Sanchita **Kamath**

Human-Computer Interaction and Generative AI Researcher

(x)Ability Lab, University of Illinois, Urbana-Champaign

(+1) 217-377-0796 | kamath.sanchita@gmail.com | www.sanchitakamath.com | SK-143381 | sanchitakamath | Sanchita Kamath

Researching in human-centered design techniques of creating user-centric immersive technologies for marginalized communities.

Summary

Ph.D. candidate in Information Science, specializing in Human-Computer Interaction; passionate about creating inclusive and accessible technology solutions. Focused on designing immersive, user-centered experiences by blending generative AI and conversational interfaces with a focus on accessibility. Dedicated to advancing inclusivity for blind and low-vision (BLV) individuals through interdisciplinary research that bridges immersive technologies with real world impact to improve their quality of life. Attempting to reduce visual reliance in technologies such as virtual reality.

Link to portfolio

Education

University of Illinois, Urbana-Champaign

Illinois, United States of America

Ph.D. in Information Sciences — *Aug. 2023 - Present*

- Advisor: Dr. JooYoung Seo
- Focus: Leveraging immersive technologies and Generative AI to enhance the quality of life for BLV individuals, with ongoing user testing of a VR boxing game developed to promote and encourage physical activity within the BLV community.
- Researching methods in which multi-modal interfaces can be implemented for Data Visualization Paradigms for BLV individuals.
- GPA: 4.0/4.0 on the first four semesters of Doctoral Studies

University of Illinois, Urbana-Champaign

Illinois, United States of America

MS in Information Sciences - Obtained on the way to the PhD — *Aug. 2023 - Dec. 2024*

- Advisor: Dr. JooYoung Seo
- Focus: Accessibility, Human-Centered Data Science
- Implemented Generative AI (OLLaMA 3.2 - 3B) via Conversational User Interfaces (CUIs) to provide real-time descriptions of the surrounding environment to BLV individuals.
- CGPA: 4.0/4.0

Manipal Academy of Higher Education - Dubai Campus

Dubai, United Arab Emirates

B.Tech in Computer Science and Engineering - Graduated Summa Cum Laude — *Sept. 2019 - Jul. 2023*

- Advisor: Dr. Sophia Rahaman
- Undergraduate Thesis - *The Privacy Concerns of Older Adults when Interacting with Voice Agents within a Smart Home Environment – a Preliminary Scoping Analysis*
  Curated a model for a Conversational Agent catering to the needs of Older Adults and provided recommendations for the modification of current systems for ameliorated Older Adult Engagement.
  Addressed privacy concerns of older adults in smart home environments, emphasizing user-friendly voice and touch interface prototypes.
  GPA: 9.86, 9.91, 9.83, 9.67, 9.86, 9.5, 9.8, 10
  CGPA – 9.80/10

Research Experience

(x)Ability Lab

UIUC, USA

Research Assistant — *Aug. 2023 - Present*

- Led the UX design for the Personalized Conversational Health Agent (PCHA), focusing on accessibility for blind and low-vision users, integrating large language models (LLMs) to create a system that motivates users to exercise and track their physical activity and health status; conducted user research and iterative prototyping to ensure a user-centric, voice-driven interface.
- Working within the MAIDR Project as a Project Manager and Human-Computer Interaction Researcher and conducting user testing to conduct in-depth user research, under the IMLS Grant for Dr. JooYoung Seo. This project integrates and leverages the capability of LLMs and subsequent personae and templates generated to explain STEM related graphs and charts to Blind and Low Vision Individuals.
- Actively led the development of an innovative VR boxing and ping-pong game hosted on the Unity Engine, tailored for visually impaired individuals, ensuring strategic direction in every aspect of its creation. This innovative project aims not only to enhance sports training but also to revolutionize fitness monitoring, ensuring a comprehensive and inclusive approach to physical well-being and athletic proficiency.

