Superhero Sportsday: Driving and Flying Experiences for Children with MotionInput 3.4 API

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Abstract

This project set out to allow children of all abilities to experience flying and driving in an engaging way, focusing on the development of two distinct games—Hang Gliding and Quad Biking. Each game is framed within an imaginative superhero theme set in the tropical islands of Mauritius. This work employed the Unity game engine, known for its robustness and flexibility for independent developers, alongside the integration of the MotionInput 3.4 API, which translates physical movements directly into game controls.

Using the Design Thinking methodology, the project was rigorously tested through multiple iterative cycles with both target groups—fully-abled and autistic children. Our top priority was to ensure the experience was family-friendly, easy to control, and intuitive to learn. These tests were conducted in varied settings, ranging from quantitative testing, such as surveys with large family audiences, to qualitative testing, such as visits to a specialist school for children with autism. The testings contributed to the continuous refinement of gameplay mechanics and control configurations. The final designs brought significant improvements, ensuring that the games were enjoyable for children with different abilities.

The successful implementation of Hang Gliding and Quad Biking not only explores the potential of adaptive game design but also demonstrates how thoughtful consideration of user capabilities can make gaming a universally enjoyable and inclusive activity. This research advances the field of accessible game design and sets an example for future educational and recreational game development, particularly in delivering driving and flying experiences targeted at children with diverse needs.

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Chapter 1

Introduction

1.1 Gaming for Children

Video games are a significant part of many children's lives, offering not only entertainment but also opportunities for cognitive development. Since controllers serve as the primary interface between children and the games, they need to be designed to accommodate a wide range of users—from young children who are still developing their fine motor skills to those with disabilities or special needs. The design of gaming controllers should prioritise ease of use, comfort, and flexibility to create a more inclusive gaming experience for all children.

1.1.1 Back in the Days - Arcade Games

In the early days of gaming, arcade games played a major role in introducing the medium to families. Iconic titles such as *Donkey Kong*, *Pac-Man*, and *Space Invaders* relied on simple controls using joysticks and a minimal number of buttons. These designs were accessible to players of all ages, including children. Arcade games were created for quick, easy-to-understand play, featuring straightforward mechanics that could be grasped without much difficulty. While arcade games eventually evolved to cater to more competitive players, often requiring more complex inputs, the simple control interfaces of classic arcade games laid the foundation for modern gaming controllers, which continue to influence design today.

Figure 1.1: *Pac-Man* Control Interface, as seen in the 7-Up TV commercial in 1981 [1]

1.1.2 Accessibility of Gaming Controllers for Children

Early gaming consoles, such as the Atari 2600, used paddles and joysticks, while later consoles like the Super Nintendo and PlayStation established the foundation for contemporary gaming controllers, increasing the reliance on finger dexterity. While finger-reliant input works well for the majority of users, it undeniably overlooks potential users with disabilities.

Alternative controllers for the Atari 2600 were created to accommodate users with different preferences. For example, the FingerTip controller offered alternative options, such as a D-pad instead of joysticks, and a reversible configuration for left-handed users. Contemporary designs, such as steering wheels and touchscreens on smartphones, feature larger buttons to reduce the reliance on finger dexterity. Motion tracking is another alternative technology for accessibility in controllers. A good example is the camera mouse, which allows users to control a cursor by moving their head, with the camera tracking the movement of a dot. These inventions have provided an entry point for disabled people to enjoy technology in ways similar to fully-abled individuals.

