



UNIVERSITY OF CALIFORNIA SAN DIEGO

CSE 272: ADVANCED IMAGE SYNTHESIS

FINAL PROJECT PROPOSAL:
RENDERING 3D OBJECTS FROM REAL WORLD

<i>Author</i>	<i>Student ID</i>
Qinpei Luo	A69035113
Wuqiong Zhao	A69033471



Figure 1: Dazu Rock Carvings (Up: Game Scene; Down: Real World)

1 Introduction

Designing meshes and textures is an essential part of various applications of computer graphics, including game design, simulation, and CG-based animation. However, merely using the tools in a renderer or game engine to create 3D objects may deviate from the real appearance in life. Besides, it also induces many reuses of resources in the development, which lacks creativity.

Nowadays, thanks to the development of camera and measurement devices, many studios can scan the objects in the real world, which can be used to create realistic objects in the game. For example, the popular game in the last year named **Black Myth:Wukong** used 3D scanning devices to collect data from over 3000 ancient architectures and antiques in China to create lifelike game scenes as in Fig. 1.

However, despite the splendid effect the game has shown in re-creating virtual objects, it requires quite professional and expensive devices like **ATOS-Q** [1] by **ZEISS**, which cost around 2000 USD. Nevertheless, owing to the advance in computer vision, we are able to reconstruct colored 3D point cloud from sparse camera images from multiple angles [4, 2, 3]. Once the colored 3D point cloud is acquired, we can use tools like **Open 3D** [5] to generate meshes and texture. With these properties given, we can mimic the real-world 3D object in the renderer or UE5.

2 Proposal

In this project, we aim to build a pipeline that renders the objects in the real world, integrating multiple functions as shown in Fig. 2. First, we use the mobile phone camera to capture photos of an object from various perspectives, which are used as input to models that generate a colored point cloud. Subsequently, the point cloud can be further processed to generate meshes and texture. Finally, all the properties can be

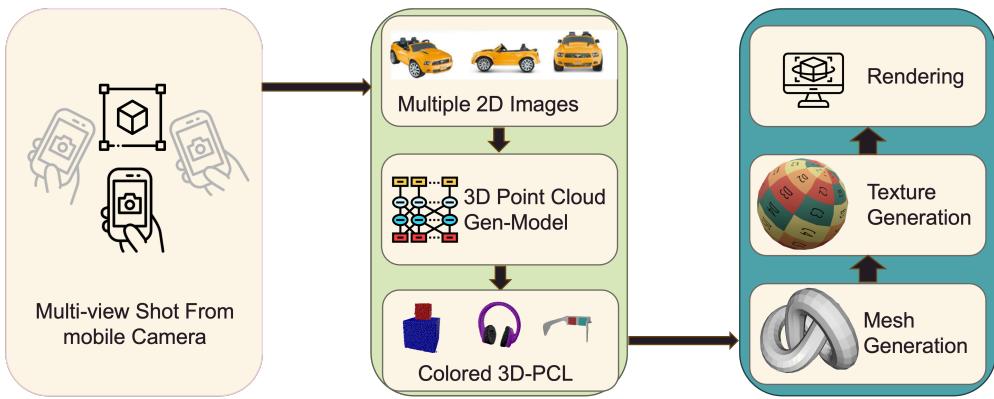


Figure 2: Pipeline of rendering objects in real world

used in the renderer to create a virtual digital-twin object.

Our goal is to create lifelike virtual objects in a renderer or game engine by collecting real data from the world. On top of that, as a supplementary experiment, we can simulate different lighting conditions in the renderer and compare it with the true lighting settings when capturing the photos.

References

- [1] CARL ZEISS METROLOGY. Quality Starts with a Q: 3D Metrology, 2024. Accessed: 2025-02-27.
- [2] LEE, J. J., AND BENES, B. Rgb2point: 3d point cloud generation from single rgb images, 2024.
- [3] MÜLLER, T., EVANS, A., SCHIED, C., AND KELLER, A. Instant neural graphics primitives with a multiresolution hash encoding. *ACM Trans. Graph.* 41, 4 (July 2022), 102:1–102:15.
- [4] NICHOL, A., JUN, H., DHARIWAL, P., MISHKIN, P., AND CHEN, M. Point-e: A system for generating 3d point clouds from complex prompts, 2022.
- [5] OPEN3D COMMUNITY. Open3d: A modern library for 3d data processing, 2025. Accessed: 2025-02-27.