The 3D Digitisation of Artefacts to be Displayed in a Virtual Museum

Introduction

As virtual reality grows more popular and with the recent launch of augmented reality, the demand for realistic 3D models for visualisation purposes in increasing. 3D content is generally created with laser scanning systems or designed manually in modelling softwares. Photogrammetry is able to generate digitised models of a real objects from a set images.

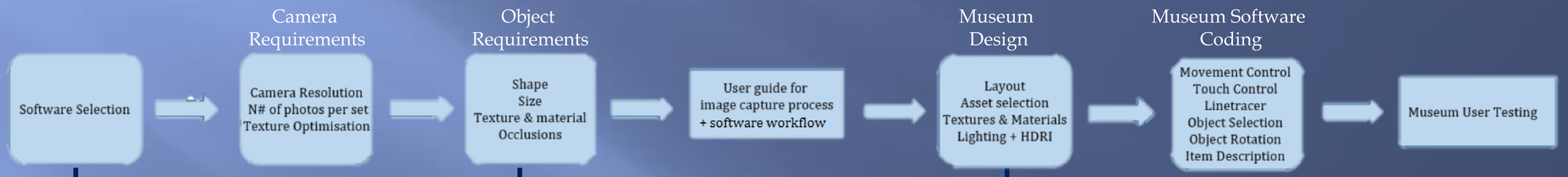
Aim

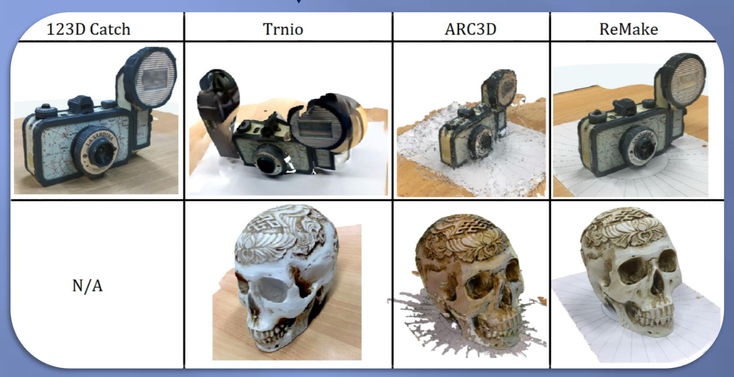
To scan a museum object and with as minimal delay as possible, incorporate it into a virtual reality environment to avoid the need to manually create the 3D object.

Objectives

- Identify and evaluate appropriate scanning systems
- 3D scan example museum objects.
- Incorporate the 3D object into a VR system using Unreal Engine
- Explore limitations of the level of detail that can be obtained
- Document the 3D capture process with examples.
- Development of a virtual museum environment.

Methodological Approach





The image above illustrates the generated models of four programs considered for the project.

Multiple photogrammetric softwares were tested and compared based on features available,, workflow process, user interface, rendering time and quality of models.

Object Requirements

In order for the matching algorithm of the image-based 3D modelling software to produce accurate models of the object being scanned, the following set of requirements must be met:

- Avoid non-textured, plain objects
- Avoid flat objects with little surface depth
- Avoid transparent, reflective or shiny materials

Virtual Museum Layout (Unreal Engine 4)

Pedestals designed in Blender

Conclusion

With recent technological improvements made in photogrammetry, an individual with an interest in the field can produce models of real objects. If the image capture process is done correctly and the object being scanned meets certain requirements, 3D models of quality equal to that of manually design models in design softwares can be generated. This technique can be applied to a multitude of applications such as game assets, cultural heritage, displaying merchandise in virtual shops and even replicate entire scenes.

Loughborough University

Mortimer Sotom – B313794
Project Supervisor: Roy Kalawsky
Electronics & Electrical Engineering MEng
Wolfson School of Mechanical Electrical and Manufacturing Engineering