Technologies for Ageing Gracefully Lab, University of Waterloo *Ontario, Canada*

Student Researcher *Feb. 2023 - Jul. 2023*

- Explored the privacy concerns of older adults in smart home environments, focusing on voice-controlled agent interactions and conducted research on voice interaction, socio-technical elements, and interactive system design.
- Devised strategies to mitigate technological anxiety among older adults, creating user-friendly voice and touch interface prototypes by investigating user experience challenges, adoption barriers, and overall acceptability of Voice User Interfaces (VUIs), utilizing qualitative methods like Reddit response analysis to gain deeper insights into user perspectives and experiences.
- Performed an extensive review of the technological landscape of VUIs, assessing market trends and advancements.
- Produced the layout of a responsive VUI specifically catered to the needs of older adults.

Manipal Academy of Higher Education - Dubai Campus *Dubai, United Arab Emirates*

Teaching Assistant and Research Fellow *Apr. 2022 - Feb. 2023*

- Conducted the Problem-Solving Using Computers (PSUC) course lab during Fall 2022.
- Independently facilitated the Relational Database Management System (RDBMS) course lab in Spring 2022, instructing and managing 46 students.
- Contributed to the drafting and underlying research of two MTech thesis projects as an undergraduate fellow, focusing on blockchain applications in blood donation and the construction industry.

OpenUAE Research Group, University of Sharjah *Sharjah, United Arab Emirates*

Reinforcement Learning Research Intern *Jul. 2022 - Sep. 2022*

- Digital Twins in the sector of Aviation: Executed a Systematic Literature Review, analyzing around 80 research papers to elucidate the concept. This comprehensive study was presented to the General Civil Aviation Authority of the United Arab Emirates, aiming to inform and guide their digital integration strategies.
- Robotic Process Automation in FOREX Trading: Innovated a trading algorithm using Reinforcement Learning to automate FOREX trading, mapping event spaces for effective decision-making; optimizing the model to enhance accuracy by 17%. Additionally, established evaluation metrics for the algorithm to ensure its optimal performance and implementation standards.

Pucho Inc. *Remote - based in Delhi, India*

UX Researcher *Jul. 2021 - Sep. 2021*

- Led the design of an inclusive and accessible interface to overcome language barriers in pan-India trials. This included developing VUIs tailored to the needs of the BLV community, resulting in a 31% increase in user engagement.
- Conducted qualitative persona creation for the financially disadvantaged demographic, offering critical insights into their challenges and reflections to iteratively improve the system's user interface.
- Developed storyboards to analyze user experiences and improve the transmission of accurate health information during the COVID-19 pandemic, addressing challenges posed by misinformation.

Publications and Presentations

JOURNAL ARTICLES

Dubey S., Subramanian G., Shukla V., Dwivedi A., Puri K., Kamath S., "Blockchain technology: a solution to address the challenges faced by the international travellers", OPSEARCH, Springer, July 2022, doi:10.1007/s12597-022-00597-x.

CONFERENCE FULL PAPER PUBLICATIONS

Seo J., Kamath S., Zeidieh A., Venkatesh S., McCurry S., "MAIDR Meets AI: Exploring Multimodal LLM-Based Data Visualization Interpretation by and with Blind and Low-Vision Users", The 26th International ACM SIGACCESS Conference on Computers and Accessibility, October 2024, doi: 10.1145/3663548.3675660.

Seo J., O'Modhrain S., Xia Y., Kamath S., Lee B., Coughlan J. M., "Designing Born-Accessible Courses in Data Science and Visualization: Challenges and Opportunities of a Remote Curriculum Taught by Blind Instructors to Blind Students", In R. S. and A. Firat Elif E. and Laramee (Ed.), EuroVis 2024 - education papers, The Eurographics Association, doi: 10.2312/eved.20241053.

Rahaman S., Ashok V., Kamath S., "Technology as a Tool to Enhance Development of Skillset in Autistic Individuals: Specific to Female Gender", 9th International Congress on Information and Communication Technology (ICICT 2024), 2024.

Kamath S., Sethi D., "Serious Games and Accessibility – an Exploratory Analysis", 11th International Conference on Serious Games and Applications for Health, 2023.

