Ish Kumar Jain

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Research Vision

My research focuses on advancing next-generation networks by optimizing spectrum resources to achieve high data rates, reliability, scalability, and practical deployments. I have particularly contributed in three areas:

- **Communication:** Develop innovative beamforming techniques (e.g., constructive multi-beams) to enhance reliable and scalable communication, particularly for mobile multi-user millimeter-wave networks.
- **Sensing:** Explore novel applications in wireless sensing, such as localization and tracking, leveraging existing infrastructure.
- **Security:** Investigate and mitigate security vulnerabilities (e.g., spoofing, jamming attacks) on wireless devices.

Education

2018 - 2024 **University of California San Diego**, *CA*.
PhD, Electrical and Computer Engineering, *GPA: 4.0*
Advisor: Prof. Dinesh Bharadia

2016 - 2018 **New York University, Tandon School of Engineering**, *NY*.
MS, Electrical and Computer Engineering, *GPA: 3.96*
Advisor: Prof. Shiv Panwar

2012 - 2016 **Indian Institute of Technology (IIT Kanpur)**, *India*.
Bachelors of Technology (B.Tech.), Electrical Engineering, *GPA: 9.5 (out of 10)*

Professional Experience

June–Sep 2022 **VMware**, *Palo Alto, CA, USA*.
Mentor: Dr. Rakesh Misra
- Designed and patented a near-real-time application (xApps) with VMware RIC in Open-RAN framework.

June–Aug 2017 **Nokia Bell Labs**, *Murray Hill, NJ, USA*.
Mentor: Dr. Özge Kaya
- Developed a Reinforcement Learning-based beam management scheme for mobile mmWave links, demonstrating 60% efficiency improvement over a baseline on a real-world mobility dataset.

Awards and Honors

- Best Poster Runner-up, Hotmobile 2023.
- VMware intern achievement award with $240,000 research grant 2022–23.
- Qualcomm Innovation Fellowship winner $100,000 research grant 2022–23.
- Winner of 3-minute research talk competition at ACM Mobisys'20, Mobicom'21, Mobicom'22.
- Commencement award for the best graduate student service in ECE, UC San Diego, May 2021.
- Commencement award for the best MS Academic Achievement in ECE, New York University, May 2019.
- Commencement award (Motorola Gold Medalist) for the best all-round performance in Electrical Engineering and Computer Science, IIT Kanpur, May 2016.
- Travel grant for MobiCom New Delhi 2018, Hotmobile CA 2023, Infocom NY 2023.
- Samuel Morse MS Fellowship ($100,000 financial support), New York University, 2016–2018.
- Secured All India Rank 390 (amongst 0.5 million students) in IIT–Joint Entrance Exam 2012.

Publications

Under Submission — CommRad: Collaborative Learning for Sensing-Driven mmWave Networks
IK Jain, Suriyaa MM, D Bharadia

Hotmobile 2024 — BeamArmor: Anti-Jamming in 5G Cellular Networks with MIMO Null-steering
F Zumegen, **IK Jain**, D Bharadia (to appear)

IEEE Infocom 2023 — mmFlexible: Flexible Directional Frequency Multiplexing for Multi-user mmWave Networks
IK Jain, RR Vennam, R Subbaraman, D Bharadia – Media coverage

IEEE S&P 2023 — mmSpoof: Resilient Spoofing of Automotive Millimeter-wave Radars using Reflect Array
IEEE Security and Privacy 2023.
RR Vennam, **IK Jain**, K Bansal, J Orozco, P Shukla, A Ranganathan, D Bharadia – Media coverage

WPMC 2022 — VRProj: Delivering 360-degree video with Viewport-adaptive Truncation
International Symposium on Wireless Personal Multimedia Communications (WPMC) 2022.
T Qiu, **IK Jain**, R Wu, P Cosman, D Bharadia

HotCarbon 2022 — Multiple smaller base stations are greener than a single powerful one: Densification of Wireless Cellular Networks,
ACM HotCarbon Workshop 2022
A Gupta, **IK Jain**, D Bharadia

SIGCOMM 2021 — [mmReliable] Two beams are better than one: Towards Reliable and High Throughput mmWave Links
IK Jain, R Subbaraman, D Bharadia – Media coverage

ACM mmNets 2020 — mMobile: Building a mmWave Testbed to Evaluate and Address Mobility Effects
4th ACM Workshop on Millimeter-Wave Networks and Sensing Systems (Mobicom Workshop), 2020.
IK Jain, R Subbaraman, TH Sadarahalli, X Shao, H Lin, D Bharadia

Usenix NSDI 2020 — LocAP: Autonomous Millimeter Accurate Mapping of WiFi Infrastructure
R Ayyalasomayajula, A Arun, C Wu, S Rajagopalan, S Ganesaraman, A Seetharaman, **IK Jain**, D Bharadia

MDPI Journal 2019 — Extreme Multiclass Classification Criteria, *MDPI Computation Journal*, 2019.
A Choromanska, **IK Jain**

IEEE JSAC 2018 — The Impact of Mobile Blockers on Millimeter Wave Cellular Systems
IEEE Journal on selected areas in communications (JSAC), 2018
IK Jain, R Kumar, S Panwar

IEEE ITC 2018 — Driven by Capacity or Blockage? A Millimeter-wave Blockage Analysis
IEEE International Teletraffic Congress (ITC) 2018
IK Jain, R Kumar, S Panwar – Invited paper

