - Jan 2018.

- Hari Raghavendrarao Bhandari. Evaluation of state of the art works on SDN/NFV Placement and Load Balancing. Master Thesis, Dec 2016 - May 2017.

HONORS AND AWARDS

- Outstanding PhD Dissertation Award, IEEE Technical Committee on Scalable Computing 2019.

- "Elsevier Computer Communications" Outstanding Reviewer May 2017.

- Travel Grants
  - ACM Travel Grants, Special Interest Group on Data Communications (SIGCOMM) Conference, Student Travel Grant, Aug 2017
  - European Conference on Networking and Communications (EuCNC) Conference, Student Travel Grant, June 2017

- Seven-time recipient of QUALSTAR award at Qualcomm, San Diego for exemplary work in different aspects of Audio sub system. June 2010 – Feb 2015.

- Received special accolades from SAGEM for developing MVC based multimedia editor in C language at Tata Elxsi, Bangalore, Nov 2005.

- Best research project for "Design of Network File System on Linux" - Computer Science and Engineering Department, NIE Mysore, June 2004.

- Best "C/C++" programmer award at "Code Drills: Annual Tech festival" NIE, Mysore, Mar 2002.

PAPER REVIEWS

- *Journals*:
  - IEEE Communications Magazine, Transactions on Networking (TON), Transactions on Cloud Computing (TOCC), & Transactions on Network and Service Management (TNSM).
  - Elsevier Computer Communications (COMCOM) & Computer Standards & Interfaces (CSI)

- *Conferences*:
  - 2017 - 2019: ACM SIGMETRICS, IFIP Networking, IEEE ICC
  - 2016 & 2015: IEEE/ACM IWQoS

SKILLS

Operating Systems: Windows, UNIX, Linux, Sun Solaris, Mac OS X.
RTOS: QNX, VxWorks, Nucleus, CE2-Linux, pSOS, ucos-ii, RT-Minix.
Programming Languages: Java, C, C++, Python, Lex, Yacc, Assembly, Shell scripting, Perl, TCl/Tk.
Database & Web Tools: Oracle8i, MySQL, MS Access, Jscript, Visual Basic, Python, HTML/CSS.
Engineering Tools: Cadence Virtuoso, MASTAR, SPEC benchmark tools, Trace32, CACTI.
Simulators and VM tools: GridSim, sim-cache, VMPlayer, SUN Virtualbox, XEN Hypervisor.
SCM/VCS's: Perforce, CVS, Microsoft Visual SourceSafe, Rational ClearCase.
SDK/IDE's: Eclipse, MS Visual Studio, KDevelop, Anjuta, Source Insight, Understand for C++.
Documentation/Drawing: TeX, Microsoft office tools, Rational Rose, Umbrello, OpenOffice, Doxygen.
Industrial Trainings: QNX, VxWorks(Tornado), UML, Embedded C++, OOSD and Design Patterns.

LEADERSHIP QUALITIES & EXTRA CURRICULAR ACTIVITIES

- Conference Organization and Volunteering
  - Publicity chair for Big Data, Cloud Computing, and Data Science Conference (BCD 2019).
  - Served as a student volunteer for ACM SIGCOMM 2018 conference, Budapest, Hungary.
  - Served as a volunteer in the organizing committee for NetSys 2017 Conference, Göttingen.
  - Served as a student volunteer for ACM CoNEXT 2016 conference, Irvine, CA, USA.

- Hosted "Codewars: Software programming contest" and "Conundrum Hour: Puzzles & Brain Teasers", Technical events of IEEE Student Branch at NIE, Mysore, May 2004.

- Active in indoor and outdoor games including Chess, Cricket and Soccer; won several awards at school and professional events.

- Hobbies include Gardening, Jogging, Music, and Reading.