

CHNT Conference Abstract

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Widening engagement with historic buildings and monuments, through participation in mobile digital recording and surveying.

Introduction

This paper focusses on widening accessibility of mobile technologies in broadening the opportunities for participation in recording and surveying architectural details of historic buildings. Historic buildings represent a universal cultural capital and a legacy for future generations, containing forms, assets and details that have evolved and developed over time (Charlton, *et al.*, 2021). Significant examples of heritage buildings are associated with more formal custodianship and may benefit for the associated status, funding and resources. Many historic buildings are of cultural importance and community interest, but do not have the same level of management. New strategies that adopt more accessible and inclusive solutions are therefore required to document and digitally preserve the features of these buildings.

Current approaches to digital heritage documentation focus on knowledge and skills that require a high degree of technical expertise, often set against a limited number of professionals in the field. Related research has focused on the technical processes and capabilities of laser scanning and model generation, often in relation to larger buildings (L'opez et al., 2018). Funding challenges are an issue for heritage organisations and custodians, in adopting such technologies (Charlton, *et al.*, 2021). The study seeks to empower individuals with interest in historical sites, but potentially limited technical expertise, to participate in the digital documentation of heritage buildings. The focus is on architectural details, as they are more suited to recording with mobile devices. It is these details that often characterise, elevate or even inform the categorisation and elevation of heritage buildings (Curtis, 1996).

Research programmes and organisations have been quick to support the better integration of new and emerging digital technologies for cultural heritage preservation. Harnessing this focus and establishing new means of data gathering and sharing, offer new possibilities for the preservation and maintenance of such assets (Wu and van Laar, 2021). The increase in relatively inexpensive mobile solutions with integrated Lidar allows wider access to digital scanning. This accessibility provides opportunities for wider engagement with digital heritage

documentation. However, the practicalities and challenges of this approach, in comparison with more established, adopted, but expensive solutions, needs to be fully understood. Through the exploration of process, interoperability, output, and operation, accessibility and cost, in comparison, with handheld and static laser scanning technologies, the capabilities and commonalities of function and use in the documentation of a variety of architectural heritage details is assessed. The selection and testing of a variety of mobile apps, explores the process of data capture and output for a range of historical details, providing guidance on the capabilities of these technologies for non-professional heritage documentation.

Methodology

The primary aim of this research was to provide guidance relating to the associated challenges and complexities of enabling “non-professionals” to scan architectural details and features of historic buildings and environments. To address this aim the study considered different hardware and software solutions in the scanning of a variety of architectural details and materials of a chosen subject (heritage building) to gain insight and provide guidance around the processes involved.

Hardware

The primary focus of the study is on evaluating mobile devices with scanning capabilities (Apple Ipad Pro, Apple Iphone 15), establishing the performance and characteristics of these devices and associated mobile applications for 3D scanning architectural detail. To support this evaluation and recommendation made, the outputs are compared with the outputs of handheld and static laser scanning devices (Faro Freestyle and Faro Focus S120).

Applications

There are a number of applications available for digital scanning via mobile devices, many are designed with non-professionals in mind, offering in-App assistance. Most are designed to capture smaller subjects with greater clarity and ease. The following Apps examined were selected based on their accessibility across both apple and android devices, free use and on user reviews:

- Scaniverse 3D Scanner
- PolyCam
- Reality Scan
- KIRI Engine
- WIDAR

Subject

The study focussed on St Georges Church in Jesmond, Newcastle Upon Tyne, UK. Consecrated in 1888, host to a variety of architectural detail and a significant number of Art Nouveau Mosaic's (Figure 1) which draw inspiration from the Romanesque mosaics found in Basilica of San Vitale, Ravenna (Faulkner, 2006).

