

CHAPTER

5

3D VIRTUAL POTTERY USING HAND GESTURE

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5.1 INTRODUCTION

Pottery, a traditional heritage art crafted with bare hands, faces a decline in practice within Malaysia. To revitalize interest and showcase the captivating nature of pottery sculpting, this chapter proposes the creation of a virtual pottery prototype. The objective is to present a three-dimensional (3D) virtual pottery puzzle allowing users to interact through hand gestures. Integrated with the Leap Motion Controller, the prototype can detect and respond to users' hand movements (Marin et al., 2014). While preserving an environment reminiscent of pottery making, the interaction with the prototype diverges from traditional methods. Upon accurately placing all components, the virtual representation of the pottery materializes. Developed using Unity 3D software, this chapter outlines the functions and environment setup of the prototype. The outcome is a comprehensive virtual pottery puzzle prototype designed to educate younger generations in traditional heritage art, aiming to sustain the popularity of pottery making in Malaysia.

Introducing a virtual pottery design, this chapter explores the implementation of hand gesture controls for pottery creation. It covers the artistic expression, user experience considerations, and practical

implementations of creating virtual pottery with hand gestures, showcasing the creative possibilities and user engagement in virtual artistry. With the integration of the Leap Motion Controller, the prototype can detect hand gestures and perform interactions. The prototype preserves the pottery-making environment, but its interaction method is unique. This prototype allows interaction through a puzzle application method. The user can select the broken pottery piece and place it in the correct position on the model reference. After all the parts are placed correctly, then the model of the pottery will appear. The case study is the complete prototype of a virtual pottery puzzle, which aims to educate youngsters in traditional heritage art so the popularity of pottery making in Malaysia can be sustained.

5.2 INNOVATION APPROACH

This section introduces the system's development, and the process involves several essential phases, as presented in Figure 5.1. During Phase 1, a preliminary investigation was carried out. This involved studying existing applications that utilize Leap Motion technology (Fadzli & Ismail, 2019). These applications were thoroughly examined, serving as references for the project. Data from these existing applications was collected, and the most appropriate method for hand gestures was identified based on the findings. Subsequently, the interaction method is conceptualized, with the chosen approach being the pinch gesture. To ensure the functional operation of the prototype, integration with the Leap Motion Controller is essential.

Phase 2 involves sensor-based gestures and the development of a 3D virtual pottery puzzle. Phase 3 is the integration of the proposed gesture interaction with the virtual environment. This phase established all aspects of the prototype, including the user interface, functions, and workflow. Finally, the project workflow concludes with the system evaluation stage. Although it is a crucial part of the framework, the specific evaluation details are not covered in this chapter.

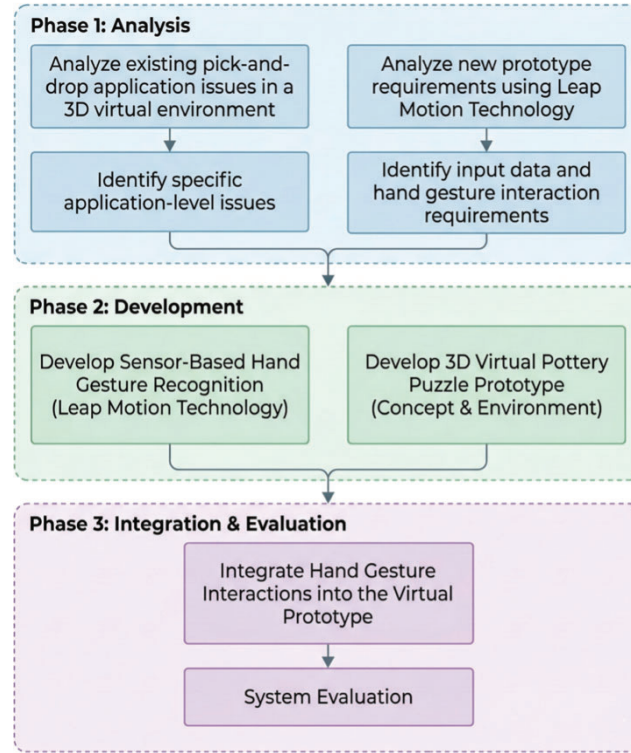


Figure 5.1 Systematic approach and workflow

5.3 IMPLEMENTATION OF GESTURE INTERACTION

The prototype was developed using the Unity 3D software. The chosen hand gesture technique, the pinch gesture, was implemented initially. Subsequently, the pinch gesture was modified to achieve the grasp gesture. The selected hand gesture technique, which is the grasp gesture, is integrated into the prototype to execute specific actions. Grasp gestures are employed to seize interactive objects.

The implementation phase commences with the proper placement of the Leap Motion Device within a suitable range. This step is crucial, as the range significantly affects the smoothness of hand tracking by the Leap Motion Sensor. Following the correct setup of the Leap Motion Device, virtual hands will appear in the scene once it is initiated, allowing for subsequent tasks to be carried out.