Maha Sajid

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Education

Virginia Tech Expected May 2028

PhD. Computer Science · CGPA: 4.00/4.00

- Research Focus: Human-Computer Interaction, Collaborative XR, Multimodal Interaction

Lahore University of Management Sciences (LUMS) Aug 2018 – May 2022

BS. Computer Science · CGPA: 3.72/4.00

- Minor in Psychology · Graduated with Distinction (Top 10% students)

Research Experience

Graduate Research Assistant Aug 2023 – Present

Virginia Tech, Computer Science *Blacksburg, VA*

Advisors: Dr. Brendan David-John and Dr. Bo Ji

Collective Situational Awareness (SA) in Asymmetric MR (under review at IEEE VR 2027):

- Led end-to-end research on multimodal communication and SA in collaborative MR, developing a networked HoloLens 2 environment, refining the protocol with a **12-participant pilot**, and conducting a **48-participant (24 dyads)** study.
- Extended SA assessment by introducing two team-level measures: **information coverage and accurate alignment**, to capture how knowledge is distributed and shared across teams, revealing limitations of aggregate awareness scores.
- Developed **multimodal analysis pipelines** synchronizing eye-tracking, speech, workload, and task-performance data; derived gaze-based and verbal coordination metrics to quantify attention and collaborative behavior.
- Found that **Gaze+Voice improved performance** and **shared awareness**, while Gaze-only maximized spatial gaze convergence, demonstrating that performance, co-attention, and collective SA capture different aspects of collaboration.

Security Attacks in Remote Collaborative MR (published in IEEE VR 2025):

- Designed and conducted a mixed-methods security study examining how users perceive and respond to security attacks in collaborative MR, refining experimental tasks, attack conditions, and study protocol through **pilot studies with 16 participants** to conduct the main study with **20 participants across 10 dyads**.
- Engineered **four real-time security attack interventions** in a networked MR environment, including **3D click-redirection** and **spatial occlusion**, to systematically investigate user interactions and behavioral responses.
- Integrated first-person recordings, questionnaires, and interviews to identify gaps between perceived and actual user behavior; 54% reported no attack during spatial occlusion, while 67% failed to report their mitigation strategy.
- Translated findings into **design recommendations** for immersive security indicators, interaction transparency, and user training; the published contributions were featured in *Computerworld*.

Bystander Privacy Indicators in XR (Published in TRUST-XR held at IEEE ISMAR 2025):

- Collaborated on a mixed-methods study investigating how situational impairment affects the usability of privacy indicators, using four focus groups to develop five visual and multimodal concepts, followed by participant evaluation.
- Analyzed participant feedback to compare indicator effectiveness across contexts, finding that visual-only cues were less effective under situational impairment while multimodal indicators were preferred in privacy-sensitive scenarios .

Undergraduate Research Assistant Jan 2022 – Feb 2023

Lahore University of Management Sciences (LUMS), Computer Science *Lahore, Pakistan*

Advisors: Dr. Fareed Zaffar and Dr. Murtaza Taj

Cross-Verification of Revenue Using Remote Sensing Data:

- Developed a computer-vision pipeline for satellite-image segmentation and land-use change detection, **achieving 92% accuracy** in identifying constructed areas to support automated property verification.
- Developed a **GIS-integrated decision-support platform** that transformed machine-learning outputs into spatial and temporal construction comparisons, enabling users to inspect newly detected construction across locations and years.
- Integrated remote-sensing outputs into a government property-verification workflow for flagging inconsistencies between GIS and taxation records and directing field-survey resources; the work contributed to the **International Growth Centre technical report**.

Selected Publications

- **Sajid, M.**, Bukhari, S. I. M. S., Ji, B., & David-John, B. (2025). *"Just stop doing everything for now!": Understanding Security Attacks in Remote Collaborative Mixed Reality.* **IEEE VR 2025**. DOI: 10.1109/VR59515.2025.00085.
- Bukhari, S. I. M. S., **Sajid, M.**, Ji, B., & David-John, B. (2025). *Rethinking Privacy Indicators in Extended Reality: Multimodal Design for Situationally Impaired Bystanders.* **IEEE ISMAR Adjunct 2025**. DOI: 10.1109/ISMAR-Adjunct68609.2025.00059.

Industry Experience

Software Engineer Feb 2023 – Jul 2023
Senarios *Lahore, Pakistan*

- Delivered a cross-platform mobile data-sharing product from design through release, implementing real-time contact synchronization, decentralized functionality for a Google Play deployment.
- Partnered with **3+ clients** to translate Web3 data-integrity requirements into implementation plans and coordinate feature delivery across engineering and product stakeholders in an Agile environment.

Software Engineer Jun 2022 – Jan 2023
PakWheels *Lahore, Pakistan*

- Independently led the integration of payment gateways and supporting checkout workflows for an automotive marketplace, owning the feature from implementation through production deployment.
- Developed a machine-learning vehicle-pricing model using Python and XGBoost, applying real-world marketplace data to generate data-driven price recommendations.

Research & Technical Skills

Programming & Data Tools: Python, C#, C++, JavaScript, SQL, Pandas, NumPy, Git

Computer Vision & Machine Learning: Image segmentation, object detection, machine-learning model evaluation, XGBoost, TensorFlow, satellite-image analysis.

XR & Spatial Computing: Unity, OpenXR, HoloLens 2, Galaxy XR, Android XR, MRTK, XR Interaction Toolkit, networked multi-user XR, Mirror, Unity Netcode, Photon Fusion

Multimodal Interaction & Analysis: Eye tracking, gaze-object mapping, joint attention, gaze entropy, speech transcription and analysis, multimodal data synchronization, behavioral telemetry. **Research Methods & Statistics:** Controlled user studies, experimental design, repeated-measures analysis, mixed methods, usability evaluation, ANOVA, Friedman and Wilcoxon tests, bootstrapping, thematic analysis

Teaching Experience

Graduate Teaching Assistant Dec 2024 – Dec 2025
Virginia Tech

- Courses: CS 1054: Intro to Programming in Java, CS/ECE 5590: System and Software Security, CS 5024: Ethics and Professionalism in Computer Science

Undergraduate Teaching Assistant Aug 2022 – May 2023
LUMS

- Courses: CS 360: Software Engineering, CS 5310: Computer Vision Fundamentals

Honors, Leadership & Service

- **Awards & Fellowships:** John Lee Pratt Fellowship (2026–2027) · Two Commonwealth Cyber Initiative (CCI) Cyber Innovation Scholar Awards ($3,500, 2024–2026). · TAPIA scholarship (2026)
- **Peer Review & Professional Service:** Reviewer, IEEE VR (2026) and Human-Centric Intelligent Systems (2026) · Organizing Committee, iXR Ideathon (2026) · Student Volunteer, IEEE ISMAR (2025).
- **Mentorship:** Mentored two Virginia Tech undergraduate researchers; Computing Research Association (CRA) UR2PhD Certified Graduate Mentor (2026).
- **Leadership & Honors:** Graduate Council Officer, Virginia Tech CS (2026–2027) · General Secretary, LUMS Data Science Society (2021–2022) · Dean's Honor List, LUMS (2019–2022).