

# Akarsh Prabhakara

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|--------------------------|--|----------------------|
| RESEARCH                 | I am a wireless and cyber-physical systems researcher that builds compact wireless systems with high fidelity sensing and communication capabilities unlocking new application potentials. I have built such end-to-end systems with transformative implications spanning cyber-physical systems, wireless communication and robotics. |                      |
| INTERESTS                | <i>Research:</i> Cyber-Physical-Systems, Radio Frequency Sensing Systems, Next Gen Wireless Systems<br><i>Application Themes:</i> Automotive, Robotics, Critical Infrastructure Monitoring<br><i>Core:</i> Wireless Systems, Signal Processing, Embedded Systems, Computer Networks  |                      |
| EDUCATION                | <b>Carnegie Mellon University</b>  | 2018 - 2024          |
|                          | Ph.D. in Electrical and Computer Engineering<br><i>Advisors:</i> Prof. Anthony Rowe and Prof. Swarun Kumar<br><i>Committee Members:</i> Prof. Aswin Sankaranarayanan (CMU) and Prof. Mani Srivastava (UCLA)  |                      |
|                          | <b>National Institute of Technology Karnataka</b>  | 2014 - 2018          |
|                          | B.Tech. in Electronics and Communication Engineering   |                      |
| PROFESSIONAL EXPERIENCES | <b>Zendar, Berkeley</b>  | May 2022 - Aug 2022  |
|                          | Research Intern with Dr. Darsh Ranjan  |                      |
|                          | <b>Optum, Pittsburgh</b>   | May 2021 - Aug 2021  |
|                          | Corporate Startup Lab Fellow with Danita Kiser   |                      |
|                          | <b>Texas Instruments, Dallas</b>   | May 2019 - Aug 2019  |
|                          | Research Intern at Kilby Labs with Xiaolin Lu  |                      |
|                          | <b>Microsoft Research, Bangalore</b>   | Aug 2017 - Dec 2017  |
|                          | Research Intern with Dr. Harsha Simhadri   |                      |
|                          | <b>University of Lübeck, Germany</b>   | May 2017 - July 2017 |
|                          | Research Intern with Dr. Alfred Mertins  |                      |
|                          | <b>Indian Institute of Science, Bangalore</b>  | May 2016 - July 2016 |
|                          | Research Intern with Dr. GV Anand  |                      |
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| AWARDS                   | • Best Presentation Runner Up, Ph.D. Forum ACM/IEEE IPSN   | 2023                 |
|                          | • Best Demo Runner Up, ACM/IEEE IPSN   | 2023                 |
|                          | • Top 5 Best Demos, ACM MobiCom  | 2023                 |
|                          | • Trailblazer Alumni - Kumarans Educational Council  | 2022                 |
|                          | • ACM GetMobile Research Highlight for Quasar  | 2022                 |
|                          | • Corporate Startup Lab Fellowship   | 2021                 |
|                          | • ACM GetMobile Research Highlight for Osprey  | 2021                 |
|                          | • CMU ECE Department Award for Exemplary Qualifying Exam Performance   | 2020                 |
|                          | • Best Paper Honorable Mention, ACM MobiSys  | 2020                 |
|                          | • Best Demo, ACM MobiSys   | 2020                 |
|                          | • Carnegie Institute of Technology Dean's Fellowship   | 2018-2019            |
|                          | • DAAD WISE Fellowship   | 2017                 |
|                          | • Indian Academy of Sciences' Summer Research Fellowship   | 2016                 |
|                          | • Final Fifteen of the IEEE Signal Processing Cup  | 2016                 |
|                          | • Best Outgoing Student Award  | 2014 and 2012        |

CONFERENCE  
PUBLICATIONS  
(PEER  
REVIEWED)

**Hydra: Exploiting Multi-Bounce Scattering for Beyond-Field-of-View mmWave Radar.**  
*N Mehrotra, D Pandey, A Prabhakara, Y Liu, S Kumar, A Sabarwal*  
Conditionally Accepted in ACM MobiCom 2024.

**DART: Implicit Doppler Tomography for Radar Novel View Synthesis.**  
*T Huang\*, J Miller\*, A Prabhakara, T Jin, T Laroia, Z Kolter, A Rowe.*  
IEEE/CVF CVF CVPR 2024.

CVPR Oral (90 orals / 2719 accepted papers = 3.3%)

**High Resolution Point Clouds from mmWave Radar.**  
*A Prabhakara, T Jin, A Das, G Bhatt, L Kumari, E Soltanaghahi, J Bilmes, S Kumar, A Rowe.*  
IEEE ICRA 2023.

**Platypus: Sub-mm  $\mu$ -Displacement Sensing with Passive mmWave Tags As Phase Carriers.**  
*T King, J. He, C. Yao, A Prabhakara, M Alipour, S Kumar, A Rowe, E Soltanaghahi.*  
ACM/IEEE IPSN 2023.

