Karan Ahuja

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I'm a Lisa Wissner-Slivka & Benjamin Slivka Assistant Professor in Computer Science at Northwestern University where I direct the Sensing, Perception, Interactive Computing & Experiences (SPICE) Lab. I am also an affiliate (by courtesy) in the Department of Preventive Medicine at the Feinberg School of Medicine. My research group creates computing technologies that sense, track, and understand humans to augment and assist them in their daily lives. These efforts overcome challenges in emerging domains such as mobile health sensing, wearable computing, smart environments, and augmented reality. We leverage expertise in signal processing, embedded systems, physical fabrication, multimodal machine learning, computer vision, and edge AI to deploy and evaluate these technologies in real-world settings. Many of our projects have been open-sourced, deployed in the wild, licensed, shipped as product features (including features used by over 200 million users) and have influenced flagship products at leading companies like Google and Apple.

EDUCATION

Carnegie Mellon University | Pittsburgh, USA
2017 - 2023 | PhD | Human-Computer Interaction
Thesis Title: Practical and Rich User Digitization (Awarded ACM SIGCHI Outstanding Dissertation)
Advisors: Chris Harrison and Mayank Goel

Indian Institute of Information Technology | Guwahati, India
2013 - 2017 | B.Tech. | Computer Science and Engineering
GPA : 4/4 | Department Rank 1

PROFESSIONAL EXPERIENCE

Northwestern University
2024 - Present | Evanston, USA | Wissner Slivka Chair in Computer Science | Tenure-Track Assistant Professor
Director of the Sensing, Perception, Interactive Computing, Experiences (SPICE) Lab in the Department of Computer Science at the McCormick School of Engineering.

Google
2023 - 2026 | Seattle, USA | Visiting Research Scientist
Visiting Faculty Researcher leading efforts on Augmented Reality and Experiences.

Apple
May – Aug 2022 | Cupertino, USA | Research Intern
Collaborators: Camera Incubation and Wireless Sensing Group | I investigated power-efficient human-sensing and activity recognition techniques.

Meta Reality Labs
May – Aug 2021 | Redmond, USA | Research Intern
Collaborators: Wolf Kienzle, Eric Whitmire, and Joseph Greer | I worked on context-aware user digitization techniques using sparse on-body sensor configurations.

Microsoft Research
Jan – Apr 2020 | Pittsburgh, USA | Research Consultant
I worked on motion stylization techniques for mixed reality.

Microsoft Research
May – Aug 2019 | Redmond, USA | Research Intern
Collaborators: Andy Wilson, Eyal Ofek, Mar Gonzalez-Franco, and Christian Holz | I worked on novel sensing and interaction techniques for mixed reality.

IBM Research
May – Jul 2016 | New Delhi, India | Research Intern

Collaborators: Kuntal Dey | I built eye-gaze estimation algorithms for mobile devices.

IBM Research
May 2015 – Dec 2015 | New Delhi, India | Research Intern
Collaborators: Kuntal Dey | I developed human behavioral inference models for cognitive load analysis.

AWARDS AND HONORS

ACM SIGCHI Special Recognition Award AndroidXR	2025
Google Research Scholar Award	2025
South by Southwest (SXSW) Innovation Awards Finalist	2025
Forbes 30 under 30 Asia	2024
MIT 35 under 35 Asia	2024
ACM SIGCHI Outstanding Dissertation Award	2024
Lisa Wissner-Slivka & Benjamin Slivka Chair in Computer Science, Northwestern University	2024
Honorable Mention Award (Top 5%) ACM CHI	2023
Heidelberg Laureate Forum Young Researcher	2022
Siebel Fellow	2022
Honorable Mention Award (Top 5%) ACM CHI	2022
Fast Company Innovation by Design Finalist	2021
Honorable Mention Award (Top 5%) ACM CHI	2021
Collegiate Inventors Competition Graduate Finalist	2020
Fast Company Innovation by Design Finalist	2020
Honorable Mention Award (Top 5%) ACM UIST	2019
President's Gold Medal India	2017
IBM Blue Scholar	2017

