

Nakul Garg

Contact Information	Brendan Iribe Center for Computer Science 8125 Campus Drive College Park, MD 20742	nakul22@umd.edu https://nakulg.com/ +1 (202) 725-1919
Research Interests	Sustainable Intelligence, Wireless Systems, Low-power Sensing, Embedded AI	
Education	Ph.D. , Computer Science University of Maryland, College Park	2019–2025
	Bachelor of Technology , ECE IPU, Delhi, India	2014–2018
Awards & Honors	<ul style="list-style-type: none"> • NSF I-Corps Commercialization Cohort 2025 • Marconi Society Young Scholar Award 2024 • Cyber-Physical Systems (CPS) Rising Star 2024 • Best Poster Runner-up, SenSys 2024 • SPiDR highlighted in Communication of the ACM 2024 • Distinguished Artifact Reviewer, ACM MobiSys 2024 • Best Poster Award, MobiSys 2023 • Ann G. Wylie Dissertation Fellowship 2023 • UMD Future Faculty Fellowship 2023 • Outstanding Teaching Assistant Award 2023 • Best Paper Award, MobiSys 2022 • Best Demo Award, MobiSys 2021 • UMD Graduate School Dean’s Fellowship 2019 • Outstanding Student Volunteer, IEEE Delhi Section. 2018 • Winner of World Food India Hackathon. Awarded by the President of India. 2017 • Winner of Celestini Project India 2017, IIT Delhi & Marconi Society. 2017 • Winner of eYantra - National Robotics Competition, IIT Bombay 2017 	
Publications	<p>Conferences:</p> <p>SING: Spatial Context in Large Language Model for Next-Gen Wearables Ayushi Mishra, Yang Bai, Priyadarshan Narayanasamy, Nakul Garg, Nirupam Roy Under Submission</p> <p>DeepSync: A Learning Framework for Pervasive Localization using Code Synchronization on Compressed Cellular Spectrum Aritrik Ghosh, Nakul Garg, Nirupam Roy Under Submission</p> <p>Large Network UWB Localization: Algorithms and Implementation Nakul Garg, Irtaza Shahid, Ramanujan Sheshadri, Karthik Sundaresan, Nirupam Roy NSDI 2025</p> <p>LiTEfoot: Ultra-low-power Localization using Ambient Cellular Signals Nakul Garg*, Aritrik Ghosh*, Nirupam Roy Sensys 2024 (Best poster runner-up award)</p>	

Sirius: A Self-Localization System for Resource-Constrained IoT Sensors
Nakul Garg, Nirupam Roy
Mobisys 2023
(Best poster award)

SPiDR: Ultra-low-power Acoustic Spatial Sensing for Micro-robot Navigation
Nakul Garg*, Yang Bai*, Nirupam Roy
Mobisys 2022
(Best paper award)

Owlet: Enabling Spatial Information in Ubiquitous Acoustic devices
Nakul Garg*, Yang Bai*, Nirupam Roy
Mobisys 2021
(Best demo award)

Workshops:

Structure Assisted Spectrum Sensing for Low-power Acoustic Event Detection
Nakul Garg, Harshvardhan Takawale, Yang Bai, Irtaza Shahid, Nirupam Roy
CPS IoT Week 2023, IASA

ThermWare: Towards Side-channel Defense for Tiny IoT Devices
Nakul Garg, Irtaza Shahid, Erin Avllazagaj, Jennie Hill, Jun Han, Nirupam Roy
HotMobile 2023

VoiceFind: Noise-Resilient Speech Recovery in Commodity Headphones
Irtaza Shahid, Yang Bai, **Nakul Garg**, Nirupam Roy
Mobisys 2022, IASA

Enabling Self-defense in Small Drones
Nakul Garg, Nirupam Roy
HotMobile 2020

Evaluating LED-Camera Communication for Drones
Bhawana Chhagani, Abhay Sheel Anand, **Nakul Garg**, Ashwin Ashok
Mobicom 2020, LioT

Journals:

SPiDR: Microstructure-assisted Vision for Ubiquitous Tiny Robots
Nakul Garg*, Yang Bai*, Nirupam Roy
Communications of ACM 2024
(ACM research highlight)

FreshSense: Transforming Supply Chains with Low-Cost and Dynamic Food Quality Sensing at the Pallet-Level
Nakul Garg, Nirupam Roy, Ranveer Chandra, Vaishnavi Ranganathan
GetMobile 2024

Microstructure-Assisted Vision: Adding New Senses to Low-Power Devices
Nakul Garg*, Yang Bai*, Nirupam Roy
GetMobile 2024
(SIGMOBILE research highlight)

Preprints:

IMUOptimize: A Data-Driven Approach to Optimal IMU Placement for Human Pose Estimation with Transformer Architecture