**Exploring mmWave Radar and Camera Fusion for High-Resolution and Long-Range Depth Imaging.**  
*A Prabhakara\*, D Zhang\*, C Li, S Munir, A Sankaranarayanan, A Rowe, S Kumar.*  
IEEE/RSJ IROS 2022.

**Zoom Out: Abstractions for Efficient Radar Algorithms on COTS architecture.**  
*TM Low, Y Chi, J Hoe, S Kumar, A Prabhakara, L Shi, U Sridhar, N Tukanov, C Wang, Y Wu.*  
IEEE Phased Array Systems and Technology (PAST) 2022.

**Millimetro: mmWave Retro-Reflective Tags for Accurate, Long Range Localization.**  
*E Soltanaghahi\*, A Prabhakara\*, A Balanuta\*, M Anderson, J Rabaey, S Kumar, A Rowe.*  
ACM MobiCom 2021.

**A Community-Driven Approach to Democratize Access to Satellite Ground Stations.**  
*V Singh, A Prabhakara, D Zhang, O Yağın, S Kumar.*  
ACM MobiCom 2021.  
ACM GetMobile Research Highlight

**TagFi: Locating an Ultra-Low Power Tag Using Existing WiFi Infrastructure.**  
*E Soltanaghahi, A Dongare, A Prabhakara, S Kumar, A Rowe, K Whitehouse.*  
Ubicomp 2021.

**Osprey: A mmWave Approach to Tire Wear Sensing.**  
*A Prabhakara, V Singh, S Kumar, A Rowe.*  
ACM MobiSys 2020.  
Best Paper Honorable Mention, ACM GetMobile Research Highlight  
Press: Gizmodo, Hackster.io, TedX Innovation Expo and That's Cool News Podcast.

**Underwater Acoustic Source Localization by Vector Sensor Array using Compressive Sampling.**  
*PV Nagesha, GV Anand, S Gurugopinath, A Prabhakara.*  
MTS/IEEE Oceans 2016.

POSTERS,  
DEMOS,  
MAGAZINES  
(PEER  
REVIEWED)

**RadarHD: Demonstrating Lidar-like Point Clouds from mmWave Radar.**  
*A Prabhakara, T Jin, A Das, G Bhatt, L Kumari, E Soltanaghahi, J Bilmes, S Kumar, A Rowe.*  
ACM MobiCom Demo 2023.  
Top 5 Best Demos

**Pushing the Limits of High Resolution Sensing with Single-Chip mmWave Radar.**

[A Prabhakara](#).

ACM/IEEE IPSN Ph.D. Forum 2023.

Best Presentation Runner Up

**Demo Abstract: Platypus: Sub-mm  $\mu$ -Displacement Sensing with Passive mmWave Tags As Phase Carriers.**

[J. He](#), [T King](#), [C. Yao](#), [A Prabhakara](#), [M Alipour](#), [S Kumar](#), [A Rowe](#), [E Soltanaghai](#)..

ACM/IEEE IPSN Demo 2023.

Best Demo Runner Up

**A Community-Driven Approach to Democratize Access to Satellite Ground Stations.**

[V Singh](#), [A Prabhakara](#), [D Zhang](#), [O Yağın](#), [S Kumar](#).

ACM GetMobile Magazine Mar 2022.

**Long-range Accurate Ranging of Millimeter-wave Retro-reflective Tags in High Mobility.**

[TH King](#), [E Soltanaghai](#), [A Prabhakara](#), [A Balanuta](#), [S Kumar](#), [A Rowe](#).

ACM MobiCom Demo 2021.

**OSPREY: A mmWave Approach to Tire Wear Sensing.**

[A Prabhakara](#), [V Singh](#), [S Kumar](#), [A Rowe](#).

ACM GetMobile Magazine Dec 2020.

**Osprey Demo: A mmWave Approach to Tire Wear Sensing.**

[A Prabhakara](#), [V Singh](#), [S Kumar](#), [A Rowe](#).

ACM MobiSys Demo 2020.

Best Demo

PATENTS

**Methods, Systems And Low Power Retrodirective RF Tags for Localization.**

[E Soltanaghai](#), [A Rowe](#), [S Kumar](#), [A Prabhakara](#), [A Balanuta](#)

US 2022/0244374A1

**Tire Sensing Systems and Methods.**

[A Prabhakara](#), [V Singh](#), [S Kumar](#), [A Rowe](#), [T Wei](#), [H Dorfi](#)

WO 2021/231381

RESEARCH  
TALKS

- ASU, NC State, UCLA, University of British Columbia, UW-Madison 2024  
*High quality sensing from compact radio frequency systems*
- ICRA 2023 2023  
*High resolution point clouds from mmWave radar*
- IPSN 2023 Ph.D. Forum 2023  
*Pushing the limits of high resolution sensing with single-chip mmWave radar*
- Microsoft Research India 2022  
*Pushing the limits of high resolution sensing with single-chip mmWave radar*
- IROS 2022 2022  
*Exploring mmWave radar and camera fusion for high-resolution and long-range depth imaging*
- DARPA/SRC CONIX Annual Review 2022  
*RF Sensing: CONIX and beyond ...*
- TedX CMU Innovation Expo 2021
- MobiSys 2020 2020  
*Osprey: A mmWave approach to tire wear sensing*
- DARPA/SRC CONIX Student Seminar 2020  
*Osprey: A mmWave approach to tire wear sensing*