PUBLICATIONS

MAJOR JOURNAL PUBLICATIONS

10. Vasco Xu, Brian Chen, Eric J. Gonzalez, Andrea Colaço, Henry Hoffman, Mar Gonzalez-Franco, and **Karan Ahuja** . 2026. SurfaceXR: Fusing Smartwatch IMUs and Ego-centric Hand Pose for Seamless Surface Interactions. IEEE Transactions on Visualization and Computer Graphics (TVCG) Presented at Proc. IEEE VR 2026.
9. Ryo Suzuki, Parastoo Abtahi, Cheng Zhu-Tian, Mustafa Doga Dogan, Andrea Colaco, Eric J. Gonzalez, **Karan Ahuja** , and Mar Gonzalez-Franco. "Programmable reality." Frontiers in Virtual Reality 6 (2025): 1649785.
8. Riku Arakawa, **Karan Ahuja** , Kristie Mak, Gwendolyn Thompson, Sam Shaaban, Oliver Lindhiem, and Mayank Goel. 2023. LemurDx: Using Unconstrained Passive Sensing for an Objective Measurement of Hyperactivity in Children with no Parent Input. In Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT) 7, 2, Article 46 (June 2023), 23 pages. UbiComp '23.
7. Vimal Mollyn, **Karan Ahuja** , Dhruv Verma, Chris Harrison, and Mayank Goel. 2022. SAMoSA: Sensing Activities with Motion and Subsampled Audio. Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT) 6, 3, Article 132 (September 2022), 19 pages. UbiComp '22.
6. **Karan Ahuja** , Eyal Ofek, Mar Gonzalez-Franco, Christian Holz, and Andrew D. Wilson. 2021. CoolMoves: User Motion Accentuation in Virtual Reality. Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), Volume 5, Issue 2, Article 52 (June 2021), 23 pages. UbiComp '21.
5. **Karan Ahuja*** , Dohyun Kim*, Franceska Xhakaj, Virag Varga, Anne Xie, Stanley Zhang, Jay Eric Townsend, Chris Harrison, Amy Ogan, and Yuvraj Agarwal. 2019. EduSense: Practical Classroom Sensing at Scale. Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), Volume 3, Issue 3, Article 71 (September 2019), 26 pages. UbiComp '19. (*Equal Contribution)

4. **Karan Ahuja*** , Rushil Khurana*, Zac Yu, Jennifer Mankoff, Chris Harrison, and Mayank Goel. 2018. GymCam: Detecting, Recognizing and Tracking Simultaneous Exercises in Unconstrained Scenes. Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), Volume 2, Issue 4, Article 185 (December 2018), 17 pages. UbiComp '19. (*Equal Contribution)
3. Jason Wu, **Karan Ahuja** , Richard Li, Victor Chen, and Jeffrey Bigham. 2019. ScratchThat: Supporting Command-Agnostic Speech Repair in Voice-Driven Assistants. Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), Volume 3, Issue 2, Article 63 (June 2019), 17 pages. UbiComp '19.
2. **Karan Ahuja** , Rahul Islam, Varun Parashar, Kuntal Dey, Chris Harrison, and Mayank Goel. 2018. EyeSpyVR: Interactive Eye Sensing Using Off-the-Shelf, Smartphone-Based VR Headsets. Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), Volume 2, Issue 2, Article 57 (June 2018), 10 pages. UbiComp '18.
1. **Karan Ahuja** , Rahul Islam, Ferdous A. Barbhuiya, and Kuntal Dey. "Convolutional neural networks for ocular smartphone-based biometrics." Pattern Recognition Letters 91 (2017): 17-26.

MAJOR CONFERENCE PUBLICATIONS (PEER-REVIEWED AND JOURNAL QUALITY)