	Varun Ramani, Hossein Khayami, Yang Bai, Nakul Garg , Nirupam Roy arXiv 2024
	Fast Localization and Tracking in City-Scale UWB Networks Nakul Garg , Irtaza Shahid, Ramanujan Sheshadri, Karthik Sundaresan, Nirupam Roy arXiv 2023
Demos & Posters	Demo: Scalable and Sustainable Asset Tracking with NextG Cellular Signals Nakul Garg* , Aritrik Ghosh*, Nirupam Roy Mobicom 2024
	Poster: Wideband Cellular Sensing for Real-time, Sustainable Geo-localization Tags Nakul Garg* , Aritrik Ghosh*, Nirupam Roy SenSys 2024
	Poster: Ultra-low-power Angle-of-Arrival Estimation Using a Single Antenna Nakul Garg , Nirupam Roy Mobisys 2023
	Poster: Bringing AR/VR to Everyday Life- A Wireless Localization perspective Nakul Garg , Irtaza Shahid, Karthik Sankar, Mallesham Dasari, Ram Sheshadri, Karthikeyan Sundaresan, Nirupam Roy HotMobile 2023
	Poster: Natural Voice Interface for the Next Generation of Smart Spaces Yang Bai, Nakul Garg , Harshvardhan Takawale, Anupam das, Nirupam Roy HotMobile 2023
	Poster: Ultra-low-power Acoustic Imaging Nakul Garg* , Yang Bai*, Nirupam Roy Mobisys 2022
	Demo: Microstructure-guided Spatial Sensing for Low-power IoT Nakul Garg* , Yang Bai*, Nirupam Roy Mobisys 2021
	Poster: Acoustic Sensing for Detecting Projectile Attacks on Small Drones Nakul Garg , Nirupam Roy HotMobile 2020
	Poster: DRIZY- Collaborative Driver Assistance Over Wireless Networks Nakul Garg , Ishani Janveja, Divyansh Malhotra, Chetan Chawla, Pulkit Gupta, Harshil Bansal, Aakanksha Chowdhery, Prerana Mukherjee, Brejesh Lall MobiCom 2017
Patents	Low-power localization and tracking system using ambient cellular signals Nirupam Roy, Aritrik Ghosh, Nakul Garg US Patent . Pending
	Monitoring produce quality in the supply chain at the pallet level with wireless signals Ranveer Chandra, Vaishnavi Ranganathan, Nakul Garg US Patent . Pending

Experience	Research Intern Microsoft Research Advised by : Vaishnavi Ranganathan, Ranveer Chandra	May. 2024—June. 2024
	Research Intern Microsoft Research Advised by : Vaishnavi Ranganathan, Ranveer Chandra	May. 2023—Aug. 2023
	Research Intern NEC Laboratories Advised by : Karthik Sundaresan, Ramanujan K Sheshadri	May. 2022—Aug. 2022
	Research Intern Computer Science Department, IIT Delhi Advised by : Rijurekha Sen	Sept. 2018—July 2019
	Technical Advisor Celestini Project India, Marconi Society, Google, IIT Delhi Led by : Aakanksha Chowdhery, Brejesh Lall	May 2018—Sept. 2018
	Research Intern Celestini Project India, Marconi Society, Google, IIT Delhi Advised by : Aakanksha Chowdhery, Brejesh Lall	Jun. 2017—Sept. 2017
Selected Talks	Invited Talk: Toward Scalable, Sustainable and Intelligent Sensing Nov 4, 2024 SenSys, Hangzhou, China	
	Guest Lecture: Structure-Assisted Acoustic Perception Oct 1, 2024 Rensselaer Polytechnic Institute	
	Invited Talk: Intelligence in Everything: How to Sense, Scale and Sustain Sept 20, 2024 University of California San Diego	
	Guest Lecture: Scaling Down to Scale Up: A New Paradigm in Wireless Sensing for Robotics and Perception Oct 13, 2023 Worcester Polytechnic Institute	
	Guest Lecture: Uncompromised Sensing for Resource-Constrained IoT May 18, 2023 University of Washington	
	Seminar: Ultra-low-power Perception for Micro-robots Sept 9, 2022 Maryland Robotics Center	
	Guest Lecture: Toward Battery-free robots April 26, 2022 First-Year Innovation & Research Experience, UMD	
	3MT Seminar: Inventing Battery-free Devices for a Sustainable Present	

April 6, 2022
University of Maryland College Park, USA

Guest Lecture: Powering up the Next Generation of Robots
Nov 16, 2021
First-Year Innovation & Research Experience, UMD

Invited Talk: Owlet: Enabling Spatial Information in Ubiquitous Acoustic devices
July 19, 2021
Stony Brook University

Invited Talk: Owlet: Enabling Spatial Information in Ubiquitous Acoustic devices
July 15, 2021
University of Illinois Urbana-Champaign

Teaching

Workshop: EmbeddedAI, 2024

Teaching Assistant: Wireless and Mobile Systems for the IoT, Fall 2021-24
Instructor: Prof. Nirupam Roy

Workshop: TinyML and TensorFlow Lite, 2022

Teaching Assistant: Computer Networks, Spring 2020, Spring 2023
Instructor: Prof. Nirupam Roy

Workshop: Socket Programming 101, 2022

Teaching Assistant: Advanced Data Structures, Fall 2019, Spring 2021
Instructor: Prof. David Mount

Course: Embedded AI and Robotics, 2016-18

Professional Services

Organizing Committees:

- TPC Co-chair, S3 Workshop at MobiCom 2024
- Social Media Chair, COMSNETS 2024
- Web Chair, IASA Workshop, CPS IoT Week 2023

Program Committees:

- SenSys Artifact 2024
- MobiCom Posters 2024
- MobiSys Artifact 2024
- MobiCom S3 Workshop 2023
- MobiCom Artifact 2023
- SenSys Shadow TPC 2022
- IMWUT/UbiComp 2023,24
- IEEE Transactions on Mobile Computing 2022

Mentorship & Leadership:

- Mentor Bitcamp Research Trail
- An initiative to engage BIPOC students in research 2021
- President, IEEE student chapter in university 2017
- Chairperson, Robotics and Automation Society - Taught in 50 workshops 2016