

## 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, tracking, and sensing-driven communication.
- **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–Dec 2022 **Research Intern, 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 **Research Intern, 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 Thesis Presentation, ITA (Information Theory Workshop), San Diego, 2024.
- 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.
- Marconi Society Scholar in Residence grant \$5000 (sole recipient) 2021–22.
- Winner of 3-minute Thesis Award 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 Review FlexLink: Decoupling Control and Data Communication in mmWave Networks  
**IK Jain, D Bharadia** (Under review at ACM Sigcomm 2024)
- Under Review CommRad: Collaborative Learning for Sensing-Driven mmWave Networks  
**IK Jain, Suriyaa MM, D Bharadia** (Under review at ACM Sigcomm 2024)

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

- Hotmobile 2024 [Poster] Tiny-twin: A Lightweight and Verifiable Digital Twin for NextG Cellular Networks  
U Ghosh, **IK Jain**, S Shakkottai, D Bharadia
- Hotmobile 2024 [Demo] Practical, Real-Time MIMO Apps with Programmable RAN Controller  
F Zumegen, **IK Jain**, D Bharadia
- 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

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## Patents

- US Patent (provisional) Collaborative Learning for Sensing-Driven Millimeter-wave Networks  
D Bharadia, **IK Jain**, et al.
- US Patent (provisional) Method and Apparatus for Resilient Spoofing of Automotive Radars  
D Bharadia, **IK Jain**, et al.
- US Patent (provisional) Directional Frequency Multiplexing in Multi-User Millimeter-wave Networks  
D Bharadia, **IK Jain**, et al.
- 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, **IK Jain** C Wu, S Rajagopalan, S Ganesaraman, A Seetharaman

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## 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- Wireless 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 Experience,** 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)
- 2022-24 Suriyaa MM (UCSD MS → Apple)
- 2021-23 Joshua Orozco (UCSD MS → TrellisWare Technologies)
- 2021-23 Puja Shukla (UCSD MS → Marvel Technology)
- 2020-22 Xiangwei Shao (UCSD MS → Huawei)
- 2020-22 Weginbara (Michael) Youpele (UCSD MS → Naval Surface Warfare Center)
- 2019-21 Hou-Wei Lin (UCSD MS → Amazon)
- 2018-20 Tejas Sadarahalli (UCSD MS → Qualcomm)
- 2019-21 Raini Wu (UCSD BS → UCSD PhD)

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## Invited Talks

### University and Industry Talks.

- Mar 2024 University of Texas, Austin, TX
- Mar 2024 Rensselaer Polytechnic Institute, Troy, NY
- Nov 2023 IMDEA Network Institute, Madrid, Spain
- Aug 2023 Qualcomm Innovation Fellowship talk, San Diego, CA
- Jul 2023 Indian Institute of Science, Bangalore, India
- Jun 2023 Indian Institute of Technology Kanpur, India
- Jun 2023 Carnegie Mellon University, Pittsburgh, PA
- May 2023 Princeton University, NJ
- May 2023 New York University, NY
- Apr 2023 University of Washington, Seattle, WA

Sep 2022 VMware invited talk, Palo Alto, CA

Jun 2022 University of Colorado, Denver, CO

### Conference Talks.

Mar 2024 Hotmobile 2024, San Diego, CA

Nov 2023 Mobicom mmNets 2023, Madrid, Spain

May 2023 Infocom 2023, New York City, NY

Aug 2021 Mobicom Workshop 2022, virtual – Best 3-minute Thesis Award

Aug 2021 Mobicom Workshop 2021, New Orleans, LA – Best 3-minute Thesis Award

Aug 2021 Sigcomm 2021, virtual

Aug 2021 Mobisys Workshop 2020, virtual – Best 3-minute Thesis Award

Aug 2020 Mobicom mmNets 2020, virtual

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## 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.

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## 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 ISIT 2024

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