

DVXR LAB (ROOM G152)

HARDWARE

- **Head Mounted Display (HMD)**
 - Microsoft HoloLens 2
 - Apple Vision Pro
 - Meta Quest Pro, Meta Quest 2
 - Meta Quest 3
 - Magic Leap 2
 - VIVE Pro 2 Full Kit
 - VIVE Focus 3
 - VIVE Focus 3 Facial Tracker & Eye Tracker
 - Oculus Rift S
- **VR Gloves**
 - 5DT Data Glove 5 Ultra, RH
 - 5DT Data Glove 5 Ultra, LH
- **Motion Detection**
 - Virtual Cube Head Tracker
 - Microsoft Kinect
 - Wireless 6DOF tracked hand wand
- **3D Gaming Desktops**
 - Alienware Aurora-R16 Gaming
 - NVIDIA® GeForce RTX™ 4070Ti SUPER 16GB GDDR6X

SOFTWARE

- **Modeling:** 3D StudioMax, Maya, Soft Image, Mudbox, Sketch Up, Motion Builder, Blender.
- **VR Programming:** Vizard 7, Unity 3D, Microsoft Visual Studio, Unreal, OpenGL.
- **Game Programming:** Game Maker Studio, JCreator, Eclipse.



CURRENT GRANTS



- **NSF: "CISE-MSI: Emergency Response and Evacuation Training for Active Shooter Events"**, Division of Computer and Network Systems (CNS), Award Period: 10/01/2021 to 09/30/2024, Award#: 2131116, New Award Number: 2319752, Award Amount: \$300,000.00 .
- **NSF: "FW-HTF-P: Immersive Virtual Reality Instructional Modules for Response to Active Shooter Events"**, Division: DRL, NSF 20-515 Future of Work at the Human-Technology Frontier: Core Research, Period: 09/01/2020 to 08/31/2024, Award Number: 2026412, New Award Number: 2321539, Award Amount: \$132,352.00.
- **NSF Sub Award: "HDR Institute: iHARP- NSF HDR institute for Harnessing Data and Model Revolution in the Polar Regions"**, HDR- Harnessing the Data Revolution, Period: 01/01/2022 to 12/31/2026, Award#: 2118285, Total Amount: \$13M (\$13,000,000.00) for 5 years. PI: Vandana Janeja (UMBC).
- **NSF: Harnessing the Data Revolution (HDR) Data Science Corps (DSC): Collaborative Research:** Creating and Integrating Data Science Corps to Improve the Quality of Life in Urban Areas, PI: Arya Gangopadhyay (UMBC), Award Period: 1 October 2019 through 30 Sep 2024, Award #1923986, New Award Number: 2321574, Total Award Amount: \$1,198,769.00 .
- **NSF: "RISE: High-Performance Intelligent Data-Science Institute (HIDI)"**, Division: Research Infrastructure for Science and Engineering (RISE), Period: 05/01/2021 - 04/30/2024, Award ID 2022981, Total Amount: \$1,000,002.00.

CONTACT

Dr. Sharad Sharma
Director of DVXR Laboratory
Professor of Data Science
College of Information Science
UNT Discovery Park
University of North Texas
Denton, TX 76207

Email: sharad.sharma@unt.edu
Phone: (940) 565-2605
Website: <https://ssharma.ci.unt.edu>

Data Visualization and Extreme Reality Lab



COI 15th Anniversary Celebration

WEBSITE: <HTTPS://DVXR.UNT.EDU>



DR. SHARAD SHARMA

DIRECTOR OF DVXR LABORATORY
COLLEGE OF INFORMATION SCIENCE

UNIVERSITY OF NORTH TEXAS
DISCOVERY PARK, ROOM NO: G152

The **Data Visualization and Extreme Reality (DVXR)** Lab provides visualization solutions for a wide range of data sets in a collaborative, interdisciplinary, and interactive environment. We focus on developing methods and tools for analyzing, visualizing, and interacting with massive, dynamic, and ambiguous data from various application domains.

GOAL

The goal of DVXR Lab is to carry out research into advanced interactive visualization by developing innovative, impactful research and applications in VR/AR/MR/XR by establishing collaborations with industry partners and academia. Our objective is to introduce students to XR hardware, software, and provide an opportunity for them to apply this knowledge to applications for education and games. Our research explores research methods in human-computer interaction, social science, scientific and information visualization, computer animation, and machine learning.

