

Ish Kumar Jain

Education

- 2016 - 2023 **Doctor of Philosophy (PhD)**, *University of California San Diego, Jacobs School of Engineering, CA.*
Major: Electrical Engineering, **GPA: 4.0 (out of 4)**
 - Graduate Research Assistant with Prof. Dinesh Bharadia.
 - **Teaching:** Communication Systems Lab (Spring-2020) | Modern Wireless Communication (Winter-2021).
 - **Selected Courses:** Digital Communication, Communication Circuit Design, Algebraic Coding, Wavelets & Filter Design, Array Processing, AI & Pattern Analysis.
- 2016 - 2018 **Master of Science (MS)**, *New York University, Tandon School of Engineering, Brooklyn, NY.*
Major: Electrical Engineering, **GPA: 3.96 (out of 4)**
 - Myron M. Rosenthal Commencement Award for the best MS Academic Achievement in ECE.
 - **Teaching:** Machine Learning (Spring-2018 and Fall-2017) | TCP-IP Lab (Spring-2017).
 - **Selected Courses:** Advanced Machine Learning, Massive-MIMO, Networks & Mobile Systems, Internet Architecture and Protocols, Probability and Stochastic Processes.
- 2012 - 2016 **Bachelors of Technology (B.Tech.)**, *Indian Institute of Technology (IIT Kanpur), Kanpur, India.*
Major: Electrical Engineering, **GPA: 9.5 (out of 10)**
 - Motorola Gold Medalist: Commencement award for the best all-round performance in Electrical Engineering.
 - **Selected Courses:** Wireless Communications, Convex Optimization, Distributed Systems, Advanced Image Processing, Robotics, Data Structures.

Technical Skills

- Programming Python, C, C++
- Software Matlab (CVX), GitHub, Shell scripting, Altium
- Systems 5G NR testbed, Wilocity wil6210 60GHz testbed, USRP, WARP, Quantenna

Research

- Jul 2020–
Ongoing **High Mobility Communication**, *Supervisor: Prof. Dinesh Bharadia.*
 - Working towards low latency cloud-RAN architecture to efficiently support high-mobility communication by taking insights from delay-Doppler channel representation.
- Sep 2018–
Aug 2020 **Towards Reliable Millimeter Wave Link using multi-beamforming**, *Supervisor: Prof. Dinesh Bharadia.*
 - Developed a testbed for 5G NR using high sampling ADC/DAC on FPGA, IF mixer, and a 28GHz phased array.
 - Established a wideband (400 MHz) OFDM link and individually characterized each component of the testbed.
 - Designed a beam refinement procedure that exploits multipath components to establish a stable and reliable mmWave connection without a significant training overhead.
 - Achieved close to 100% reliability in a dynamic environment with a mobile user and random blockages.
 - Current progress includes reducing the form-factor of our testbed and perform a marathon of outdoor experiments.
- July 2018–
Ongoing **Wireless Virtual Reality**, *Supervisors: Prof. Dinesh Bharadia, Prof. Pamela Cosman.*
 - Developed a new viewport-aware Truncated Square Pyramid (TSP) scheme for projecting 360° videos for VR.
 - Introduced a truncation parameter to optimize the trade-off between video quality and bandwidth and developed algorithms to tune this parameter for optimal performance.
 - Initial results indicate that high quality 360° videos are delivered with high PSNR even for a low bandwidth link.
- Jan–June
2018 **[MS Thesis] Millimeter Wave Blockage Analysis**, *Supervisor: Prof. Shivendra Panwar.*
 - Analyzed the impact of blockage by static buildings, mobile blockers, and self-blockage by the user on mmWave link reliability in an outdoor mmWave environment with macro-diversity (connectivity with multiple base stations).
 - Our results indicate that the minimum density of BS required to satisfy the QoS for URLLC applications is mainly driven by reliability and latency constraints, rather than coverage or capacity requirements.

