SUKHDEEP SINGH, Ph.D.

Senior Chief Engineer - Samsung R&D India- Bangalore | Alumni - Sungkyunkwan University (SKKU), South Korea | Member: IEEE & ACM
Email: sukh.sandhu@samsung.com; sukhdeepsingh90@gmail.com | **Mobile:** +91 8968-724-198 | **Skype:** sukhdeepsingh90
LinkedIn: https://www.linkedin.com/in/sukhdeep-singh-76381714/ | **Portfolio:** http://www.sukhdeepsingh.info
UK Global Talent Visa Holder (Start date - September 15, 2020)

EXPERIENCE

Samsung R&D India-Bangalore (SRI-B)
5G Access Software Design R&D Team - Network R&D Division
September 2016 – Present

Area/Technology:
RAN/Core System Design; Cloud System Design (ONAP, ORAN, vRAN, Service Oriented Core, Network Slicing)

Contribution:

- **Feature Design of Ultra-Modern Samsung Core Networks for leading Global Operators**
  - '26' Features Designed for Samsung Core
  - Impact Analysis of '22' 3GPP Specifications
- **ONAP Research and Design**
  - Attended end-to-end ONAP training in Amdocs Office in Ottawa Canada along with HQ employees.
  - Requirement analysis of ONAP and ETSI MANO
  - ONAP 5G VNF interface and system level flow design proposal
  - End-to-end orchestration of non-SDN Components design proposal
  - Research paper on ONAP based access discovery and selection for 5G submitted in IEEE WCNC 2020 (main track).
  - Closed Loop Automation for scale out of Samsung Proprietary vCU
- **Design analysis of 5G NR Integrated Access and Backhaul (IAB) Feature**
- **Detailed design of microservice based Samsung Logging and Policy platform: Architecture and Workflows (Creation & Execution).**
- **TOSCA Modelling of Samsung's 5G Core**
- **5G RAN System Design:**
  - Contributing a O-RAN use case in WG1 and WG2 use case specify O-RAN Alliance "ML based Congestion Prediction and management"
  - Building a use case design document for Automatic Scaling in O-RAN
  - Network Slice Information model comparison from GSMA, 3GPP, IETF, ETSI, O-RAN and ONAP
  - Working on Predictive Closed Loop Automation of Network Slice in O-RAN
  - Helped SRI-B to have an official agreement with Virginia Tech, USA to write research papers in O-RAN area. Submitted 2 paper in IEEE Communication Magazine and 2 other will be submitted by July last week.
- **Head: Research Task Force, Access group (200+ employs) of Network R&D Division**
  - Leading a Research Task Force of Access Group (200+ employs) to guide the team on patent and research paper front.
  - Collaborated with Professors / Directors / SVP / VPs / President from Universities / MNCs of US, South Korea, UK, Canada, India, Botswana for different research projects/research publications/guest editorials/book chapters
  - Editing World's first book on 6G: https://www.6gbook.info/book-editors
  - Published 17 research articles and filed 3 patents (2 US and 1 Indian) in different areas of 5G RAN & Core Networks
  - Worked directly under Vice President of Network Business Division of Samsung Electronics, Head Quarters based in South Korea for TCP congestion control of 5G Networks. The research paper won Samsung Best Paper award in 2018 felicitated by CEO and President of Samsung Electronics, South Korea
  - Worked with Senior VP and VPs of Samsung Research (SR), Seoul & Professors from KAIST S. Korea, SKKU S. Korea, IIT Kanpur India and MMU UK to write a proposal for conducting a workshop on Open-RAN at IEEE WCNC. The proposal got accepted and for the first time SRI-B and SR-Seoul organized a workshop at IEEE WCNC.
    Appreciated on Samsung Research Portal: https://research.samsung.com/news/SRI-B-Debuts-Virtual-Open-RAN-Workshop
  - Worked with VPs of Samsung Research (SR), Seoul & SR UK & Professors from SKKU S. Korea, and MMU UK to write a proposal for conducting a 2nd International workshop on Open-RAN at IEEE Globecom. The proposal got accepted and SRI-B, SR UK and SR-Seoul will organize a workshop at IEEE Globecom 2020 (Tier 1 conference of IEEE)
- **Managed 2 Interns directly for PoC Development of new 5G mobility architecture**

