

Shakiba Davari

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Expertise Area

Intelligent Augmented Reality (AR) Interface Design: My research interest lies in connecting my past research experience in applied machine learning (ML) and my current passion for AR interface design. I am a 3D interaction/interface designer, focusing on intelligent AR interfaces. I concentrate on different aspects of detecting AR user's context and utilizing it to adapt their AR interface. Such context-aware interfaces mitigate the existing challenges of AR, such as real-world occlusion and social intrusiveness, while providing more reliable and efficient information access and interaction in AR.

Education

PhD., Computer Science	Virginia Tech	2018-Present
Dissertation Topic: Intelligent Augmented Reality Interfaces		<i>Expected Graduation: May 2024</i>
MSc., Computer Science		
Specialization: Human Computer Interaction (HCI) (<i>Degree received</i>)	Virginia Tech	2018-2020
Specialization: Computational Perception and Robotics	Georgia Tech	2017-2018
BSc., Computer Engineering (<i>Degree received</i>)	SBU, Iran	2010-2014

Relevant Research Experience

Graduate Research and Teaching Assistant

Virginia Tech

2018 Aug-Present

Advisor: Doug A. Bowman

Applied a methodical approach based on a) consideration of end goals, features and challenges of AR, and b) in-depth review and analysis of existing AR interfaces, and context frameworks and taxonomies to:

- Propose a methodology for classification of AR interfaces and introduce Glanceable AR interfaces according to this classification [6].
- Propose a taxonomy of the design dimensions of AR interfaces [1].
- Propose a taxonomy of context, specifically tailored for capturing and inferring the intricacies and features crucial to effective intelligent AR interfaces [2, 4].
- Develop a framework for context-aware inference and adaptation tailored for the creation of intelligent AR interfaces [2, 4].

- Designed and developed a socially intelligent AR interface for HoloLens devices, incorporating face and speech recognition to customize the content and display of the information based on user's needs.
- Designed and conducted a user study on 36 participants to evaluate the effect of AR interfaces and context-awareness on the user experience and information access efficiency compared to mobile phones [3].

Tools: Python, OpenCV, DNNs, Flask web app development, Unity Game Engine, Photon, MRTK

- Designed and implemented numerous 3D Interaction techniques and communicated results in the winning team of the best 3D User Interface award at the IEEEVR conference for two consecutive years.
- Led a team of 10 graduate and undergraduate students to design an immersive VR experience using passive haptics and everyday proxy objects [5, 7].

Research Scientist Intern

Adobe Inc.

2022 May-Aug

- Designed and developed 16 different AR interfaces for navigation through a large number of documents on iOS devices.
- Designed and conducted a preliminary survey on 8 participants to explore the effectiveness of these AR interfaces in multiple contexts.
- Utilizing the findings from the survey and iteratively applying the design cycle, selected the most promising candidate interfaces and implemented them for HoloLens devices.
- Designed and conducted a user study on 24 participants to evaluate the effectiveness of two different AR content placement strategies on document navigation in four contexts using a HoloLens2 device.
- Currently, analyzing the quantitative and qualitative data and preparing the manuscript for publication [1].

Tools: Apple ARKit, Swift, Adobe Aero, Unity Game Engine, MRTK, JMP

Research Intern

Microsoft Inc.

2021 May-Aug

- Designed and developed a new tool to leverage the potentials of virtual monitors for assisting low-vision users.
- Designed and conducted a user study on 21 low vision participants.
- Derived valuable design suggestions for enhancing the hardware and software aspects of virtual monitors tailored to the needs of the low vision population.

Tools: Unity Game Engine

Researcher

Stanford University

2017-2018

Designed and developed various driving simulation scenarios to gather driver data across diverse situations in a project Investigating the effect of leveraging human actions in autonomous cars.

Tools: SimVista, SimCreator

Investigated and developed various algorithms to automate the flight path of Unmanned Aerial Vehicles (UAVs) within dynamic construction sites, for efficient image capture [8], in a project investigating automation of construction progress monitoring.