34. Yiquan Li, Taeyoung Yeon, Chenfeng Gao, Vasco Xu, Xuanyou Liu, and **Karan Ahuja** . 2026. MARIO: Motion-Augmented Real-Time Multi-Sensor Inertial Odometry. To Appear In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Findings.
33. Taeyoung Yeon, Vasco Xu, Henry Hoffmann, and **Karan Ahuja** . 2025. WatchHAR: Real-time On-device Human Activity Recognition System for Smartwatches. In Proceedings of the 27th International Conference on Multimodal Interaction (ICMI '25). Association for Computing Machinery, New York, NY, USA, 387–394.
32. Junyi Zhu, Tianyu Xu, Jiayu Wang, Emily Guan, JaeYoung Moon, Stiven Morvan, D Shin, Andrea Colaço, Stefanie Mueller, **Karan Ahuja** , Yiyue Luo, and Ishan Chatterjee. 2025. EI-Lite: Electrical Impedance Sensing for Micro-gesture Recognition and Pinch Force Estimation. In Proceedings of the 38th Annual ACM Symposium on User Interface Software and Technology (UIST '25). Association for Computing Machinery, New York, NY, USA, Article 23, 1–14.
31. Baosheng James Hou, Lucy Abramyan, Prasanthi Gurumurthy, Haley Adams, Ivana Tosic Rodgers, Eric J Gonzalez, Khushman Patel, Andrea Colaço, Ken Pfeuffer, Hans Gellersen, **Karan Ahuja** , and Mar Gonzalez-Franco. 2025. Online-EYE: Multimodal Implicit Eye Tracking Calibration for XR. In Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems (CHI '25). Association for Computing Machinery, New York, NY, USA, Article 550, 1–16.
30. Arpit Bhatia, Moaaz Hudhud Mughrabi, Diar Abdlkarim, Massimiliano Di Luca, Mar Gonzalez-Franco, **Karan Ahuja** , and Hasti Seifi. 2025. Text Entry for XR Trove (TEXT): Collecting and Analyzing Techniques for Text Input in XR. In Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems (CHI '25). Association for Computing Machinery, New York, NY, USA, Article 1223, 1–18.
29. Riccardo Bovo, Steven Abreu, **Karan Ahuja** , Eric J. Gonzalez, Li-Te Cheng, and Mar Gonzalez-Franco. "Embardiment: An embodied AI agent for productivity in XR." In 2025 IEEE Conference Virtual Reality and 3D User Interfaces (IEEE VR), pp. 708-717. 2025.
28. Anders Christensen, Nooshin Mojab, Khushman Patel, **Karan Ahuja** , Zeynep Akata, Ole Winther, Mar Gonzalez-Franco, and Andrea Colaco. "Geometry Fidelity for Spherical Images." In European Conference on Computer Vision (ECCV), pp. 276-292. Springer, Cham, 2025.
27. Vasco Xu, Chenfeng Gao, Henry Hoffmann, **Karan Ahuja** . "MobilePoser: Real-Time Full-Body Pose Estimation and 3D Human Translation from IMUs in Mobile Consumer Devices." In Proceedings of the 37th Annual ACM Symposium on User Interface Software and Technology, pp. 1-11. 2024.
26. Mustafa Doga Dogan, Eric J. Gonzalez, Andrea Colaco, **Karan Ahuja** , Ruofei Du, Johnny Lee, Mar Gonzalez-Franco, and David Kim. "Augmented Object Intelligence: Making the Analog World Interactable with XR-Objects." In Proceedings of the 37th Annual ACM Symposium on User Interface Software and Technology, pp. 1-15. 2024. **South by Southwest (SXSW) Innovation Awards Finalist**
25. Mar Gonzalez-Franco, Diar Abdlkarim, Arpit Bhatia, Stuart Macgregor, Jason A. Fotso-Puepi, Eric J. Gonzalez, Hasti Seifi, Massimiliano Di Luca, and **Karan Ahuja** . "Hovering Over the Key to Text Input in XR." In 2024 IEEE International Symposium on Emerging Metaverse (ISEMV), pp. 13-16. IEEE, 2024.
24. Rahul Islam, Vasco Miguel Liang Xu, and **Karan Ahuja** . "MotionTrace: IMU-based Trajectory Prediction for Smartphone AR Interactions." In 2024 IEEE 20th International Conference on Body Sensor Networks (BSN), pp. 1-4. IEEE, 2024.
23. Alexander Kyu, Hongyu Mao, Junyi Zhu, Mayank Goel, and **Karan Ahuja** . 2024. EITPose: Wearable and Practical Electrical Impedance Tomography for Continuous Hand Pose Estimation. In Proceedings of the CHI Conference on Human Factors in Computing Systems (CHI '24). Association for Computing Machinery, New York, NY, USA, Article 402, 1–10.

