

Digitalizing Indigenous Craft Heritage: A WebXR Augmented Reality Platform for Communicating Sri Lankan Wood Design Traditions

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Abstract

Sri Lanka's tradition of wood craftsmanship represents a significant form of indigenous cultural knowledge, encompassing artistic techniques, design vocabularies, and spatial aesthetics transmitted across generations of artisans. This heritage faces erosion as local craftspeople encounter barriers in communicating their work within digital retail environments. The "imagination gap," where consumers struggle to spatially visualize culturally embedded artifacts, constitutes a commercial and cultural challenge. Grounded in digital humanities, this study investigates how a browser-accessible augmented reality platform built on Web-based Extended Reality (WebXR) can democratize access to indigenous wood design knowledge, in line with the Collective Benefit, Authority to Control, Responsibility, and Ethics (CARE) principles for indigenous data governance. A progressive fidelity methodology grounded in user-centered design was employed. Four participants, representing professional interior designers and casual consumers, took part in formative and summative evaluations. An Agile User Experience (AgileUX) process employed storyboarding and parallel prototyping to map user narratives. Data were gathered through semi-structured interviews, think-aloud protocols, and the System Usability Scale (SUS) to assess usability, including cognitive load, learnability, and error prevention. The summative evaluation yielded an average SUS score of 73.75, exceeding the benchmark of 68. Professional designers rated the platform highly for client consultations (average SUS of 85). Novice users initially experienced cognitive overload but achieved a 100% task completion rate after guided onboarding and a unified user interface were introduced. Delivery through WebXR removed the need for app downloads, and a custom coordinate-mapping algorithm reduced mental model misalignments between two-dimensional floor plans and three-dimensional real-time views. The findings suggest that digital humanities methodologies, applied through WebXR-based augmented reality, offer an accessible approach to preserving indigenous wood craft heritage. The platform's capacity to embed culturally situated knowledge in the browser provides a replicable model for other traditions at risk of digital exclusion. These results contribute to digital heritage scholarship by indicating that browser-native augmented reality tools can function as instruments of cultural preservation, with implications for indigenous knowledge equity. The study also affirms the role of liberal arts perspectives, including cultural analysis and humanistic inquiry, alongside user-centered design, in shaping ethical and inclusive digital media environments.

Keywords: *Digital Humanities, Indigenous Knowledge, Augmented Reality, Cultural Heritage, WebXR*