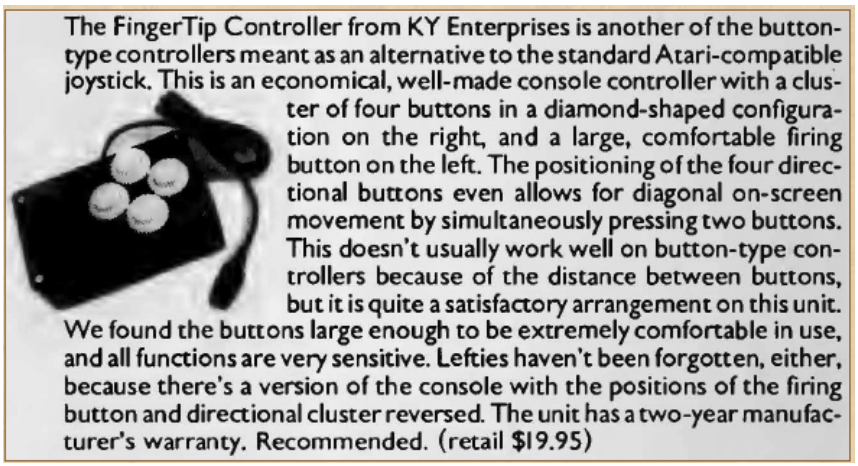

Figure 1.2: An advertisement of the FingerTip Controller [2]

1.1.3 Problems of Accessibility in Game Designs

However, accessibility tools are rarely as efficient as the standard input methods used by fully-abled users. Technologies like head-tracking require the same level of precision as a mouse, and voice-control input takes more time for the computer to process speech. The problem is that these tools are designed to work with software that prioritises fully-abled users. Modern devices often cram more content into the user interface to enhance productivity. In gaming, not only have user interfaces become more complex, but user input has also become more intricate. Video games today frequently require simultaneous input, such as pressing two keys at once for special attacks in fighting games. For instance, the recent game *Stellar Blade*, like many other modern games, offers accessibility modifications, but a reviewer on Can I Play That? stated that "Accessibility features in *Stellar Blade* don't lessen the steep difficulty enough to make it enjoyable for those with motor impairments." The reviewer was unable to finish the game before writing the review. [3] Even family-friendly games like *Mario Kart* require players to steer while pressing a button to drift, which can be relatively challenging for disabled players, even with assistive tools. Thus, the issue does not lie solely in the controllers; the design also needs improvement to be compatible with simplified input methods and accessible for disabled users.

1.2 Aims and Goals

1.2.1 Aims

The aim of the project is to develop a fully interactive game in Unity, for all children to play and enjoy. It will be themed around sports, similar to the *Wii Sports* game and is to be built for AI PCs running Windows 10/11. The project will be a team effort involving six members. Each of us will primarily focus on developing our own games, while some code and components will be shared to maintain consistency.

There are many general aspects to developing a game. By creating game levels individually, we have the opportunity to learn the basics of game development, from the hierarchy of game objects to detailed features such as rendering. The scope of the project operates as if we are solo developers so that we can learn the fundamentals of each process.

One of the key elements of game development is coding. Unity Engine uses C#, which will be the primary focus of my project. Scripting is the tool that controls the behaviour of game objects, and I expect this project to heavily emphasise learning C# for Unity.

In addition to the technical side, game design is another major focus of this project. The intriguing aspect of game development is that, while coding is important, it serves a creative purpose. Players' reactions are the most critical aspect, regardless of how robust the code is. During development, there will be a steep learning curve in not only ensuring the game runs smoothly but also making it enjoyable. Since the game is designed for both disabled and fully-abled players, achieving a good balance between these two groups with different abilities will be a valuable learning experience.

To create a game that accommodates all children, including those with autism, we first need to understand their needs. Accessibility is a major topic that many people overlook because they do not require accessibility modifications or assistance in games. As someone who is not familiar with accessibility in society, it will be crucial for me to continually learn and understand these needs throughout the project.

1.2.2 Goals

We will be working as a team to deliver one final game build, containing all of our individual games. This build must be bug-free and run at a stable, consistent frame rate. Individually, I will be designing and developing two games, with the rules, mechanics, and main components fully implemented. The assets and game objects will be designed to be easily replaceable for future development by other teams.