Posters/ Demos

Milcom 2023 — [Demo] BeamArmor: Anti-Jamming System in Cellular Networks with srsRAN Software Radios
F Zumegen, **IK Jain**, D Bharadia

Mobicom 2023 — [Demo] A Compact and Real-Time Millimeter-wave Experiment Framework with True Mobility Capabilities
IK Jain, S MM, D Bharadia

Hotmobile 2023 — [Poster] Delay Phased Arrays: Towards programmable beam-bandwidth for 5G networks
IK Jain, RR Vennam, D Bharadia – Best Poster Runner-up

Mobicom S3 2021 — Demo and dataset for mmWave multi-beam tracking using mMobile 28 GHz testbed
IK Jain, R Subbaraman, D Bharadia

MobiCom 2018 — [Poster] Facilitating Low Latency and Reliable VR over Heterogeneous Wireless Networks
A Ravichandran, **IK Jain**, R Hegazy, T Wei, D Bharadia

Selected Patents

US Patent (provisional) — A platform for xApp development with RAN intelligent controller
R Misra, **IK Jain**, et al., inventors from VMware.

US Patent (granted) — Enabling Reliable Mmwave Link Using Multi-Beam Pro-Active Tracking.
D Bharadia, **IK Jain**, R Subbaraman, T Sadarahalli

US Patent (granted) — Enable Indoor Navigation with Context assisted Localization
D Bharadia, R Ayyalasomayajula, A Arun, C Wu, S Rajagopalan, S Ganesaraman, A Seetharaman, **IK Jain**

Teaching and Mentoring Experience

Teaching Assistant.

WI 2021,23 ECE 257B- Modern Wireless Communication (Graduate) – best TA 10/10 rating. [Link to class evaluations]
Spring 2020 ECE 157B- Communication and Sensing Systems (Undergraduate) – helped design a new class. [Link to my notes]
Spring 2018 EEGY 9123- Introduction to Machine Learning (Graduate).
Fall 2017 EEUY 4563- Introduction to Machine Learning (Undergraduate) – helped design a new class.[Link to class exercises]
Spring 2017 ELGY 6373- Internet Architecture and Protocols Lab (Graduate).

Mentorship, I have mentored historically underrepresented and underprivileged students.

2022-23 Rohith Reddy (UCSD PhD)
2019-21 Tian Qiu (UCSD PhD)
2023-24 Ushasi Ghosh (UCSD PhD)
2023-24 Mohamed Waeel (UCSD PhD)
2019-21 Raini Wu (UCSD BS → UCSD PhD)
2018-20 Tejas Sadarahalli (UCSD MS → Qualcomm)
2019-21 Hou-Wei Lin (UCSD MS → Amazon)
2020-22 Xiangwei Shao (UCSD MS → Huawei)
2020-21 Weginbara (Michael) Youpele (UCSD MS → Naval Surface Warfare Center)
2021-23 Joshua Orozco (UCSD MS → TrellisWare Technologies)
2021-23 Puja Shukla (UCSD MS → Marvel Technology)

Invited Talks

University and Industry Talks.

Mar 2024 University of Texas, Austin
Nov 2023 IMDEA Network Institute, Madrid, Spain
Aug 2023 Qualcomm Innovation Fellowship Invited Talk, San Diego
Jun 2023 Carnegie Mellon University, Pittsburgh
May 2023 Princeton University, NJ
May 2023 New York University, NY
Apr 2023 University of Washington, Seattle
Sep 2022 VMware invited talk, Palo Alto, CA
Jun 2022 University of Colorado, Denver

Leadership

2021–2022 **The Marconi Society**, *Scholar in Residence*.
Served as a student scholar for facilitating the Marconi Society meetings with the chair Vint Cerf and other prominent scientists, engineers, and policymakers.

2021–2022 **Escribamos Ciencia K12 team**, *UC San Diego*.
Developed interesting science modules and videos for K12 students on topics such as electricity, internet, nuclear power, etc., under guidance of Prof. Olivia Graeve.

2020–2022 **Jacobs Undergraduate Mentorship Program**, *UC San Diego*.
Mentored underprivileged students through lab tours, industry talks, panel discussions, technical workshops, etc., and bridged the communication gap between undergraduates and graduate students.

2020–2021 **O.W.L Reading group**, *Inter-continental collaboration*.
Founded in Fall 2020 as a small group of Ph.D. students interested in research talks and discussion on recent conference papers and has grown over 100+ members in a year.

2019–2021 **Vice President, ECE graduate student council**, *UC San Diego*.
Responsible for providing communication between ECE students and the ECE department and organizing seminars and student mentorship programs.

Services

2023 **Co-chair**.
ACM Mobicom S3 Workshop 2023, co-chair
ACM Mobicom mmNets 2023, publicity chair

2021–2022 **Technical Program Committee (TPC)**.
ACM Mobicom S3 Workshop 2021
IEEE WCNC 2022

2019–2023 **Artifact Evaluation Committee (AEC)**.
ACM Sigcomm 2023
ACM Mobicom 2023
ACM CoNEXT 2019

2019–2023 **Technical Reviews**.
IEEE Transactions on Communications (TCOM) 2023
IEEE Transactions Vehicular Technology (TVT) 2019-23
IEEE/ACM Transactions on Networking (TNET) 2023
IEEE Access 2021-23
IEEE Comm Letter 2022-23
IEEE JSAC 2023
IEEE WCNC 2022-23

2021–2022 **Lead organizer and moderator**.
Sigcomm'21 Social Trivia Organizer
COMSNETS'22 Panel Moderator