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|-------------------------------------|--|
| PRESS<br>ARTICLES                   | <ul style="list-style-type: none"> <li>• Pioneering Minds<br/>“Low Power, High Accuracy Tag That Can Improve Autonomous Driving”</li> <li>• That’s Cool News Podcast<br/>“Osprey: Utilizing mmWaves to Sense Vehicle Tire Wear and Tear — Akarsh Prabhakara”</li> <li>• Hackster.io<br/>“Researchers Develop System That Monitors Tire Wear in Real-Time”</li> <li>• Gizmodo<br/>“Researchers Find That Radar Can Be Used to Detect a Nail in a Tire Long Before It Goes Flat”</li> <li>• Weibold<br/>“Radar to monitor tire wear developed by American engineers”</li> <li>• Wonderful Engineering<br/>“This Radar Based Device Can Detect Tire Punctures Along With Wear And Tear”</li> <li>• Interesting Engineering<br/>“Radar Can Be Used to Detect Tire Wear and Tear, Nail Punctures”</li> <li>• Tyrepress.com<br/>“Measuring tyre wear with on-car radar”</li> </ul> |
| ENGINEERING<br>TEAM<br>COMPETITIONS | <p><b>DARPA Subterranean Challenge 2019</b><br/>As part of the winning <a href="#">CMU team</a>, I performed initial experimentation on wireless mesh networking for consistent communication among robots, access points and base station in mines and caves.</p> <p><b>IEEE Signal Processing Cup 2017</b><br/>We built a real-time beat tracking algorithm running on an embedded device reacting to a variety of music signals. Check out our trippy visualizations <a href="#">here!</a>.</p> <p><b>IEEE Signal Processing Cup 2016</b><br/>We developed a solution to extract power signal leaking into recorded audio signals and geolocate the power grid where audio was recorded. We finished top 15 in the world!</p>   |
| RESEARCH<br>MENTORING               | <ul style="list-style-type: none"> <li>• John Martins (CMU UG) 2023</li> <li>• Priyadarshini Kulkarni (CMU Masters) 2022</li> <li>• Tao Jin (CMU Masters → CMU Ph.D.) 2021-2022</li> <li>• Chao Li (CMU UG → MIT Ph.D.) 2021-2022</li> <li>• Thomas Horton King (CMU UG → Stanford Ph.D.) 2020-2021</li> </ul>   |
| TEACHING                            | <ul style="list-style-type: none"> <li>• Graduate Teaching Assistant at CMU: Developed course material, gave lectures, and worked with students through assignments. <ul style="list-style-type: none"> <li>• Wireless Communication Fall 2021</li> <li>• Computer Networks Spring 2020</li> </ul> </li> <li>• Guest Lectures <ul style="list-style-type: none"> <li>• Intro to Computer Systems, CMU ECE Spring 2023</li> <li>• Advanced Topics in Communication, UW EE Spring 2023</li> </ul> </li> </ul>  |
| PEER<br>REVIEWING                   | <ul style="list-style-type: none"> <li>• 2024: IEEE ICRA, IMWUT, Robotics and Automation Letters, ToN, Network Magazine</li> <li>• 2023: Transactions on Networking (ToN), Intelligent Vehicles (TIV), Sensor Networks (ToSN)</li> <li>• 2022: IMWUT, Transactions on Sensor Networks (ToSN)</li> <li>• 2021: Shadow Program Committee ACM Compass</li> </ul>  |
| ORGANIZATION<br>AND LEADERSHIP      | <ul style="list-style-type: none"> <li>• Co-chair S3 workshop at ACM MobiCom 2023</li> <li>• Member of CMU ECE student council for faculty candidate interviews 2023</li> <li>• Treasurer of CMU ECE Graduate Student Organization 2019-2022</li> <li>• Joint-Secretary of IEEE Chapter at NITK 2017-2018</li> </ul>   |
| SOCIETAL<br>OUTREACH                | <ul style="list-style-type: none"> <li>• Mentored 5 Masters and early Ph.D. students as part of CMU ECE’s Peer Mentor Program organized by the Diversity, Inclusion and Outreach Committee.</li> <li>• Worked with Optum Inc. about large scale wireless connectivity technologies and built an actionable plan to bridge the urban/rural divide in accessing digital health solutions.</li> <li>• Developer and Instructor at CMU ECE Outreach program. I developed lab sessions and organized hardware building for middle and high school students in the Pittsburgh region.</li> </ul>   |