User data will be collected during live demos through surveys and direct feedback. This information will be valuable not only for the current development but also for future work.

The source code and documentation will be provided for future development. Clear instructions will be included to ensure the next team can seamlessly continue developing the project.

1.3 Project Overview

This project will begin with a period of research and learning for me to study Unity. Meanwhile, communication will start with our client, MotionInput. This early stage will help us understand the requirements before development officially begins.

The development process will commence with building a prototype, a simple game that is barely playable. Feedback will then be gathered from various users and the client. Content will be added or changed based on the feedback. It is likely that many designs may remain unused by the end. The iteration process could occur multiple times in order to achieve excellent results for users.

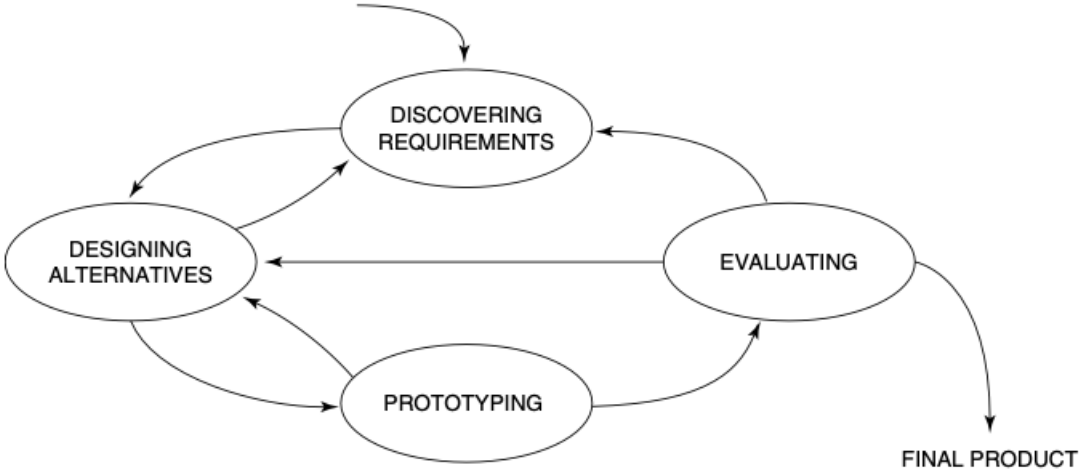

Figure 1.3: Design Life Cycle [4], p. 52

1.4 Report Overview

The report will begin with some background and research on current game technology. In order to understand the current development of accessibility, the research will not be limited to motion tracking alone. Gaining an understanding of other controllers will help address the needs of children and disabled users. The research will also examine other elements relevant to the project, as required by the client. Studying the features and limitations of MotionInput is essential for designing the games. Even small details, such as how to build terrain with realistic geographic data, are important, particularly as the theme of the project is based on a real location.

This will be followed by analysis and requirements. Based on the current problems and the client's preferences, the requirements will be outlined.

As the project will have multiple iterations of designs and different features will progress at different stages, the iterations will not be presented in strict chronological order. I will divide the design process into two parts, with the majority of the requirements being met in the first iteration.

However, feedback from target players and experts will improve the project, and the game will change multiple times. A chapter will evaluate the first iteration so that I can understand what players prefer.

After reviewing all the feedback and comments, a new chapter will be written to evaluate the previous design and explain the changes made. This will serve as a good example to illustrate the learning process. Meeting all the requirements does not necessarily mean that the game will be enjoyable.

Chapter 2

Background & Literature Review

2.1 What are the alternatives? - Accessibility of Game Controller

2.1.1 Arcade Controllers

Early arcade games were primarily controlled using simple setups, typically consisting of a joystick and two buttons. This straightforward design allowed players to easily grasp the controls, making the games accessible to a wide range of users. The simplicity of the joystick-and-button configuration became iconic, forming the foundation for classic arcade gameplay.