Marmorato P., Swami R., Kamath S., Asikaer N., Molyneaux H., Munteanu C., Stobert E., "Contextualizing Privacy for Older Adults in Canada", In Proceedings of Symposium on Applications of Contextual Integrity (CI '23), ACM, USA, 2023.

Kamath S., Rahaman S., "Self-Dependency Amelioration and Dignity Revival for South-East Asian Older Adults – using Technology as a Means and Method", 9th International Conference on Information and Communication Technologies for Ageing Well and e-Health (ICT4AWE 2023), April 2023, doi: 10.5220/0011957900003476.

Puthukkattu S. S., Poojary R., Kamath S., “An Energy Audit-based Case Study on varied Organizations”, 2023 International Conference on Renewable and Sustainable Energy - 2023 Advances in Science and Engineering Technology (ASET) International Conferences, 2023. doi: 10.1109/aset56582.2023.10180612.

Anand A., Jimoh A., Poojary R., Dudhe R., Kamath S., “Design and Testing of a Solar Powered Automated Fruit and Vegetable Sorter”, VLSI, Signal Processing, Power Electronics, IoT, Communication and Embedded Systems (VSPICE), 2022. doi: 10.1007/978-981-99-4444-6-16.

Kamath S., Martin A., Poojary R., “Effectuating Communication for the Deaf and Hard-of-Hearing: An Ethnographic Review”, The International Conference on Electrical and Computing technologies and Applications, pp. 80-83, 2022, doi: 10.1109/ICECTA57148.2022.9990196.

Kamath S., Rahaman S., “Engagement of Senior Citizens in a Family Setting to Help Revive Dignity: A Study”, 8th International Conference on Information and Communication Technologies for Ageing Well and e-Health (ICT4AWE 2022), January 2022, doi: 10.5220/0011074800003188.

Kamath S., “Science Fiction Prototyping In English as a Design Thinking Tool to Inspire the Future”, 4th Applied Linguistics and Language Teaching International Conference, March 2022, ISBN: 978-9948-791-44-7.

Kamath S., “Active and Participatory User Contribution to Inclusive Design for Net Zero Homes in UAE”, ZEMCH International Conference Proceedings, 2021, ISSN 2652-2926.

POSTER PRESENTATIONS

Kamath S., Zeidieh A., Khan O., Sethi D., Seo J., “Playing Without Barriers: Crafting Playful and Accessible VR Table-Tennis with and for Blind and Low-Vision Individuals”, The 26th International ACM SIGACCESS Conference on Computers and Accessibility, October 2024, doi: 10.1145/3663548.3688526.

Kamath S., Martin A., “HVAC Systems”, ASHRAE, Poster Competition, Team Res Novae.

Academic Service

Google Women Techmakers, Google (MENA and Global) — *United Arab Emirates*

WTM Ambassador — *Jun. 2022 - Aug. 2023*

- Led a mentorship initiative for female students, dedicated to bridging the gender gap in technology.
- Held interactive sessions and industry-focused events, designed to empower these students with the skills and confidence needed to excel in their professional journeys, committing to fostering diversity, inclusion, and female leadership in the technological community.

Manipal Academy of Higher Education - Dubai Campus, UAE — *Dubai, UAE*

Student Career Services Co-Ordinator — *Sep. 2020 - Aug. 2023*

- Spearheaded the coordination of student placements within the Computer Science Engineering & IT Department, playing a pivotal role in aligning students’ academic pursuits with professional opportunities.

Google Developer Student Club, MAHE Dubai — *Dubai, UAE*

GDSC Mentor — *Jun. 2022 - Jun. 2023*

- Served as a mentor for the GDSC ’22 Lead at MAHE - Dubai Campus, guiding the club’s leadership.
- Organized study sessions, events, hackathons, and workshops to provide a dynamic platform for students, fostering their involvement in technological advancements.

Google Developer Student Club, MAHE Dubai — *Dubai, UAE*

GDSC Lead — *Jun. 2021 - Jun. 2022*

- Delegating and managing tasks through collaboration to ensure influence and promotion of the Club, as a Founding Member of GDSC MAHE-Dubai Campus.
- Academia: Instantiated Community Service Pedagogically by helping other students within the university learn.