EDUCATION

- Ph.D., Computer Engineering, Sungkyunkwan University (SKKU), Suwon, South Korea | 2016 | 4.44 / 4.5 (Branch Topper)

Projects Undertaken:
1. Mobile video delivery architecture and scheduling over LTE-A & 5G. 2. Social aspect of upcoming 5G network technologies. 3. PCID Allocation for 5G ultra dense networks. 4. Social Cloud Radio Access Networks. **5.** Customized D2D Services.
Thesis Title:
Video Delivery Framework for Next Generation Wireless Networks
Guide:
Dr. Navrati Saxena, Associate Professor, SKKU, South Korea
Co-guide:
1. Dr. HanSeok Kim, VP, Samsung Electronics, HQ, South Korea. 2. Dr. Abhishek Roy, Director, Samsung Electronics, HQ, South Korea (then). **3.** Dr. Pradipta De, Assistant Prof., State University of New York (then).

- Dual Degree (B.Tech CS + M.Tech SE), SGVU, Jaipur, India | 2013 | 70% (Aggregate)
- XII | CBSE | D.A.V. Sr. Sec. School, Bathinda, India | 2006 | 80%
- X | CBSE | St. Xavier's Sen. Sec. School, Bathinda, India | 2006 | 91.4% (Top 5% students in the school)

RESEARCH PUBLICATIONS

After Joining Samsung

1. [Journal] Madhan Raj K, Sukhdeep Singh, Irlanki Sandeep, HanSeok Kim, Mukesh Kumar, Jaehyun Hwang, Abhishek Roy, Navrati Saxena, "NexGen DTCP-Next Generation Dynamic TCP Congestion Control Algorithm", IEEE Access, Sept 2020 (Accepted).
2. [Journal] Abhishek Roy, Farooque Hassan Kumbhar, Harpreet Singh Dhillon, Navrati Saxena, Soo Young Shin and Sukhdeep Singh, "Efficient Monitoring and Contact Tracing to Combat Covid-19: A Smart IoT based Framework" IEEE IoT Magazine, August 2020 (Accepted)
3. [Journal] Madhan Raj, Sukhdeep Singh, Sujith Rengan, Mukesh Kumar, Gunjan Kumar, Gaurav Sinha, "QSOCKS: 0-RTT Proxification Design of SOCKS Protocol for QUIC", IEEE Access, July 2020 (Accepted)
4. [Conference] R. Banerji N. Gupta, S. Kumar, S. Singh, A Bhat, BJR Sahu, S. Yoon., "ONAP Based Pro-Active Access Discovery and Selection for 5G Networks," 2020 IEEE WCNC, Seoul, Korea, 2020, pp. 1-6
5. [Conference] Harman Jit Singh, Diljot Singh, Sukhdeep Singh, VL Narasimhan, "When Sociology Meets Next Generation Wireless Networks", ICIMMI, 2019, Jaipur, India.
6. [Conference] Satish Kumar, Rahul Banerji, Naman Gupta, Sukhdeep Singh, Suman Kumar, Avinash Bhat, Seungil Yoon, Bharat JR Sahu, "MAS5G: Move Around Smartly in 5G", IEEE FiCloud 2019, Istanbul, Turkey, Aug. 2019. (Accepted & Presented).
7. [Journal] Mudasar Lateef M, Navrati Saxena, Abhishek Roy, Sukhdeep Singh, Dong Ryeol Shin, "Ambient Backscatter Communications to Energize IoT Devices" Taylor and Francis IETE Technical Review, March 2019. (SCIE)
8. [Book Chapter] Pankaj Thorat, Sukhdeep Singh, Gaurav Jain, Avinash Bhat, Lakshmi Narasimhan, "SDN-enabled IoT: Ensuring Reliability in IoT Networks through Software Defined Networks" Springers book on Towards Cognitive IoT Networks, Jan 2019
9. [Journal] Navrati Saxena, Abhishek Roy, Bharat JR Sahu, Sukhdeep Singh, BiSON-A Bio-inspired Self Organizing Network for Dynamic Auto-Configuration in 5G Wireless, Wileys WCMC, Sept 2018. (SCIE)