Apart from the classic arcade controller, there are also more alternative designs that enhance the immersive experience. For example, in Namco's *Prop Cycle*, the controller simulates a cycling and flying experience, allowing the player to feel as if they are pedalling and flying through the air. Another example is *Daytona USA*, which provides a realistic driving experience by incorporating a driving seat and steering wheel, closely mimicking real-life driving. These tailored controllers offer intuitive and immersive gameplay, where the controls align with real-world actions, making the experience accessible and enjoyable, even for children.

Figure 2.1: Namco Prop Cycle poster [5]

2.1.2 Accessibility in Controllers

Although my project has decided that motion tracking will be the primary input technology, it is important to briefly examine other popular controllers. The main difference between an accessibility controller and motion tracking is that a controller requires physical contact with the player. This allows us to understand how disabled users can customise their controllers for comfort, as well as providing insight into the limitations imposed by different disabilities.

Nintendo Switch

All the input methods rely primarily on the very small buttons on the Joy-Cons. These buttons are about half the size of those on an Xbox or PlayStation controller. Users without agile fingers will definitely find it harder to control.

Although the Nintendo Switch does not provide the same level of accessibility as its competitors, it offers a different approach to accessibility that is worth studying. The main feature of the console's design is its compatibility with both a home console setup and a handheld mode. In both modes, players can choose their preferred control style. The Joy-Cons can remain attached to the console as a handheld device, or they can be detached, allowing the player to hold them separately in each hand or attach them to a grip, resembling a traditional controller. While this design feature may not be suitable for all differently-abled users, it focuses on providing a comfortable user experience based on the player's preference.

Although the finger-reliant button input is not ideal for all differently-abled users, the motion tracking feature has become a key part of the console's input method. With accelerometers and gyroscopes in both Joy-Cons, the controllers can detect the direction and velocity of the user's movements as input, allowing for more intuitive control.

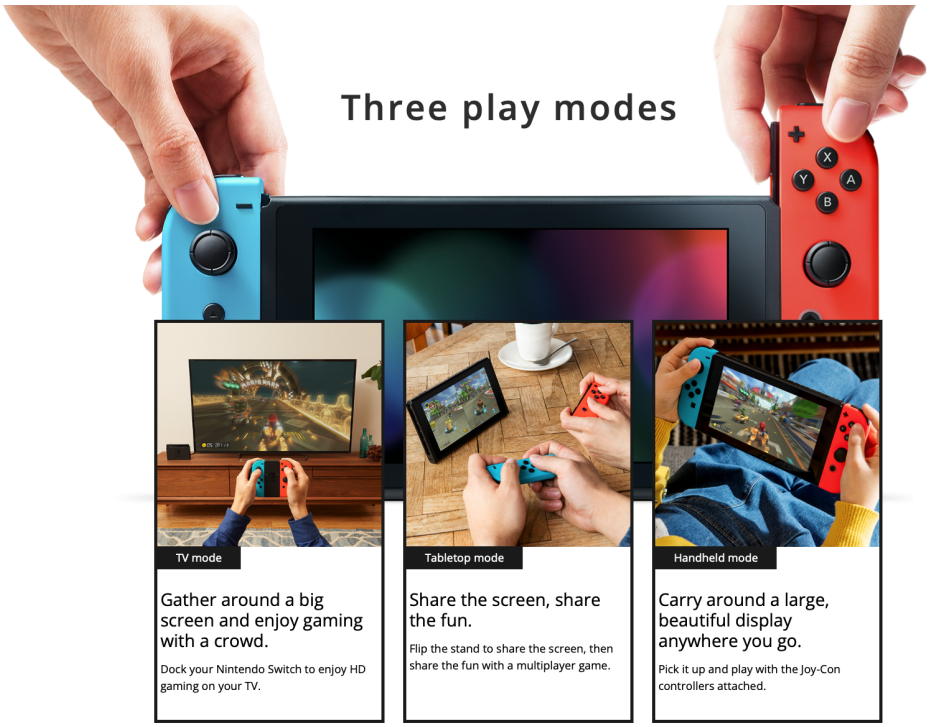

Figure 2.2: Three play modes of Nintendo Switch, as demonstrated on the website [6]

