

CHAPTER

3

MARBLES GAME WITH HAND GESTURE CONTROL

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3.1 INTRODUCTION

The traditional Marbles game is losing its popularity among youngsters due to the rise of modern technologies. Nowadays, children prefer spending their leisure time playing games on notebooks or mobile phones in virtual worlds. It is very hard to find physical stores that sell marbles, and even if they do, ensuring children's safety during play is quite challenging. Smaller children may easily misplace and eat marbles, requiring adult supervision.

Our communal memory also includes images of men so deft at their craft that even now many residents can close their eyes and still see them, hear the sharp clink of glass on glass in a game of marbles played for all the world to see, or catch sight of a perfectly aimed marble skimming over the ground dust. The game of marbles has many names: '*guli*' warming in the Malaysian sun, or '*kelereng*' under the Indonesian streetlights, but it is a symbol now for other simple joys that seem to erode almost as swiftly as those drawings on chalk after the rains. Today's kids, of course, live in a digital world, their imaginations captured by pixels and code, and these physical amusements are on the verge of extinction. But could not we also build a bridge across the eras? What if

such technology that embodies the new age is used to give a new life to an age-old game? We could port it over to a lush three-dimensional (3D) world and make you feel like you are right in the thick of the action while holding on to its roots at the same time. It would be a digital phoenix not rising from its ashes but directly from the dirt of those forgotten playgrounds, reconstructed with hyper-realistic physics engines that convincingly capture the weight and roll of every shot and presented in vivid detail within virtual spaces ranging from gauntlets of nostalgia to magic-infused playgrounds. Players could grow unique collections of marbles, an assortment that would have its own weight and history, and square up in international arenas or story-driven missions steeped in the game's cultural heritage. Thanks to the alchemy of game engines, cloud networks, and even augmented reality, we can give a new generation the chance to experience the deep, impulsive joy in discovering a world through an object that their grandparents loved: The spirit of the marble — all glowing simplicity — is never really gone.

To ensure the preservation and continued interest in this traditional game as an effort towards heritage preservation, we developed a 3D Marbles game that integrates hand gesture technology. This innovative approach aims to safeguard our cultural heritage and ignite enthusiasm for traditional games among children. By doing so, children will have access to enriched digital content related to Marbles, all within a safe virtual environment. The implementation relies on technologies for recognizing hand gestures, such as Kinect and Leap Motion.

As the Marbles game's popularity began to fade, efforts were made to restore its former glory. Some of the initiatives involve creating a mobile game version of the Marbles game (Hussien et al., 2022). However, this digital adaptation falls short in capturing the authentic experience of playing with real marbles. In the mobile game, users mostly interact by touch and slide actions.

The primary goal of this project is to incorporate hand gesture interaction into a virtual Marbles game prototype. To achieve this, three key objectives have been identified. First, an in-depth study of Marbles game mechanics and hand gesture interaction was conducted. Second,

a 3D virtual environment for a Marbles game prototype was designed and developed. Lastly, the integration and testing of hand gesture interaction using the Leap Motion Controller was carried out.

3.2 MARBLES GAME

This section presents a collective review of the Marbles game, features, and technologies that made it possible to adapt the traditional game into an exciting 3D digital version in a virtual environment. Traditional games are gradually fading into extinction (Mat Nayan & Kun, 2019). In today's digital era, children prefer video games and internet browsing compared to outdoor play, whether in parks or on streets. Among these forgotten traditional games is the Marbles game, known as '*guli*' in Malaysia and '*kelereng*' in Indonesia. Typically played by children aged seven to twelve, this nostalgic pastime is a testament to simpler times.

Back in the early days when *guli* was first introduced in Malaysia, people used rounded pieces of wood about the size of chicken eggs as marbles (Abdul Halim et al., 2024). Later on, marbles were crafted from limestone materials mixed with cement. At that time, the marbles were as large as a toe. The ideal arena for playing *guli* is in a shaded, flat area or any space with ample room. Dry land is preferred because players need to dig holes for the game. When the ground is muddy, the game becomes less enjoyable, as the marbles tend to stick to the ground, complicating the gameplay.

There are many varieties of *guli* games. We will adopt this setting for our digital adaptation: a circle with a diameter of 1m is drawn on the ground. Next, a hole is dug in the middle of the circle with a width of roughly 10 cm and a depth of 7 cm. This hole is called the Main Hole. Next, a straight line is marked 3m away from the circle (see Figure 3.1). This line determines the order in which players begin the game. Each player stands behind the line and flicks their marble into the circle. The player whose marble lands in the main hole or closest to it gets the honor of starting the game.