22. Vimal Mollyn, Riku Arakawa, Mayank Goel, Chris Harrison, and **Karan Ahuja** . 2023. IMUPoser: Full-Body Pose Estimation using IMUs in Phones, Watches, and Earbuds. In Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (CHI '23). Association for Computing Machinery, New York, NY, USA, Article 529, 1–12. **Best Paper Nomination**
21. Riku Arakawa, Mayank Goel, Chris Harrison, and **Karan Ahuja** . 2022. RGBDGaze: Gaze Tracking on Smartphones with RGB and Depth Data. In Proceedings of the 2022 International Conference on Multimodal Interaction (ICMI '22). Association for Computing Machinery, New York, NY, USA, 329–336.
20. **Karan Ahuja** , Vivian Shen, Cathy Fang, Nathan Riopelle, Andy Kong, and Chris Harrison. 2022. ControllerPose: Inside-Out Body Capture with VR Controller Cameras. In CHI Conference on Human Factors in Computing Systems (CHI '22). Association for Computing Machinery, New York, NY, USA, Article 108, 1–13.
19. Craig Shultz, Daehwa Kim, **Karan Ahuja** , and Chris Harrison. 2022. TriboTouch: Micro-Patterned Surfaces for Low Latency Touchscreens. In CHI Conference on Human Factors in Computing Systems (CHI '22). Association for Computing Machinery, New York, NY, USA, Article 347, 1–13. **Best Paper Nomination**
18. **Karan Ahuja** , Eric Whitmire, Joseph Greer, and Wolf Kienzle. 2022. ActivityPoser: Activity driven Full-Body Pose Estimation from Sparse IMU Configurations. In Symposium on Spatial User Interaction (SUI '22). Association for Computing Machinery, New York, NY, USA, Article 19, 1–2.
17. **Karan Ahuja** , Paul Streli, and Christian Holz. 2021. TouchPose: Hand Pose Prediction, Depth Estimation, and Touch Classification from Capacitive Images. In The 34th Annual ACM Symposium on User Interface Software and Technology (UIST '21). Association for Computing Machinery, New York, NY, USA, 997–1009.
16. Andy Kong, **Karan Ahuja** , Mayank Goel, and Chris Harrison. 2021. EyeMU Interactions: Gaze + IMU Gestures on Mobile Devices. In Proceedings of the 2021 International Conference on Multimodal Interaction (ICMI '21). Association for Computing Machinery, New York, NY, USA, 577–585.
15. **Karan Ahuja** , Sven Mayer, Mayank Goel, and Chris Harrison. 2021. Pose-on-the-Go: Approximating User Pose with Smartphone Sensor Fusion and Inverse Kinematics. In Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems (CHI '21). Association for Computing Machinery, New York, NY, USA, Article 9, 1–12. **Fast Company Innovation by Design Finalist**
14. **Karan Ahuja** , Yue Jiang, Mayank Goel, and Chris Harrison. 2021. Vid2Doppler: Synthesizing Doppler Radar Data from Videos for Training Privacy-Preserving Activity Recognition. In Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems (CHI '21). Association for Computing Machinery, New York, NY, USA, Article 292, 1–10.
13. **Karan Ahuja*** , Deval Shah*, Sujeath Pareddy, Franceska Xhakaj, Amy Ogan, Yuvraj Agarwal, and Chris Harrison. 2021. Classroom Digital Twins with Instrumentation-Free Gaze Tracking. In Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems (CHI '21). Association for Computing Machinery, New York, NY, USA, Article 484, 1–9. (*Equal Contribution)
12. Yasha Iravantchi, **Karan Ahuja** , Mayank Goel, Chris Harrison, and Alanson Sample. 2021. PrivacyMic: Utilizing Inaudible Frequencies for Privacy Preserving Daily Activity Recognition. In Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems (CHI '21). Association for Computing Machinery, New York, NY, USA, Article 198, 1–13. **Best Paper Nomination**
11. **Karan Ahuja** , Andy Kong, Mayank Goel, and Chris Harrison. 2020. Direction-of-Voice (DoV) Estimation for Intuitive Speech Interaction with Smart Devices Ecosystems. In Proceedings of the 33rd Annual ACM Symposium on User Interface Software and Technology (UIST '20). Association for Computing Machinery, New York, NY, USA, 1121–1131.
10. **Karan Ahuja** , Mayank Goel, and Chris Harrison. 2020. BodySLAM: Opportunistic User Digitization in Multi-User AR/VR Experiences. In Symposium on Spatial User Interaction (SUI '20). Association for Computing Machinery, New York, NY, USA, Article 16, 1–8.
9. **Karan Ahuja** , Abhishek Bose, Mohit Jain, Kuntal Dey, Anil Joshi, Krishnaveni Achary, Blessin Varkey, Chris Harrison, and Mayank Goel. 2020. Gaze-based Screening of Autistic Traits for Adolescents and Young Adults using Prosaic Videos. In Proceedings of the 3rd ACM SIGCAS Conference on Computing and Sustainable Societies (COMPASS '20). Association for Computing Machinery, New York, NY, USA, 324.
8. **Karan Ahuja** , Chris Harrison, Mayank Goel, and Robert Xiao. 2019. MeCap: Whole-Body Digitization for Low-Cost VR/AR Headsets. In Proceedings of the 32nd Annual ACM Symposium on User Interface Software and Technology (UIST '19). Association for Computing Machinery, New York, NY, USA, 453–462. **Best Paper Nomination**
7. **Karan Ahuja** , Sujeath Pareddy, Robert Xiao, Mayank Goel, and Chris Harrison. 2019. LightAnchors: Appropriating Point Lights for Spatially-Anchored Augmented Reality Interfaces. In Proceedings of the 32nd Annual ACM Symposium on User Interface Software and Technology (UIST '19). Association for Computing Machinery, New York, NY, USA, 189–196. **Collegiate Inventors Competition Finalist**

6. Gierad Laput, **Karan Ahuja** , Mayank Goel, and Chris Harrison. 2018. Ubicoustics: Plug-and-Play Acoustic Activity Recognition. In Proceedings of the 31st Annual ACM Symposium on User Interface Software and Technology (UIST '18). Association for Computing Machinery, New York, NY, USA, 213–224. **Fast Company Innovation by Design Finalist**
5. Aanand Nayyar, Utkarsh Dwivedi, **Karan Ahuja** , Nitendra Rajput, Seema Nagar, and Kuntal Dey. 2017. OptiDwell: Intelligent Adjustment of Dwell Click Time. In Proceedings of the 22nd International Conference on Intelligent User Interfaces (IUI '17). Association for Computing Machinery, New York, NY, USA, 193–204.
4. **Karan Ahuja** , Anubhav Pandey, Ferdous A. Barbhuiya, Seema Nagar, and Kuntal Dey. "SmallStore: A region-of-interest based adaptive system for compressing human face videos." In TENCON 2017-2017 IEEE Region 10 Conference, pp. 1004-1009. IEEE, 2017.
3. **Karan Ahuja** , Rahul Islam, Ferdous A. Barbhuiya, and Kuntal Dey. "A preliminary study of CNNs for iris and periocular verification in the visible spectrum." In 2016 23rd International conference on pattern recognition (ICPR), pp. 181-186. IEEE.
2. **Karan Ahuja** , Ruchika Banerjee, Seema Nagar, Kuntal Dey, and Ferdous Barbhuiya. "Eye center localization and detection using radial mapping." In 2016 IEEE International Conference on image processing (ICIP), pp. 3121-3125. IEEE, 2016.
1. **Karan Ahuja** , Abhishek Bose, Seema Nagar, Kuntal Dey, and Ferdous Barbhuiya. "ISURE: User authentication in mobile devices using ocular biometrics in visible spectrum." In 2016 IEEE International Conference on Image Processing (ICIP), pp. 335-339. IEEE, 2016.