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10. [Book Chapter] Navrati Saxena, Abhishek Roy, Sukhdeep Singh, "5G Small Cells: The Harbinger of IoT and Connected Living" Taylor and Francis book on 5G Enabled Internet of Things, Sept. 2018.
11. [Conference] Sukhdeep Singh, Ravneet Kour, Abhishek Roy, Navrati Saxena, Yaswanth Kumar G, Bharat JR Sahu, "SPEAD: Smart P-GW for Enhanced Accesss Discovery and Selection for NGCN", IEEE, HPCC, UK, April, 2018.
12. [Conference] Madhan Raj K, Sukhdep Singh, Venkata Sunil Kumar B, Kyoung J Moon, "S-MPTCP: A Smart MultiPath TCP Controller for Next Generation Mobile Networks", IEEE HPCC, UK, April 2018.
13. [Conference] Arjun Nanjundappa, Sukhdeep Singh, Gaurav Jain, "Enhanced Multi-RAT Support for 5G", IEEE CCNC 2018, Las Vegas, Jan 2018.
14. [Conference] Madhan Raj, Sukhdeep Singh, Irlanki Sandeep, Abhishek Roy, Navrati Saxena, "D-TCP: Dynamic TCP Congestion Control Algorithm for Next Generation Mobile Networks", IEEE CCNC 2018, Las Vegas, Jan 2018.
15. [Journal] Abhishek Roy, Shamik Sen Gupta, Kai-Kit Wang, Vaskar Raychoudhury, Kannan Govindan, Sukhdeep Singh, "5G Wireless with Cognitive Radio and Massive IoT", Taylor and Francis IETE Technical Review, Dec. 2017 (SCIE).
16. [Journal] S. Umrao, N. Saxena, A. Roy, Sukhdeep Singh, "Mobile Network Operator and Mobile User Cooperation for Customized D2D Data Services", Springers Journal of Network and System Management", pp: 1-26, Dec. 2017 (SCIE).
17. [Journal] F. H. Kumbhar, Sukhdeep Singh, N. Saxena, A. Roy,"Social CRAN: Novel Futuristic Paradigm for Next Generation Cellular Networks", IETE Tech Review, pp. 1-12, Feb. 2017 (SCIE).

After Joining SKKU

18. [Journal] Sukhdeep Singh, N. Saxena, Abhishek Roy, Pradipta De,"Proximity Based Video Delivery Architecture for LTE Networks", IEEE/IET Electronics Letters, Vol. 52, Issue 11, May 2016, pp 984- 986 (SCI).
19. [Journal] Sukhdeep Singh, N. Saxena, Abhishek Roy, HS Kim, "A Survey on 5G Network Technologies from Social Perspective", Taylor and Francis IETE Technical Review, Feb. 2016, pp: 1-10 (SCIE).
20. [Journal] Navrati Saxena, Sukhdeep Singh, Abhishek Roy, Deepti H. Ail, "NEST: novel eMBMS scheduling technique", Springers Wireless Networks, Sept. 2015, pp: 1-14 (SCI).
21. [Journal] Sukhdeep Singh, N. Saxena, A. Roy, HS Kim,"Energy Efficiency in Wireless Networks: a Composite Review", Taylor and Francis IETE Technical Review, Vol. 32, Issue 2, Dec. 2014, pp: 84-93 (SCIE).