Internships

Sentient Labs — *United Arab Emirates*

UX Engineer and Designer — *Jul. 2022 - Aug. 2022*

- Responsible for research on Unmanned Surface Vehicles (USVs), articulating its need and Design Requirements.
- Analyzed research data collected on USVs to understand fallacies and methodologies adopted in development.

Ojo *Remote - Dubai, UAE*

Student Brand Ambassador *May. 2020 - Aug. 2020*

- Completed tasks and conducting User Research by interviewing students of varied ages, to improve the platform's impact and increasing user engagement by 36%.
- Worked with multiple project members and students to generate solutions to build the software to guide students in their careers through guided user studies. The enrollment in the program increased from 130 to 347.
- Created a user-centered business model as a group project, by understanding business needs and future goals, to help manage the furthering of the start-up towards its goal.

Projects

RESEARCH PROJECTS

Reconciling Public Perceptions with Formal Data for Context-Aware Accessibility Resources

Sep. 2024 - Dec. 2024

- Developed a context-aware system integrating sentiment analysis and legal frameworks, improving empathetic responses for disability-related inquiries. Built on the foundation of OLLaMA 3.2.
- Created an LLM prototype incorporating lived experiences and statistical trends, achieving enhanced user satisfaction during beta testing.
- Conducted thematic analysis of Reddit data and aligned it with NHIS insights to inform a legally compliant and user-focused accessibility resource.

Autistic Education Study

Mar. 2023 - Jun. 2023

- Created a fine motor skills development, ethics and behavior learning application for autistic children.
- Conducted User Research and SLR for current methods employed for autistic learning.
- Conducted interviews to explore the learning processes of autistic students (along with observational research), providing insights into the potential role and impact of technological interventions in their educational experiences.

Role of Upbringing, Education, Culture and Society in shaping opinions

Mar. 2022 - May. 2022

- Conducted Data Cleaning, Formatting and Visualization on the Open-Source General Social Survey.
- Identified trends in data and correlations between Ethnicity, Geographical Location and Overall Happiness along with the extent of influence of factors such as Gender, Degree, Family Size and Marital Status on the reported Happiness of the survey participants.

DEVELOPMENT PROJECTS

TripBot - Conversational Interface to Provide Actionable Independent Travel Insight to Blind and Low Vision (BLV) People

Jan. 2024 - Present

- Solely responsible for the integration of LLMs into the conversational agent capable of providing accurate environmental condition information to BLV individuals.
- Aiming to Fine-Tune and leverage LLaVA to provide continuous instruction and Orientation and Mobility (O&M) aid to BLV individuals.
- Currently conducting pilot testing with BLV people to understand the robustness of the system and parameters of detail required to direct a fine-tuning approach to incorporate BLV individuals' perceptions of LLM responses by using a preference strength algorithm.

Investigating the potential of Immersive Technologies in Spatial Learning for Blind and Low Vision Individuals

Sept. 2023 - Jun. 2024

- Prototyping a VR Ping-Pong game designed to foster inclusive play between sighted and BLV individuals, encouraging physical activity through engaging gameplay, achievement unlocks, and intuitive rule-learning via practice and muscle memory.
- Leading the development of dynamic and spatial audio cues for the virtual ball, incorporating sound variations based on force, trajectory, and proximity to enhance user experience.
- Designing an innovative haptic feedback mechanism integrated with the BHaptics TactGlove, delivering variable intensity and frequency signals to provide a secondary channel for information transmission.

RLHF Voice-based Conversational Agent on Intelligent Reflective Surfaces

Mar. 2023 - Jan. 2024

- Designed and developed a smart mirror with a voice agent for mood analysis, integrating emotion recognition and speech feature analysis using Python, JavaScript, and Node.js.
- Deployed an RNN model for speech analysis, paired with a novel Reinforcement Learning with Human Feedback (RLHF) algorithm based on Partially Observable Markov Decision Processes (POMDP), enabling dynamic responses to fluctuations in user emotions.
- Led technical creation and empirical studies, crafting a conversational interface and exploring the interplay between emotion recognition, cognitive engagement, and attention metrics for improved user interaction.
- Incorporated the Mistral and LLaMA-uncensored models into the system, enabling nuanced emotional vector space analysis and delivering tailored, low-risk advice for mood improvement. Addressed system limitations, including hallucination of hobby-related recommendations for emotionally distressed users, with ongoing efforts focused on mitigating these issues.
- Conducting information behavior studies based on pilot testing and the Wizard of Oz technique to refine updated features, ensuring enhanced user experience and functionality.