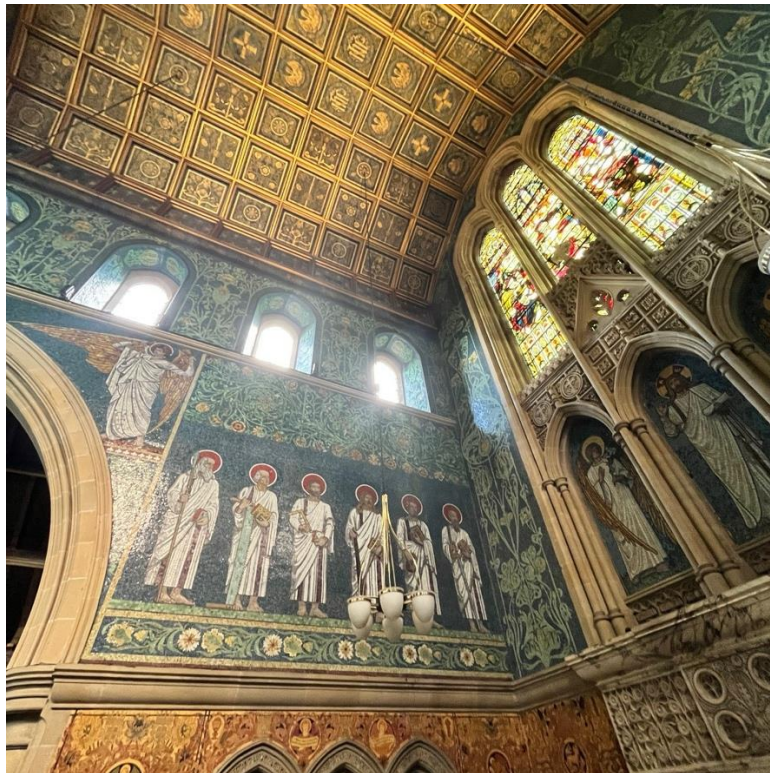


Figure 1. Art Nouveau Mosaics in St George's Church c1902.

The church provided the opportunity to explore the functionality and output of the applications, on a variety of architectural details of different three-dimensional forms, with a variety of surface texture and colour, including:

- Carved Hard Woods
- Sculpted Marble and Stone
- Applied Oil Painting
- Mosaic Tesserae
- Stained Glass

Process

All the featured applications offer the ability to scan for free, however they vary in terms of approach, support, capabilities and output. To gain insight and provide guidance around use and capability, the following aspects of function and ease of use were assessed for the adopted mobile, handheld and static scanning solutions:

- Capture setup
- In-App or device guidance and prompts
- Scan quality and detail
- Variance between object/ detail types and materials
- Output quality and format

The methodology adopted the following sequence (shown in *Figure 2*) in the evaluation of the different approaches (hardware and applications).

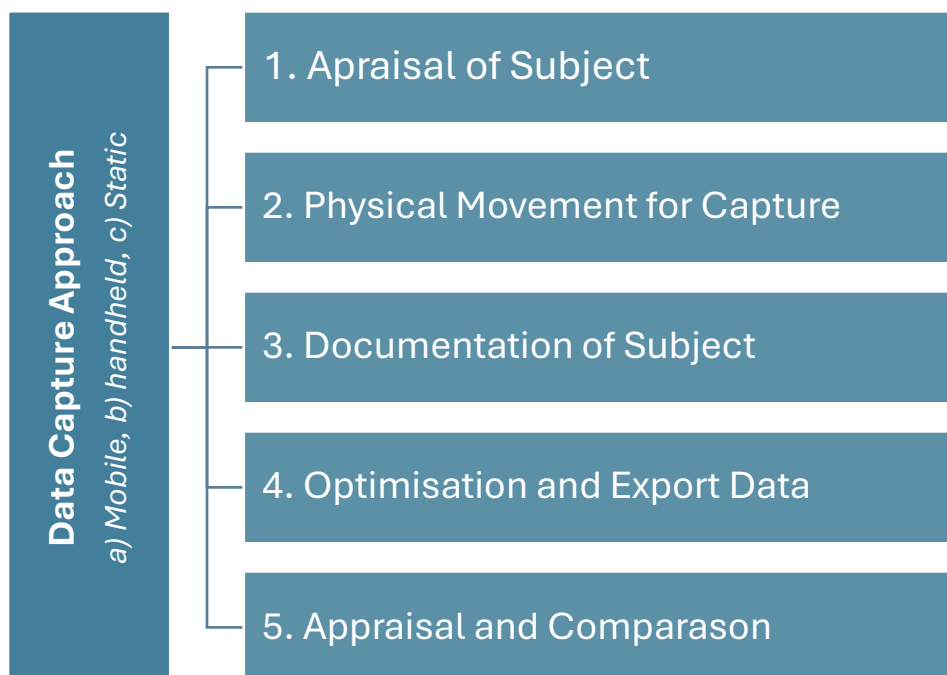


Figure 2. Analysis Structure Diagram

Results & Conclusions

The paper provides recommendations in developing a structured approach to the use of mobile scanning applications, in the documentation of architectural heritage detail. The study demonstrates that many of the available applications are intuitive to use, making them accessible for users, however process and output varies between subject matter. A framework for the use of mobile technologies within heritage documentation provides guidance for the custodians of heritage buildings, and highlights ability of the assessed applications to scan different materials, levels of relief, colour and texture. The paper identifies opportunities for greater participation by non-professionals in the recording and digital preservation of heritage details. The study highlights that heritage organisations can benefit from the adoption of more accessible solutions. Such activities also encourage public participation with built heritage, perhaps prompting different perspectives, interpretations and understanding of the given subjects. The study highlights future research opportunities in relation to Heritage Building Information Modelling (HBIM), to address limited funds and resources in the management of heritage buildings.

References

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