CONFERENCE ADJUNCT PUBLICATIONS (PEER-REVIEWED)

4. Steven Abreu, Tiffany D. Do, **Karan Ahuja** , Eric J. Gonzalez, Lee Payne, Daniel McDuff, and Mar Gonzalez-Franco. "PARSE-Ego4D: Personal Action Recommendation Suggestions for Egocentric Videos." In ICLR 2025 Workshop on Foundation Models in the Wild.
3. Eric J. Gonzalez, Kushman Patel, **Karan Ahuja** and Mar Gonzalez-Franco, "XDTK: A Cross-Device Toolkit for Input & Interaction in XR," 2024 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW), Orlando, FL, USA, 2024, pp. 467-470.
2. Eric J Gonzalez, Ishan Chatterjee, Mar Gonzalez-Franco, Andrea Colaço, and **Karan Ahuja** . 2024. Intent-driven input device arbitration for XR. In Extended Abstracts of the 2024 CHI Conference on Human Factors in Computing Systems (CHI EA '24). Association for Computing Machinery, New York, NY, USA, Article 199, 1–5.
1. Utkarsh Dwivedi, **Karan Ahuja** , Rahul Islam, Ferdous A. Barbhuiya, Seema Nagar, and Kuntal Dey. 2017. EyamKayo: Interactive Gaze and Facial Expression Captcha. In Proceedings of the 22nd International Conference on Intelligent User Interfaces Companion (IUI '17 Companion). Association for Computing Machinery, New York, NY, USA, 53–56.

PATENTS

GRANTED

11. E Ofek, M Franco, A Wilson, K Ahuja, C Holz. Real time styling of motion for virtual environments. US Patent App. 11,055,891.
10. G Laput, K Ahuja, M Goel, C Harrison. System and method for acoustic activity recognition. US Patent App. 11,069,334.
9. R Vaculin, U Dwivedi, K Ahuja, S Nagar, K Dey. Product placement optimization using blind-spot analysis in retail environments. US Patent App. 11,120,459.
8. K Ahuja, K Dey, S Mukherjea, S Nagar. Selective display of objects based on eye gaze attributes. US Patent App. 11,119,572.
7. K Ahuja, H Bansal, K Dey, S Nagar. Pre-Cooling and Pre-Heating Transportation Vehicles Using Predictive Crowd Estimation Techniques. US Patent App. 15/407,816.
6. K Ahuja, K Dey, S Nagar, R Vaculin. Analyzing team game play interactions using gaze data. US Patent App. 9,999,805.
5. K Ahuja, K Dey, S Nagar, R Vaculin. System, Method and Recording medium for tracking gaze with respect to a moving plane with a camera with respect to a moving plane. US Patent 9,874,934.
4. K Ahuja, K Dey, S Nagar, R Vaculin. System, method, and recording medium for tracking gaze using only a monocular camera from a moving screen. US Patent 9,996,744.
3. K Ahuja, K Dey, S Nagar, R Vaculin. Determining Player Performance Statistics Using Gaze Data. US Patent App. 15/184,229 filed June 2016.
2. K Ahuja, R Banerjee, K Dey, S Nagar. Gaze Point Detection Using Dynamic Facial Reference Points Under Varying Lighting Conditions. US Patent App. 10,082,866.
1. K Ahuja, U Dwivedi, K Dey, S Nagar, R Vaculin. Gaze based classroom notes generator. US Patent App. 15/842,334.

