





Disha Sardana, Ph.D.

Human Centered Design, Virtual/Augmented Reality, Space Weather

 Irvine, CA 92618  disha-sardana  dishas9@vt.edu  disha-sardana.squarespace

SUMMARY

- 6+ years of experience designing, developing, and testing innovative approaches for analyzing complex datasets in 3D immersive environments using mixed reality – head-mounted augmented reality devices, motion capture, and spatial audio technologies
- 8+ years of experience in academic research labs, conducting literature reviews, and running fast-paced user research studies. Hands-on lab experience, leading multiple scientific studies from start (i.e., designing, prototyping) to finish (i.e., analyzing data, communicating results) in a collaborative, interdisciplinary setting

EXPERIENCE

DOCTORAL RESEARCHER

JAN 2019 – MAY 2023 | CENTER FOR HUMAN-COMPUTER INTERACTION AT VIRGINIA TECH (CHCI AT VT)

Relevant links: [Demo I](#) | [Demo II](#) | [Creativity + Innovation Day-Article](#) | [Student Spotlight](#)

- Developed and tested an approach for embodied data exploration of multi-dimensional datasets in an immersive **mixed reality (MR)** environment using HoloLens 2
- Demonstrated the prototype at a science fair (ICAT Creativity + Innovation Day 2019) and gathered user feedback from a diverse general audience (over **20 participants**)
- Designed, planned, and ran research studies with **34 participants** to evaluate the strengths and limitations of analyzing data in a 3D immersive environment compared to a non-immersive WebGL desktop environment, based on accuracy and task completion times of specific visual analytics tasks, to improve visual and interaction design
- Recommended user-centered design principles for doing data analytics in an MR environment based on frames of reference by assessing user performance, presence, rank order, physical comfort, and subjective user feedback
- Designed, conducted, and analyzed 90-minute in-person research experiments with **55 participants** to quantify the impact of audio on augmenting visual data analysis in MR environments
- Performed thematic analysis on the collected user data and compared task metrics such as the number of patterns identified by users, their confidence level, task responses, NASA-Task Load Index, and System Usability Scale (SUS) questionnaire between audio-visual and visual-only scenarios
- Conducted a user study at a space weather conference (CEDAR 2023) and collected data from **43 space science experts** to broaden the demographics to more rigorously quantify and assess the potential impact of XR technologies on educational and analysis tools and techniques
- Mentored Masters-level graduate students and managed group research teams with empathy, inclusivity & transparency

LEAD RESEARCHER ON AN NSF-FUNDED PROJECT

AUG 2017 – JUL 2020 | INSTITUTE FOR CREATIVITY, ARTS, AND TECHNOLOGY AT VIRGINIA TECH (ICAT AT VT)

Relevant links: [Spatial Audio Data Immersive Experience \(SADIE\) - NSF Funded Project](#) | [wvtf-article](#) | [VT News](#)

- Led an NSF-funded project that focused on the sonification of geospatial datasets and how sound can help detect patterns and outliers in datasets - **Award Abstract #1748667**
- Designed a new motion-tracking glove to enable user interaction with immersive sound environments utilizing **motion capture systems**. Programmed the logic to recognize 3-dimensional gestures (such as pinch, zoom, etc.) from real-time coordinates of various glove elements
- Tested and debugged the system by conducting beta-testing with around **40 participants**
- Conducted in-person user studies with over **150 participants** to study the human perception of sound in an immersive multi-layered auditory environment
- Performed hypothesis testing and **statistical analysis** (including t-test and ANOVA) on user data, leading to four publications in prestigious audio-related conferences

PROJECTS

STUDY OF GEOMAGNETIC SOLAR STORMS USING MACHINE LEARNING

AUG 2015 - MAY 2018 | CENTER FOR SPACE SCIENCE AND ENGINEERING RESEARCH AT VIRGINIA TECH (SPACE@VT)

Relevant links: [Best Presentation Award](#)