Xbox Adaptive Controller + Joystick:

Xbox introduced its accessibility innovations in 2011 with the Adaptive Controller and in 2024 with the Adaptive Joystick. Both devices are highly customisable in terms of hardware components and configuration. The design of the Adaptive Controller features two extra-large buttons and a D-pad. The large button design is convenient for users who are not agile with their fingers, as they can use any part of their body to press the buttons. It is highly modifiable, as additional accessories such as joysticks or buttons can be connected to the main panel. Extra buttons are available in different materials, including cushion buttons for added comfort. Users can place the buttons wherever they feel comfortable, making the design flexible. [7]

The Adaptive Joystick is a new controller that requires only one hand, or in some cases, no hands, to operate. It features only one side of a traditional controller. While the thumbstick may not always be accessible for disabled users, it can be replaced with a different shape. All buttons are remappable. The customisable design of these two devices offers the flexibility needed in an accessibility device. [8]

In addition, Xbox has introduced a new style of gaming—co-op mode—to enable more players to enjoy gaming. Some players may not be able to manage all the controls on their own, so co-op mode allows two players to cooperate as one. For example, one player can use an Xbox controller to control character movement, while another player using the Adaptive Controller can manage the character's actions. [9]

While these tools are excellent, they come at a cost. A standard Adaptive Controller (main panel) is currently priced at £74.99, and the total cost, including all necessary accessories to replicate a typical controller's buttons, is approximately £150. This can be a financial burden for families with disabled members, raising concerns about the accessibility of these devices.

Figure 2.3: Youtube channel LinusTechTips demonstrates the co-pilot mode of two players co-driving a vehicle [9]

PlayStation Access Controller

Since the design principles are similar to Xbox's Adaptive Controller, I will only briefly analyse it and highlight the differences between the two accessibility approaches taken by two of the largest console manufacturers.

PlayStation's approach to accessibility is similar to Xbox's. Instead of using a rectangular panel, the design is circular and surrounded by modifiable buttons and a control stick. The advantage is

that the main panel already contains most of the frequently used buttons. As a result, it only has four ports for additional tools and does not require the user to purchase many extra accessories to complete the set of inputs. However, this is also a disadvantage, as the circular design may not be suitable for all disabled users.

Similar to Xbox, it also works in parallel with the DualSense controller, giving players the flexibility to choose how much they rely on each of these tools.

Figure 2.4: Demonstration of one of the many ways to use the PlayStation Access Controller [10]

2.1.3 Motion Tracking

When considering accessibility in gaming, motion tracking technology offers an alternative input method that can be particularly beneficial for users who may have difficulty using traditional controllers. Below, I examine some of the current motion tracking devices available on the market, highlighting their capabilities and limitations.

Xbox One with Kinect

The Xbox Kinect was a pioneering device in motion tracking, using an infrared sensor to detect depth and track body movements in 3D space. This technology allowed for a controller-free gaming experience, where users could interact with games through gestures and voice commands. Kinect's motion control capabilities were innovative, making it possible for users to engage with games using their entire body, thus removing the need for traditional controllers.

Despite its innovation, the Kinect was made to serve the Xbox users. It is limited by its game library, as only specific titles were designed to adopt its features. Additionally, the motion control capabilities were not fully customisable, which limited its use for accessibility purposes. The Kinect's reliance on the Xbox console and its relatively narrow application scope meant that it was not universally usable across all games. It could not be adapted for broader input remapping, which is crucial for accessibility.