FILED/PENDING

13. M Gonzalez-Franco, E Gonzalez, K Ahuja, A Colaco. Reference frame alignment between computing devices. US Patent App. 19/035,552 filed Jul 2025.
12. I Chatterjee, K Ahuja, E Gonzalez. Arbitration of touch input based on device screen state. US Patent App. 18/732,105 filed Dec 2025.
11. I Chatterjee, K Ahuja, E Gonzalez. Arbitration of touch input based on device orientation. US Patent App. 18/660,587 filed Nov 2025.
10. B Hou, M Gonzalez-Franco, I Tosic Rodgers, P Gurumurthy, E Gonzalez, K Patel, A Colaco, K Ahuja, L Abramyan. Realtime background eye-tracking calibration. US Patent App. 19/197,641 filed Nov 2025.
9. K Ahuja, S Pareddy, R Xiao, C Harrison, M Goel. System and method using light sources as spatial anchors. US Patent App. US 16/868,061 filed Nov 2020.
8. K Ahuja, R Banerjee, K Dey, SKV Sesha, S Nagar. System and method for creating shoppers gaze, implicit interest, identity and social network based information disbursement system and combo deals. US Patent App. 15/430,603 filed Feb 2017.
7. K Ahuja, H Bansal, K Dey, S Nagar, R Vaculin. Regulating environmental conditions within an event venue. US Patent App. 15/836,802 filed Jan 2017.
6. K Ahuja, K Dey, U Dwivedi, S Nagar, R Vaculin. System, method and computer program product for stateful instruction-based dynamic man-machine interactions for humanness validation. US Patent App. 15/400,458 filed Jan 2017.
5. K Ahuja, K Dey, S Nagar, R Vaculin. Using dynamic facial landmarks for head gaze estimation. US Patent App. US15/841,653 filed Dec 2017.
4. K Ahuja, K Dey, S Nagar, R Vaculin. Analyzing and Interpreting a Referee's Actions Using Gaze Data. US Patent App. 15/184,239 filed June 2016.
3. K Ahuja, K Dey, S Nagar, R Vaculin. System, method, and recording medium for advertisement remarketing. US Patent App. 15/180,260 filed June 2016.
2. K Ahuja, K Dey, S Nagar, R Vaculin. System, method, and recording medium for location-based advertisement. US Patent App. 15/180,256 filed June 2016.
1. K Ahuja, R Banerjee, K Dey, S Nagar. Managing power, lighting, and advertising using gaze behavior data. US Patent App. 15/002,746 filed Jan 2016.

PAPER REVIEWED (500+)

ACM CHI	2019, '20, '21, '22, '23, '24, '25
ACM UIST	2019, '20, '21, '22, '23, '24, '25
ACM IMWUT	2018, '19, '20, '21, '22, '23, '24, '25
ACM SIGGRAPH	2021, '25
ACM MobileHCI	2019, '21, '22
IEEE/ACM ISMAR	2020, '21, '22
ACM ISS	2020, '22
ACM TOCHI	2022
IEEE TBIOM	2021
IET Image Processing	2018
Elsevier CVIU	2017

ACADEMIC SERVICE

NSF Panel	2024, '26
Editorial Board, Associate Editor (AE) , ACM IMWUT	2024, '25, '26
Editor-in-Chief , ACM XRDS (formally Crossroads)	2021-23
Program Committee, Associate Chair (AC) , ACM UIST Papers	2021, '22, '24, '25, '26

Program Committee, Associate Chair (AC) , ACM CHI Papers 2024
Program Committee, Associate Chair (AC) , ACM MobileHCI Papers 2021, ’22
Program Committee, Associate Chair (AC) , ACM CHI Late-Breaking Work 2020, ’21
Organizing Committee , Interactivity Co-Chair, ACM CHI 2025, ’26
Organizing Committee , Workshop Chair, ACM UIST 2024
Organizing Committee , Posters, IEEE Body Sensor Networks 2024
Organizing Committee , Video Chair, ACM UIST 2020, ’21
PhD Admissions Committee , Computer Science, Northwestern University 2024, ’25
PhD Admissions Committee , Technology and Social Behaviour, Northwestern University 2024
Best Paper Selection Committee , ACM UIST Papers 2024
Best Paper Selection Committee , ACM MobileHCI Papers 2021
Session Chair , ACM UIST 2021, ’22
Session Chair , ACM MobileHCI 2021
Session Chair , ACM CHI 2021

ACADEMIC TEACHING EXPERIENCE

COURSES

Machine Learning and Sensing , Instructor, Northwestern University 2025, ’26
Advanced Topics in Ubiquitous Computing , Instructor, Northwestern University 2024, ’26
Multimodal AI for Human Sensing and Interaction , Co-Instructor, ACM CHI Courses 2025
Machine Learning and Sensing , Co-Instructor, Carnegie Mellon University 2022
User-Centered Research and Evaluation , Teaching Assistant, Carnegie Mellon University 2021
Building User-Focused Sensing Systems , Teaching Assistant, Carnegie Mellon University 2021

GUEST LECTURES

Northwestern University , Intro to Grad Studies 2024
Northwestern University , Navigating Academic Job Markets 2024
University of California Los Angeles , Embedded Systems 2023
Northwestern University , Intro to Grad Studies 2023
University of Michigan , Navigating HCI PhD Applications 2023
University of California Los Angeles , Engineering Interactive System 2022
Carnegie Mellon University , Machine Learning and Sensing 2020

