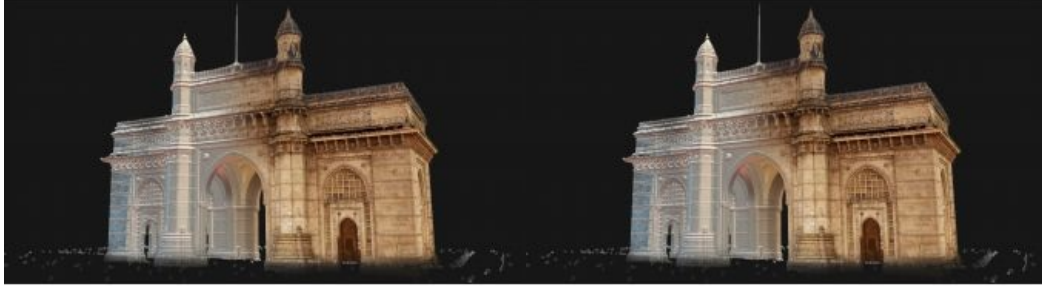


How Geospatial Technology Facilitates Remote Tourism



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COVID-19 has transformed our lives and our ability to travel and explore the world like no other event in recent memory. For our cultural heritage institutions, this has drastically altered typical visitation

patterns and disrupted the revenue that flows not only directly to these organizations and sites, but also to the surrounding economic ecosystem that is fuelled by tourism. According to estimates by the United Nations World Tourism Organization (UNWTO), international tourist numbers in May 2020 were down 98% from the previous year and very significant effects are likely to be felt throughout this year and next.

This has brought a renewed focus on the importance of digital outreach and virtual visitation to access a remote audience of tourists and visitors who are now no longer physically able to travel to these places. It also presents a new opportunity to build a foundation for reaching a much wider audience than just those that can make the physical journey, and for providing virtual access to previously restricted sites or areas.

Digital Cultural Twins

We are fortunate that reality capture technology has progressed so far. Today, a compelling facsimile or 'digital twin' of these places can be constructed and rendered to provide a compelling backdrop for rich storytelling that aims to transport the virtual visitor to these places. These digital twins can be created using a variety of methods, but two technologies in particular have revolutionized the speed, fidelity and cost with which they can be produced. Consumer drones with high-quality imaging capabilities have made small to medium-scale aerial photogrammetry projects highly accessible. Combined with DSLR-based terrestrial photogrammetry, comprehensive coverage of even large sites and structures is possible in a short period of time. Software solutions for processing these inputs into a homogenous and high-quality textured mesh such as [RealityCapture](#) and [Pix4D](#) have evolved rapidly in recent years in terms of both ease of use and quality of the final model.

Virtual and Augmented Reality

In recent years, the advent of standalone virtual reality (VR) headsets with six degrees of freedom tracking (the ability to track rotation and translation of the headset) has opened up room-scale VR to a whole new audience of users. Affordable devices such as the Oculus Quest (US\$399) and HTC VIVE Focus (US\$650) are easy to set up and provide an immersive user experience. 360-degree tours (either 360-degree panoramas or 360-degree video) were long the staple for the immersive presentation of real-world places but often disappointed end users with their lack of fidelity and limited ability to explore beyond a linear and predefined path. In recent years, a number of applications have taken advantage of high-detail 3D models to present a more compelling and open-world experience. [Masterworks](#) and [National Geographic Explore VR](#) are two examples of apps that allow users to explore open environments, providing them with interactive tasks and commentary to learn about the histories of the relevant sites within stunning photo-realistic environments.

Augmented reality (AR) presents another experiential medium for the display and presentation of these digital replicas. Tabletop or markerless AR allows the user to fix a virtual object in a location within a real-world scene (such as on a tabletop) and inspect and explore the object by moving their mobile device. Organizations such as Google Arts and Culture have curated 3D objects from cultural institutions around the world and made them available via the [Pocket Gallery](#) allowing for exploration in an AR environment.

The intersection of world events and technology for the recording and presentation of cultural heritage has presented an opportunity to not only reach absent tourists, but also build a future platform for the presentation of sites to a much wider audience. The potential of VR and AR to allow users to virtually experience real-world locations is just beginning to be tapped and will be further fuelled by the availability of high-quality photo-realistic 3D models for users to explore.



The Gateway of India is a remnant of the country's colonial history and also its resilience. Today, it remains one of the most visited sites in Mumbai. In 2019, CyArk documented the structure using aerial and terrestrial photogrammetry combined with Lidar. The 3D data will be used for further preservation of this iconic structure.