Figure 2.5: Gameplay of *Kinect Sports*, on Xbox One with Kinect [11]

PlayStation Camera

The PlayStation Camera is primarily used for PlayStation VR and streaming, but it also has applications in some non-VR games, particularly those that require motion tracking or augmented reality features, though very limited. For instance, games like *The Playroom* and *Just Dance* leverage the camera to track player movements, offering a different kind of interactive experience. It is also integral to the PlayStation VR setup, helping track the VR headset and controllers for immersive gameplay.

However, the PlayStation Camera's utility in accessibility is limited. Similarly to Kinect's disadvantage, it does not provide extensive customisation options for remapping inputs, which is a significant drawback for users with disabilities. Furthermore, its use is restricted to the PlayStation console, limiting its broader application outside of Sony's ecosystem. I would describe PlayStation Camera an extension to the console experience but it was designed for accessibility like Kinect.

Leap Motion Controller

The Leap Motion Controller represents a different approach to motion tracking, focusing specifically on hand and finger movements. This device only requires a USB cable for connection, it uses cameras and infrared sensors to detect precise hand gestures in real-time. Leap Motion's ability to track detailed finger movements provides a unique and highly customisable input method for certain specialised applications. I purchased one of the controllers from the first generation. The performance is exceptional, with fps (frames per second) approximately about 115. It has accurate tracking for fingers and arms.

However, its requirement to be close to the sensor plane (usually within a few feet) and its limited range mean that it cannot replace a traditional mouse or controller for most gaming scenarios. Moreover, its utility in accessibility is confined to applications where hand and finger movements are the primary mode of interaction. And it cannot even detect other body points, users who are amputees or have significant difficulty using their hands and fingers may find it challenging to use effectively, as it relies heavily on fine motor control and hand gestures.

Figure 2.6: Userinterface of Leap Motion Controller, demonstrated by me

2.2 Within Software – Accessibility of Game Design

New advancements in physical tools assist users with disabilities, but the design of the games themselves is equally important. As mentioned earlier, while some video games on the market offer assistive settings for disabled users, this does not always ensure equal access to the game. In some cases, games can remain unplayable for users with certain disabilities.

This section analyses effective game design measures that help users with physical disabilities enjoy gaming. Although there are many types of disabilities, such as visual and audio impairments, this project focuses specifically on physical disabilities and thus will only examine relevant design practices.

2.2.1 Flexible Difficulty Adjustments

Many games include options to lower difficulty by reducing the need for complex inputs. For example, in many video games, maximising user control often means adding more keys or buttons for different actions, which can be a barrier for disabled users who have limited ways to input commands.

A prime example is *Celeste's* Assist Mode. *Celeste* is a critically acclaimed game known for its challenging gameplay. After recognising the need for inclusivity, the developer Matt Thorson included an Assist Mode which allows players to modify the difficulty to suit their abilities.

In Assist Mode, players can slow down the game, have infinite stamina, perform infinite air dashes, and even enable invincibility. This ensures that all players, regardless of their physical abilities, can enjoy the game's story and experience. The game's design embodies the principle of accessibility by allowing players to customise their experience to match their skill levels, while the game remains enjoyable for everyone.

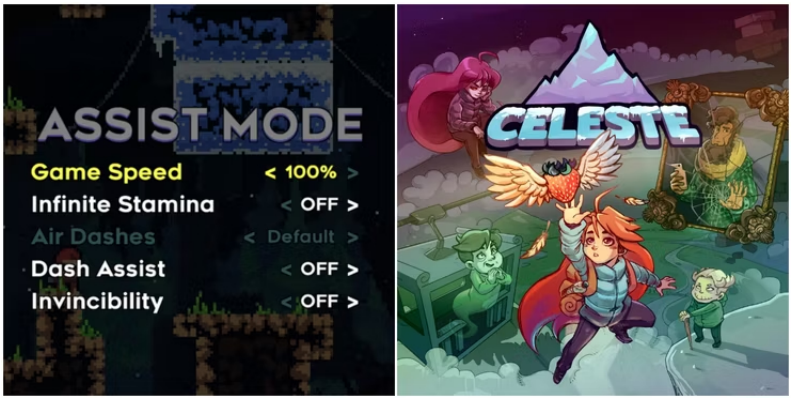

Figure 2.7: Assist Mode settings in *Celeste*

Matt Thorson believed that *Celeste* could deliver more than the developer's intentions by allowing players the freedom to explore the game in the way that matches with their abilities and preferences. Thorson stated,