SELECTED INVITED TALKS AND KEYNOTES

ISMAR TRUST-XR, Keynote Speaker , Towards Camera-less Computer Vision: Privacy-Aware Sensing for XR 2025
Qualcomm XR , INRTL: Inertial Real-time Tracking and Localization 2025
McCormick Advisory Council, Northwestern University , Transcending Human Sensing from Labs to Life 2025
New faculty Welcome, Northwestern University , Latest from SPICE Lab 2025
IIIT Delhi , Understanding Ourselves Through Our Digital Self 2025
CSD Connects, Northwestern University , The Ambient Biographer 2025
Apple Human-Centered ML , The Human API: Understanding Ourselves Through Our Digital Self 2024
SIGCHI Awards , The Human API: Understanding Ourselves Through Our Digital Self 2024
Seoul National University, Keynote Speaker , HCI Day 2023

Samsung , Building Practical and Deployable User Digitization Technologies 2023
Northwestern University , Intro to Grad Studies 2023
University of Michigan , HCI Colloquium 2023
Google Research , Enabling Practical and Rich User Digitization 2023
University of Pittsburgh , School of Nursing, Eye-tracking for Health Sensing 2023
EPFL , Enabling Practical and Rich User Digitization 2023
MIT , Enabling Practical and Rich User Digitization 2023
Northwestern , Enabling Practical and Rich User Digitization 2023
Cornell , Enabling Practical and Rich User Digitization 2023
UW Madison , Enabling Practical and Rich User Digitization 2023
UMass Amherst , Enabling Practical and Rich User Digitization 2023
ETH Zurich , Enabling Practical and Rich User Digitization On-the-Go 2023
MBZUAI , Enabling Practical and Rich User Digitization On-the-Go 2023
University of California Los Angeles , Invited Lecture, Embedded Systems 2023
Stanford , HCI Lunch Seminar, Enabling Practical User Digitization On-the-Go 2022
U Chicago , Enabling Practical User Digitization On-the-Go 2022
UT Austin , Enabling Practical User Digitization On-the-Go 2022
CMU Summit, Keynote Speaker , AR/VR Panel 2022
New York Augmented Reality Meetup , User Digitization in XR 2022
University of California Los Angeles , Invited Lecture, Engineering Interactive System 2022
Indian Institute of Technology Gandhinagar , Privacy Sensitive Sensing 2021
Semiconductor Research Corporation , Spatially-Anchored Augmented Reality Interfaces 2021
CONIX , Exploring Interactions and User-digitization in Extended Reality 2021
Facebook Reality Labs , User digitization and activity recognition 2021
AREA Research , Sensing Human Gestures 2020
Carnegie Mellon University , Edge Computing, Privacy Sensitive Sensing 2020
CONIX , Interactions in Augmented Reality 2020
Microsoft Research , AI Breakthroughs, Privacy Sensitive Sensing 2020
Apple Machine Hearing and Sensing , Direction-of -Voice Estimation 2020
Apple AI and Machine Interaction , Direction-of -Voice Estimation 2020
Semiconductor Research Corporation , LightAnchors 2020
Qualcomm , Ad Hoc Spatially-Anchored Augmented Reality Interfaces 2020
Carnegie Mellon University , Invited Lecture, Machine Learning and Sensing 2020
AREA Research , Spatially-Anchored Augmented Reality Interfaces 2019

PHD STUDENTS ADVISED

Yiquan Li 2025 - Present
Aidan Bradshaw 2025 - Present
Chenfeng (Jesse) Gao 2024 - Present
Vasco Xu 2023 - Present

UNDERGRADUATE AND MASTERS STUDENTS ADVISED

Bishnu Dev , Masters, Computer Science 2025
Taeyoung Yeon , Undergraduate, Computer Science (Currently PhD Student at NYU) 2024-25
Hongyu Mao , Masters, Computational Design (Currently PhD Student at UW) 2023-24
Vimal Mollyn , Masters, Engineering Design and Data Science (Currently PhD Student at CMU) 2022-23
Daehwa Kim , Masters, Computer Science (Currently PhD Student at CMU) 2022
Andy Kong , Undergraduate, Computer Science 2020-21
Riku Arakawa , Masters, Computer Science (Currently PhD Student at CMU) 2021
Dhruv Verma , Undergraduate, Computer Science (Currently PhD Student at U Toronto) 2020
Andey Ng , Undergraduate, Information Systems 2019

PH.D. THESIS COMMITTEES

Glenn Jacob Fernandes Computer Science, Northwestern University.
Thesis title: Multi-modal wearable camera systems for AI-driven prediction of health-risk behaviors 2025
Mara Ulloa Computer Science, Northwestern University.
Thesis title: Mental Models of ML-Driven Just-In-Time Adaptive Interventions for Next-Day Stress 2025 - Present
Ruize Yang Neuroscience, Northwestern University 2024 - Present
Farzad Shahabi Computer Science, Northwestern University 2025 - Present

