AHRC/Exeter Summer School on 2D, 2.5D and 3D capture and visualisation of textured artefacts

The aim of this training course is to provide participants with foundational knowledge and skills in 2D, 2.5D and 3D capturing and visualisation, using accessible and low-cost digital photography equipment. This practical training course will provide participants with new technical skills on using a digital photographic camera, related equipment and software for creating 2.5D and 3D visualisations and interpreting the produced outputs.

The course is designed for academic professionals and researchers in Higher Education Institutions and Research Organisations who conduct research related to Arts and Humanities topics. No prior experience or skills in 2D, 2.5D and 3D visualisation is required, but a basic knowledge of digital photography will be beneficial.

The training course is designed for 5 days, including 2 hours of theory and 5 hours of guided practice every day. The course will be in person, with maximum 10 participants.

The schedule of the course is as below:

Day 1: Basic introduction to photography

The module will focus on analysing the basic operations and adjustments of digital cameras, specifically the camera exposure triangle (aperture (f), shutter speed and ISO), as well as the importance of light. It will cover the basic principles of archiving photography, and it will provide an overview of different formats of digital photographs and an introduction to basic applications of image processing software.

During the module, participants will have the opportunity to practice using a DSLR camera and capture various pictures by adjusting the camera exposure triangle.

Day 2: Introduction to RTI 2.5D

On the second day, participants will learn about 2.5 D photography, through the application of Reflectance Transformation Imaging (RTI). They will learn about different set-ups, RTI capture, different formats of results (e.g. Polynomial Texture Mapping (PTM), Normal visualisation) and the software options available.

Participants will have the opportunity to create RTI files and extract the results.

Day 3: Introduction to Photogrammetry

On the first day dedicated to photogrammetry participants will learn about its principles and applications, required equipment, and suitable subjects for this method. Techniques for capturing non-suitable subjects will also be covered.

Participants will have the opportunity to put their knowledge into practice by capturing images of various example objects, including their own.

Day 4: Creation of the 3D models with photogrammetry

On the second day of photogrammetry, participants will focus on the process of building a 3D model. The course will cover the different parameters used by photogrammetry software, the use of masking, and various formats of 3D models.

Participants will have the opportunity to apply their knowledge by building their own 3D models using the images captured on the previous day.

Day 5: Further process on 3D models and sharing the results

On the final day, participants will learn how to further refine their 3D models, and how to share them online. They will have the opportunity to practice on the 3D models they created.

Following the training, the participants will have the necessary knowledge to:

- Use camera settings such as aperture, shutter speed, and ISO to create properly exposed photographs, in natural and artificial light.
- Use basic photo editing tools to enhance and manipulate digital images.
- Understand the RTI method and use specialized equipment to create the set-up, such as dome lights and digital cameras, in order to capture RTI data.
- Use industry-standard software to process RTI data and create 2.5D models.
- Create and manipulate RTI images, revealing hidden details or enhancing specific features of an object or surface.
- Understand the different RTI file formats, such as PTM and HSH, and how they can be used in different contexts.
- Analyse and interpret the data obtained from RTI to extract meaningful information about an object or surface.
- Understand the photogrammetry techniques for capturing small objects and identify which subjects are suitable for this technique.
- Use basic functionality of photogrammetry software.
- Process data from photographs, creating accurate 3D models or ortho-mosaics.
- Understand the importance of light and shadows to ensure that the resulting data is accurate and reliable.
- Use basic tools for further processing the 3D models.
- Share and publish 3D models online.