"We also accept that every player is different, and that people come into the game at many different skill levels. So systems like the strawberries, b-sides, and assist mode are all there to help players find the challenge level that's right for them. We want people to come out of this game feeling capable and powerful, so that means we have to teach them, challenge them, and support them through the failures along the way." [12]

This philosophy reflects on the design of Assist Mode, emphasising the importance of player autonomy and the idea that games should be accessible and enjoyable for everyone, not just those who can meet the standard difficulty.

Similarly, Nintendo's *Mario Kart™ Deluxe 8* for Switch offers features to lower the difficulty for players. Smart Steering helps prevent users from driving off the track or falling off the edge. This feature is particularly beneficial for players who may struggle with the precise control needed in racing games, allowing them to enjoy the game without constantly worrying about navigating tricky sections of the track. [13]

Not all games offer such comprehensive difficulty assistance, and some may still require more inputs than disabled users can comfortably manage. This limitation can make certain games less accessible, despite the presence of difficulty settings. For example, in many racing games, the default settings may still require constant input for acceleration and steering, which can be challenging for users with physical disabilities.

2.2.2 Minimal Input Requirements

Apart from Smart Steering, *Mario Kart* also offers solutions to racing game's constant-input problem. Despite Nintendo's lack of a dedicated accessibility controller, the company has made significant efforts in designing games that cater to players of all abilities.

In *Mario Kart™ 8 Deluxe*, auto-acceleration allow users to play without needing to hold down the acceleration button throughout the race. [14] This design reduces the physical strain on players, making the game more accessible to those with limited hand mobility. Additionally, the game makes good use of the Joy-Cons' accelerometer and gyroscope, which allow players to steer by tilting the controller. There are also officially licensed third-party mini steering wheel accessory to mount one joy con on [15] [16]. Instead of holding a mini controller, user only has to turn the steering

wheel as if driving, making it easier to steer left and right intuitively without relying on traditional buttons or sticks. This setup simplifies the controls, enabling players to engage with the game using minimal inputs, potentially even with just one hand.

While these features enhance accessibility, there are still areas where *Mario Kart* could improve. For example, while auto-acceleration reduces the need for constant input, other aspects of the game, such as braking or using items, still require traditional button presses, which could be challenging for some players.

Figure 2.8: *Mario Kart™ 8 Deluxe* Racing Wheel - Mario Edition [16]

2.2.3 Customisable Input (Remapping Features)

As highlighted in "Assessment of Universal Design Principles for Analyzing Computer Games Accessibility", Mustaquim states that customisable controls is a fundamental feature for accessibility [17], p.430, as it allows users with varying physical abilities to modify the game's controls to their specific needs. This flexibility is crucial in ensuring that all players can engage with and enjoy the game, regardless of their physical limitations.

Gears 5 offers an exemplary model of customisable input within a game [18], allowing players to remap controls to suit their specific needs. This feature is crucial for players with disabilities, as it lets them tailor the control scheme to their capabilities. First of all, the game allows for the full remapping of buttons, users can configure controls in a way that minimises discomfort or difficulty. This principle is similar to the fully modifiable mapping of the Xbox Adaptive Controller, only it is within the game.

In addition to button remapping, *Gears 5* includes settings that eliminate the need to hold buttons for actions like aiming. In most shooting games, user usually have to hold one button to stay aiming. Instead, players can toggle aiming on and off with a single press, which is easier for those who may struggle with sustained pressure. The game also features a one-handed mode, further enhancing its accessibility by accommodating players who can only use one hand .