SELECTED PRESS COVERAGE

Next Reality Google XR-Objects: Every Object Becomes AI Assistant 2025
Road to VR Researchers Catalog 170+ Text Input Techniques to Improve Typing in XR 2025
Google Research Blog Augmented object intelligence with XR-Objects 2024
North by Northwestern Sense, track, understand: The SPICE Lab 2024
Hackster.io Tracking Movement on the Move 2024
Live Science New app performs motion capture using just your smartphone 2024
Digital Journal New app enables real-time, full-body motion capture using a smartphone 2024
The Engineer MobilePoser puts motion capture into mobile devices 2024
MSN A new system for real-time full-body motion capture using consumer devices 2024
CNBC Forbes 30 Under 30 Asia: Here are Indians who are revolutionising healthcare and science 2024
NDTV Forbes 30 Under 30 Asia List Out. These Indians Made It 2024
Hindustan Times Forbes 30 Under 30 Asia 2024: Meet 86 Indians who made it to the coveted list 2024
Firstpost Forbes 30 under 30 Asia list: Which young Indians made the cut? 2024
Northwestern News Karan Ahuja Wins ACM SIGCHI Outstanding Dissertation Award 2024
Gizmodo You Could Soon Move Around in VR With an iPhone, an Apple Watch, and Some Airpods 2023
Hackster.io Body Tracking on a Budget 2023
Today Show Step into the Metaverse: How the virtual world may change reality 2022
NBC Nightly News Inside the metaverse: what does the future of virtual reality feel like? 2022
CNN These researchers came up with a solution for one of VR's biggest issues: tracking your legs 2022
Gizmodo A Bump-Covered Screen Protector Can Surprisingly Make Touchscreens React Faster to Swipes 2022
ACM TechNews A Solution for One of VR's Biggest Issues: Tracking Your Legs 2022
RoadToVR Researchers Show Full-body VR Tracking with Controller-mounted Cameras 2022
VR Times Researchers Demonstrate Body Tracking via Modded VR Controllers in Meta Quest 2 2022

RealVirtual ControllerPose: full body capture with cameras on the controllers 2022
UploadVR Researchers Demonstrate Body Tracking From Cameras On VR Controllers 2022
TechCrunch Controlling your phone with your eyes 2022
TechXplore Your eyes can control your smartphone via new gaze-tracking tool 2022
ACM CACM The Eyes Have It 2022
BiometricUpdate Carnegie Mellon research develops gaze-tracking smartphone tool 2022
TechHive In the future, we might control our smart homes with just our eyes 2022
Devdiscourse New gaze-tracking tool lets you control your smartphone with your eyes 2022
Daijiworld New gaze-tracking tool to help your eyes control your smartphone 2022
Android Police This neat eye-tracking experiment looks like a weirdly convenient way to interact with your phone 2022
HotHardware Researchers Develop EyeMU Tech That Lets You Control Your Phone With Your Eyes 2022
Business Wire Siebel Scholars Foundation Announces Class of 2022 2021
Sillicon Valley Daily Siebel Scholars Names 2022 Class 2021
Pittsburgh Post-Gazette As smart technology expands, focus is on privacy safeguards 2021
TechCrunch CMU researchers show potential of privacy-preserving activity tracking using radar 2021
Cult of Mac Full-body Animoji? Smart tech uses iPhone camera to track body motion 2021
MLive Worried your smart home device is listening to you? 2021
Engadget AI could tell smart speakers what direction your voice is coming from 2020
Hackaday Robots can finally answer, are you talking to me? 2020
The Register Hey, over here, I'm talking. Academics help computers figure out which way you're facing when you speak 2020
PRNewsWire 2020 Collegiate Inventors Competition Finalists Show Future of American Innovation 2020
Digital Trends Think your house is smart now? Here's a peek at what it'll be like with AR 2019
The Register LightAnchors array: LEDs in routers, power strips, and more, can ship data to this smartphone app 2019
Hackaday Modulated Pilot LightsAnchor AR to real world 2019
NPR (Wesa.fm) CMU Researchers Developing Tech To Help College Professors Be Better Teachers 2019
TechXplore , EduSense: Researchers develop comprehensive classroom sensing system 2019
New Atlas Computer vision system tracks instructors' performance 2019
Display Daily MeCap Can Add Low Cost Whole Body Digitization to VR/AR Headsets 2019
ACM Technews GymCam Tracks Exercises That Wearable Monitors Cannot 2019
Market Research Finance GymCam Counts Your Reps And Sets Just Like A Personal Trainer 2019
I-programmer GymCam Tracks Your Workout 2019
Medgadget GymCam Automatically Classifies, Counts Exercise Reps 2019
ZDnet This camera watches while you work out 2019
Hackaday GymCam knows exactly what you've been doing in the gym 2019
New Atlas Computer vision system tracks workouts when wearables can't 2019
Engadget Speculative gadgets at the Future Interfaces Group 2018
TechCrunch This robot uses lasers to 'listen' to its environment 2018
The Register (UK) Alexa heard what you did last summer– AI Recognizes Activities from Sound 2018
Science Daily Sound, Vibration Recognition Boost Context-Aware Computing 2018
Futurity Sound and Vibrations Let Smart Devices Know Where They Are 2018