After Joining SGVU

22. [Conference] Harcharan Singh Pabla, Sukhdeep Singh, Niyati Gupta, Palak Makhija, Prabhjot Kaur, Gurpal Singh, "Proposal and Survey of Various Data Mining Aspects in Mobile Computing Environment" Springers SocPros, IIT Roorkee, India, Dec 2013.
23. [Conference] Sukhdeep Singh ; Gurpal Singh ; V. Lakshmi Narasimhan ; Harcharan Singh Pabla, "Petri net modelling and analysis of mobile communication protocols UMTS, LTE, GPRS and MANET, IEEE ICCCI, India Jan 2014.
24. [Conference] Rajat Arora, Sukhdeep Singh. Paridhi Agarwal, "A Proposal for Deployment of Wireless Sensor Network in Day-to-Day Home and Industrial Appliances for a Greener Environment", Springers SocPros 2012, December 2012.
25. [Conference] Sukhdeep Singh, Arushi Rawal, Prabhjot Kaur, Niyati Gupta, "Major components associated with Green Networking in Information Communication Technology systems", IEEE ICCCA, India, Feb 2012.

RESEARCH PATENTS

1. Methods and systems for managing mobility of devices in 5G networks Application no. 201941009290 (US)
2. Dynamic TCP Congestion Control Mechanism For Next Generation Mobile Networks Application no. 201841002139 (US)
3. Method and System For NGCN Smart P-Gw Intelligent Access Discovery And Selection Application no. 201741025870 (India)

AWARDS & ACHIEVEMENTS (Last 7 years)

1. Appreciated on Samsung Research Portal for conducting Global event on Open-RAN in international conference: https://research.samsung.com/news/SRI-B-Debuts-Virtual-Open-RAN-Workshop
2. "Samsung Best Paper Award 2018" - Silver by CEO and President of Samsung Electronics, HQ, South Korea
3. "Samsung Citizen Award" - Employee of the Quarter (Q2 2018) by MD, SRI-B (Q1-2020; Q4-2019; Q2-2018; Q4-2017).
4. "MD Special Incentive 2018" by MD, SRI-B for outstanding performance in the year 2017-18
5. "Ph.D. Superior Research Award 2016" – Gold given by Dean, SKKU, South Korea.
6. "International Full Tuition Fee Scholarship" of 7,600,000 KRW (6700 USD Approx.) per semester during whole graduate studies at SKKU.
7. Korea Research Foundation (KRF) Fellowship for a duration of 1 year to conduct research at Mobile Ubiquitous Systems Information Center (MUSIC) at SKKU

PROFESSIONAL SERVICE

1. Editing World's first book on 6G: https://www.6gbook.info/book-editors
2. General Chair and main organizer of 2nd International Workshop on Open-RAN: Open Road to Next Generation Mobile Networks to be held in IEEE Globecom 2020, Taiwan, Dec 2020.
3. General Chair and main organizer of International Workshop on Open-RAN: Open Road to Next Generation Mobile Networks to be held in IEEE WCNC 2020, Seoul, S. Korea, May 2020..
4. Invited Keynote Speaker in IEEE Virtual Talk Series 2020.
5. Invited Keynote Speaker in Springers International Conference on Information Management and Machine Learning 2019.
6. Invited Guest Lecturer at University of Toronto, SKKU, IIT, IIM, IIIT.
7. Guest Editor for Special issue on "5G Wireless with Cognitive Radio and Massive IoT" published by Taylor and Francis IETE Technical Review
8. Served as TPC in IEEE iSES 2020, IEEE iSES 2019, IEEE iSES 2018, IEEE iNIS 2017
9. Lab Head of Mobile Ubiquitous Systems Information Center, SKKU, South Korea from 2014 to 2016.
10. International Student Representative in SKKU from 2014 to 2016).
11. President of Indian Association at SKKU from 2014 to 2016.
12. General Secretary of Hyphen Community at SGVU from 2010-2012.
13. School Core Cabinet member for the year 2004-05.
14. Personal Interview featured in SKKU webzine
15. Article on Indian Association at SKKU published in Korea Herald (top selling English newspaper of South Korea).