

Abstract

Stained glass, a visually stunning craft dating from as early as the late Roman Empire, adorns the windows of both historical and modern architecture. Research across disciplines continues being conducted to maintain and digitise these complex works of art. Concurrently, newly developing 3D and VR technologies offer novel immersive and interactive means to experience objects in virtual environments. This dissertation casts a discerning light on the capacity of these computer technologies to greatly enhance the appreciation and preservation of such artefacts. We define a workflow for making digital recreations from photographs of existing stained glass windows and build a proof-of-concept application in the Unity 3D development engine, deployed to Google Cardboard VR. This prototype is assessed in the extent of its delivery of photorealism and a smooth user experience, running on a high-end Android smartphone released in 2021. Findings show efficient memory utilisation, substandard yet usable frametime performance for VR, and mixed results regarding visual fidelity, with marked differences between the rendered images on the development PC and mobile test device. In this manner, we perform a practical examination of the feasibility of real-time 3D VR for realistic simulations of stained glass windows. We conclude that while accessible mobile hardware does not yet meet the high computational demands of real-time 3D VR stained glass simulation, there is certain potential in more powerful and dedicated VR platforms and future mobile devices. Finally, we propose courses of action to refine and expand upon the procedure and project defined in this body of work, given the prospect for real-world applications in the fields of architectural simulation and preservation of cultural heritage.