IoT-based door locking system in a Smart Living Environment

Mar. 2022 - Dec. 2022

- Developed an advanced door locking system that recognizes the user's face for automatic opening, enhancing accessibility and convenience.
- Initiated the creation of a guidance robot for BLV people, which would understand unknown environments and provide navigational guidance.

M. Hostels

Dec. 2021 - Jun. 2022

- Developed a Dynamic Pricing Algorithm through parametric articulation to set prices for rooms based on time, date and nature of booking.
- Created Digital Wireframes and High-Fidelity Prototypes to initiate development.

Won Best Project title

AI-Based Natural Disaster Analysis System - IBM Externship

Jul. 2021 - Oct. 2023

- Created a flask application/CNN model for image analysis and comparison with a database to predict presence of a natural disaster.

Optima

Apr. 2021 - Jun. 2021

- Defined the concept for interface design and created Digital Prototypes. Responsible for including accessibility features into design for BLV individuals.
- Produced a working android application for timeslot distribution.

HARDWARE PROJECTS

Smart Shoe

Mar. 2023 - Dec. 2023

- Measured user foot pressure distribution to identify potential detrimental effects on knee health, enabling precise assessments of pressure impact.
- Factored in injury effects by analyzing differential weight exerted by each foot, providing insights into weight distribution imbalances.
- Developed the complete software architecture for a smart shoe, including a deep learning algorithm that dynamically adjusts foot pressure based on user stance, and designed the foundational hardware circuitry.

OctaBin

Mar. 2022 - Jun. 2023

- Led the team in Application Development, to generate software that has an inbuilt reward system to encourage waste management and pinpoint bin locations.
- Worked on the hardware for the bin for dynamic spacing and sorting.

ViBrain

Jun. 2021 - Aug. 2021

- Conducted research to develop a device for the Deaf and Hard-of-Hearing (DHH) using bone conduction technology, to reduce a gap in lifestyle.

Sustainable Housing

Sep. 2019 - Dec. 2019

- Created floor plans for housing using ancient Indian science called ”vastu”.

Awards

2025	**XR Symposium 2025 Scholarship and Travel Grant**, XR Access, Cornell Tech	*USA*
2025	**CSUN Assistive Technology Conference 2025 Travel Grant**, Access Computing, University of Washington	*USA*
2024	**ASSETS 2024 Travel Grant**, Access Computing, University of Washington	*USA*
2024	**Irwin Lois Wells Fellowship**, Graduate College, UIUC	*USA*
2023	**Wilkinson Scholarship Fund**, Graduate College, UIUC	*USA*
2023	**Illinois Distinguished Fellowship**, Graduate College, UIUC	*USA*
2023	**Academic Excellence Award**, MAHE Dubai	*Dubai, UAE*

Committees

2021	**Student Outreach Manager**, Society of Innovators and Entrepreneurs, MAHE (SIE)	*Dubai, UAE*
2020	**Student Champion**, Expo 2020	*UAE*

Competitions

2023	**Third Place**, IEEE Innovation Competition for OctaBin – a Smart Automated Waste Sorter which employs concepts such as dynamic spacing and object recognition.	*Sharjah, UAE*
2023	**Presenter**, IEEE Student Day - Presented a Poster and Smart Shoe prototype capable of measuring differential foot pressure.	*Sharjah, UAE*

Languages Learnt

Python, Java, C, C++, R

mySQL, NoSQL

HTML/CSS, JavaScript, ASP.NET

Design Software

AdobeXD, FIGMA, Canva, Sketch, Unity