MISSION

Our mission is to analyze and communicate data with interactive systems. The students and faculty are pioneering the use of VR, AR, MR, XR technology in areas such as data visualization, evacuation, way finding, battlefield simulation, emergency response, healthcare, education, and classroom environment.

RESEARCH PROJECTS

Our current research projects mainly focus in the areas of Data Visualization (DV), Virtual Reality (VR), Augmented Reality (AR), Extreme Reality (XR), and Software Engineering (SE).

DATA VISUALIZATION (DV)

Human-centric situational awareness and visualization are needed for analyzing the big data in an efficient way. The projects include: 1) Analysis of Crime, 2) COVID-19 Data Visualization, 3) Crime Data Visualization, 4) Scientific Data Visualization, 5) Data Analytics, 6) Human Centric Cyber Situation Awareness.

Data Analysis and Visualization of Crime Data

This work compares and visualizes the crime data for four different cities in the USA, namely Chicago, Baltimore, Dallas, and Denton.



HoloLens 2

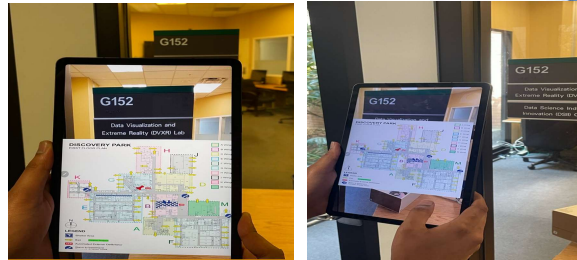


Meta Quest 3

AUGMENTED REALITY & EXTREME REALITY (XR)

Mobile Augmented Reality Application (MARA)

This research develops the science needed to enhance mobile augmented reality applications with (a) Situational awareness, (b) Navigation, (c) Evacuation, and (d) Emergency response. The projects will advance discovery of visualization techniques to permit mobile applications to enhance the viewing of the physical world, while promoting contextualized 3D visualizations, spatial knowledge acquisition and cognitive mapping thereby enhancing situational awareness.



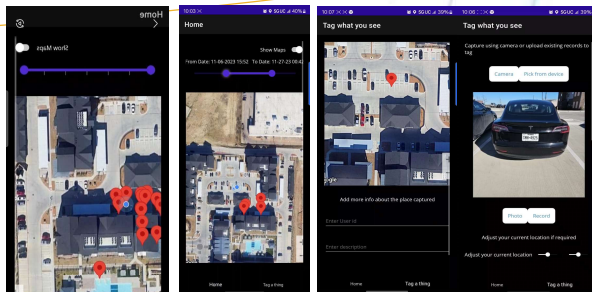
XR with HoloLens: Building Evacuation

The application was also built for Microsoft HoloLens, a device offering users a 3D, holographic view of building floor plans so that they can have a better perspective of the building, making it easier for them to find a way out of the building during the evacuation.



Mobile Application for Identifying Anomalous Behavior and Conducting Time Series Analysis

Understanding anomalous behavior and spatial changes in an urban parking area can enhance decision-making and situational awareness insights for sustainable urban parking management.



VIRTUAL REALITY (VR)

Active Shooter Response, Training, and Decision Making

We have developed an immersive collaborative virtual environment (CVE) for active shooter response at UNT campus building (for building occupants & security personnel) based on homeland security protocol. We present an immersive virtual reality (VR) experimental setup for conducting active shooter experiments and virtual evacuation drills in response to extreme events that impact the actions of occupants.



Multi-User Virtual Reality (MUVR) Evacuations

MUVR environments for emergency evacuation drills are developed that include: Subway evacuation, airplane evacuation, school bus evacuation, VR city, night club disaster evacuation, building evacuation, mega city, and university campus evacuation.



Virtual Reality Instructional (VRI) Modules

The goal of this research work is to develop virtual reality instructional (VRI) modules for 1) Teaching, 2) Health Care, 3) Patient Safety, and 4) Manufacturing.



SOFTWARE ENGINEERING (SE)

Modelling and Simulation of human behavior in a multi agent system (MAS) for evacuation

Two MAS and models are developed and evaluated namely AvatarSim and AvatarSim2. The AvatarSim model simulates building evacuation, airplane evacuation, and battlefield scenarios. Fuzzy logic is used in refining human emotional behavior.