Tools: Python2, OpenCV, Pymunk

Researcher

University of Toronto

2015-2016

Combined various ML classification models and developed a robust system to categorize construction site images into one of the five states indicative of the construction progress [9], in a project investigating automation of construction progress monitoring

Tools: Python2, OpenCV

Selected Honors & Awards

Invited Talk: "Context Aware Inference and Adaptation in Intelligent AR Interfaces" [PERCXR* @ISMAR** 2022]

Best 3DUI Award [IEEEVR 2020 & IEEEVR 2021]

Departmental Service Award [CS Department @Virginia Tech 2020]

Grace Hopper Celebration of Women in Computing Scholarship [Virginia Tech 2022] – [Virginia Tech 2021]

Inclusion, Diversity, and Accessibility Scholarship [IEEEVR 2022]

ACM Capital Region Celebration of Women in Computing Scholarship [Virginia Tech 2020]

Tapia Celebration of Diversity in Computing Scholarship [Tapia Foundation 2020] – [Virginia Tech 2019] – [Georgia Tech-2017]

Selected Service Activities

Poster Chair [ACM Spatial User Interaction (SUI) 2024]

Reviewer [CHI 2021 & 2023] – [IEEEVR 2021 & 2022] – [ISMAR 2020 & 2021 & 2022] – [UIST*** 2022] – [AutomotiveUI 2020]

President [Virginia Tech Graduate Student Council 2020]

Vice President [Virginia Tech Graduate Student Council 2019] – [Iranian Society at Virginia Tech 2018 to 2021]

Mentoring and Advising [Danny Stover 2022-2023]

Selected Publications

- [1] A taxonomy of AR design dimensions, and exploring the effect of AR content placement on document navigation, S. Davari, S. Petrangili, J. Hofswell, DA Bowman (In-preparation for ISMAR 2024)
- [2] Intelligent AR: A Taxonomy of Context and a Design Framework, S. Davari, DA. Bowman (In-preparation for ISMAR 2024)
- [3] Validating the Benefits of Glanceable and Context-Aware Augmented Reality for Everyday Information Access Tasks, S. Davari, F. Lu, and DA. Bowman, IEEEVR 2022, New Zealand, pp. 436-444
- [4] DCI Context-Aware Inference and Adaptation in AR, S. Davari, IEEEVR 2022, New Zealand, pp. 938-939
- [5] Integrating Everyday Proxy Objects in Multi-Sensory Virtual Reality Storytelling, S. Davari, F. Lu, Y. Li, L. Zhang, L. Lisle, X. Feng, L. Blustein and DA. Bowman, Everyday Proxy Objects for Virtual Reality (EPO4VR) Workshop @ ACM CHI 2021
- [6] Occlusion Management Techniques for Everyday Glanceable AR Interfaces, S. Davari, F. Lu, and DA. Bowman, WEVR @ IEEEVR 2020, USA, pp. 324-330
- [7] Save the Space Elevator: An Escape Room Scenario Involving Passive Haptics in Mixed Reality, S. Davari, Y. Li, L. Lisle, F. Lu, L. Zhang, L. Blustein, X. Feng, B. Gabaldon, M. Kwiatkowski, D. A. Bowman, 2019 IEEEVR, Japan, pp. 1405-1406
- [8] UAV Mission Planning Using Swarm Intelligence and 4D BIMs in Support of Vision-based Construction Progress Monitoring and As-Built Modeling, H. Hamledari, S. Davari, O. Sajedi, P. Zangeneh, B. McCabe, M. Fischer, Construction Research Congress 2018, USA, pp. 43-53
- [9] Automated computer vision-based detection of components of under-construction indoor partitions, H. Hamledari, B. McCabe, S. Davari, Automation in Construction 2017, Vol 74, pp. 78-94

* PERCXR: Workshop on Perceptual and Cognitive Issues in xR

*** ACM Symposium on User Interface Software and Technology

** ISMAR: IEEE International Symposium on Mixed and Augmented Reality