- Presented a study of large solar storms occurring from 2000-2018 to quantify their effects on the Total Electron Content (TEC) in the ionosphere over the U.S. sector
- Studied the strength of influence of various storm parameters on the TEC using tree-based **machine learning** techniques, such as random forest, which included filtering, visualizing, and processing large datasets
- Used AWS, Python, and scikit learn to build a pipeline to fetch and ingest time-series ionospheric data (order of 10s of GBs) to train and test machine learning models
- Work won the **student presentation award** at the AMS 98th Annual Meeting (2018)

AN INTERACTIVE AUGMENTED REALITY BOARD GAME

JAN 2019 - DEC 2019 | CENTER FOR HUMAN-COMPUTER INTERACTION AT VIRGINIA TECH (CHCI AT VT)

Relevant links: [Best Poster Award](#) | [Game Design](#)

- Designed and prototyped an “Interactive Augmented Reality (AR) Board Game for Recruiting Prospective Students” as an innovative marketing strategy to promote playful information delivery and collective decision-making
- Achieved product design through market research, compelling narratives and visual representations of user personas, and research methods such as focus groups, semi-structured interviews, formative evaluation, and usability studies
- Led the development of the AR component of the mobile application using Vuforia & Unity3D based on user needs
- Communicated research data and actionable insights to the stakeholders at the university
- Work won the **best poster award** at the CHCI Student Symposium, Blacksburg, VA, in May 2019

HONORS

- Selected as a reviewer for the **NASA Open Science 101 curriculum** and a panelist for the **Transform to Open Science (TOPS)** community panel held at NASA Headquarters, Washington D.C., on October 14, 2023.
- Received an honorable mention for “Clear Articulation of Hypotheses and Metrics” for the **IEEE VAST Challenge 2022**
- Awarded **NSF scholarship** for the Student ThinkTank at the International Conference on Auditory Display in 2018 & 2019
- Received a student presentation award at the AMS 98th Annual Meeting (2018) for **exceptional research & presentation**

LEADERSHIP

- **President** | CHCI Student Council, Inaugural Chapter at Virginia Tech, 2022-2023
- **Co-Founder & Vice-President** | Kala - Indian Classical Music Society at Virginia Tech, 2018-2023
- **Graduate Liaison** | Creativity + Innovation (C+I) at Virginia Tech, 2020-2021
- **Event Coordinator** | Virginia Tech Eta Kappa Nu (IEEE-HKN) Honor Society, 2018-2019
- **President** | Indian Students Association at Virginia Tech, 2015-2019

EDUCATION

Virginia Tech, Blacksburg, VA, USA May 2023
Doctor of Philosophy (Ph.D.) - Interdisciplinary (Human-Centered Design) - GPA: 3.88/4.0

Virginia Tech, Blacksburg, VA, USA May 2018
Masters of Science (M.S.) - Electrical Engineering (Electromagnetics) - GPA: 3.85/4.0

SELECTED PUBLICATIONS [FULL LIST ON GOOGLE SCHOLAR]

- **Sardana, D.**, Chandrashekhar, N. D., Gračanin, D., Matković, K., & Earle G. D., “Iterative Design of an Immersive Analytics Environment,” in **International Conference on Human-Computer Interaction 2023** (pp. 86-100)..
- **Sardana D.**, “Embodied Data Exploration in Immersive Environments: Application in Geophysical Data Analysis,” **Dissertation (2023)**, Virginia Tech.
- Debchoudhury, S., **Sardana, D.**, & Earle, G. D., “The relative importance of geomagnetic storm signatures on the total electron content perturbations over the continental US,” in the **Journal of Geophysical Research: Space Physics, 2021.**

SKILLS

Research: Human Participant Research, Human-Computer Interaction, Human Factors, UX Research, User Studies, Usability Testing, User Experience Design, User Data Analysis, Experimental Design, Quantitative & Qualitative Research, A/B Testing, Survey Design, Interviews, Field Research, Augmented/Virtual Reality (AR/VR)

Programming Languages: Python, R, MATLAB, C#, Javascript

Tools & Devices: HoloLens 2, Magic Leap 1, Unity3D, Git, Visual Studio, Miro, Figma, Max/MSP, Qualtrics