Internship

June–Aug **Nokia Bell Labs**, *Murray Hill, NJ, USA*.

2017 Topic: Millimeter Wave Beam Training Algorithm Design, *Mentor: Dr. Özge Kaya*

- o Developed an adaptive beam training algorithm for mobile multi-user scenario in outdoor mmWave cellular networks.
- o Achieved an average of over 60% reduction in beam-steering delay over a sequential search baseline.

Publications

- Sigcomm 2021 **I K Jain**, R Subbaraman, D Bharadia "Two beams are better than one: Towards Reliable and High Throughput mmWave Links", *SIGCOMM 2021*.
- mmNets 2020 **I K Jain**, R Subbaraman, TH Sadarahalli, X Shao, H Lin D Bharadia, "mMobile: Building a mmWave Testbed to Evaluate and Address Mobility Effects", *4th ACM Workshop on Millimeter-Wave Networks and Sensing Systems (Mobicom Workshop)*, 2020.
- NSDI 2020 R Ayyalasomayajula, A Arun, C Wu, S Rajagopalan, S Ganesaraman, A Seetharaman, **I K Jain**, D Bharadia, "LocAP: Autonomous Millimeter Accurate Mapping of WiFi Infrastructure", *NSDI*, 2020.
- MDPI 2019 A Choromanska, **I K Jain**, "Extreme Multiclass Classification Criteria", vol 7, issue 1, *MDPI Computation Journal*, 2019.
- MobiCom 2018 A Ravichandran, **I K Jain**, R Hegazy, T Wei, D Bharadia, "[Poster] Facilitating Low Latency and Reliable VR over Heterogeneous Wireless Networks", *Mobicom*, 2018.
- JSAC 2018 **I K Jain**, R Kumar, S Panwar, "The Impact of Mobile Blockers on Millimeter Wave Cellular Systems", *IEEE JSAC special issue on URLLC*, 2018.
- ITC 2018 **I K Jain**, R Kumar, S Panwar, "Driven by Capacity or Blockage? A Millimeter-wave Blockage Analysis", *IEEE International Teletraffic Congress (ITC30)*, 2018.

Leader/Volunteer

2020–2021 **Coordinator, Jacobs Undergraduate Mentorship Program**, *UC San Diego*.

Bridging the communication gap between undergraduates and graduate students at Jacobs School of Engineering.

2019–2020 **Vice President, ECE graduate student council**, *UC San Diego*.

Responsible for providing communication between ECE students and the Council and organizing weekly events such as seminars and coffee hours.

May 2017 **Volunteer, Commencement Ceremony**, *NYU Tandon School*.

Helped in the enforcement of law and management at the NYU Tandon commencement ceremony of above 1000 students at Barclay Center, Brooklyn, NYC.

2014–2015 **Coordinator, Fine Arts Club**, *IIT Kanpur*.

Organized institute level Fine Arts workshops and coordinated live performances such as on-stage *speed art* and *sand art* along with a team of 4 members and 25 volunteers.

2013–2014 **Academic Mentor, Counselling Service**, *IIT Kanpur*.

Guided a group of academically weak students in elementary programming and electronics courses and helped them to adjust in the new academic environment.

Awards/Honors and Services

- o Marconi Society Scholar in Residence 2021-22.
- o Commencement award for the best graduate student service in ECE, UC San Diego, May 2021.
- o Technical Program Committee (TPC), S3 Workshop, Mobicom 2021.
- o Reviewer of IEEE Trans. Vehicular Technology (TVT) 2019, 2020, NCC 2021, Globecom 2021.
- o Artifact Evaluation Committee, ACM CoNEXT 2019.
- o Awarded student travel grant for MobiCom, New Delhi 2018.
- o Samuel Morse MS Fellowship (full financial support during MS at NYU) 2016–2018.
- o Secured All India Rank 390 (amongst 0.5 million students) in IIT–Joint Entrance Exam 2012.