Despite these robust customisation options, not all games offer the same level of flexibility. Games that do not allow for remapping or require multiple simultaneous inputs may still pose challenges for players with physical disabilities, limiting their ability to fully enjoy the gaming experience.

2.3 Inspirations Beyond Gaming

Apart from the existing technology, now we will search for any gesture or motion as input to digital devices. The inspiration we get here is mostly science fiction, as this is part of the human imagination towards the future, better or worse, through telling a story. Those stories can sometimes be reality at the end. These imaginations also reflects our desire. If this project is meant to make a difference, then we should get inspirations from things that have not become a reality, yet.

As concluding the research of design, I have look at gestures and motion as inputs for digital devices. Much of our inspiration comes from science fiction—a genre where human imagination explores future possibilities, whether in utopian or dystopian setting. These fictional representations often shape our expectations and desires for technology. This project aims to make a significant impact, I believe it should draw from ideas that have yet to become a reality, offering a vision of what might be possible.

2.3.1 Minority Report (2002)

Figure 2.9: Using datagloves as controller in *Minority Report* [19]

In *Minority Report*, the interaction is depicted as a straightforward replacement of traditional mouse and keyboard inputs with hand and finger gestures. This technology is primarily used to manipulate a computer user interface. Gestures, such as swiping, scrolling, dragging, and tapping, are now intuitive to us because of our reliance on smartphones. The concept of interacting with a plane surface using natural gestures has since influenced real-world developments in touch and motion-based interfaces .

The interaction in *Minority Report* is limited to 2D plane surfaces, which restricts the range of possible interactions. While it offers an intuitive replacement for traditional inputs, it does not extend into more complex, three-dimensional interactions. The portrayal focuses on enhancing existing paradigms rather than introducing fundamentally new ways of interacting with digital environments. The implementation of this technology is already possible with Leap Motion Controller, even without datagloves.

2.3.2 Iron Man

Iron Man is one of the most influential franchises and characters in the 21st century, one of the appeals is his superpower is simply advanced technology, which was initially made for accessibility.

Figure 2.10: Tony Stark using touchless control to interact with holographic projection [20]

Apart from the superpower suits, the interaction between Tony Stark and his AI personal assistant, JARVIS — it combines voice commands with gestures, creating a seamless, futuristic interface. One notable scene in *Iron Man 2* (2010) involves Stark redesigning his lab with motion tracking and holographic technology. He manipulates 3D models with hand gestures, presenting a compelling vision of interaction between humans and computer. This scene has influenced the development of real-world design software and creative tools that adopt motion tracking .

The difference between the depiction in *Iron Man* and current technology lies in the 3D world and its use of holographic 3D objects. Current technology emphasises a touchless design in which user interacts with a computer freely. Comparing to the film, the interaction is designed to make the interaction weightless while maintaining the simulation with real physical items.

While this presents an exciting possibility for the future, the focus on holographic projection and physical simulation goes beyond the current scope of our project and most practical applications. It is still a good conceptual inspiration than a directly applicable model for real-world technology.

2.3.3 Her (2013)

Figure 2.11: Touchless control for gaming in *Her* [21]

In *Her*, set in a future Los Angeles, the film explores a world where human relationships are increasingly distanced because of technology. The most iconic invention in the film is Samantha,

an AI that predicts the rise of chatbots. However, one scene particularly relevant to our project features the protagonist playing an AI-driven video game. During gameplay, he uses minimal, intuitive gestures to control the character. The gestures—such as tapping with both hands to mimic stepping and pulling both hands back to zoom into a character close-up. This interaction is simple and natural.

The film's depiction of minimal gestures is inspiring for its simplicity. While it may not be sufficient for more complex tasks which require more detailed control, the simplicity of the gestures should be working well for video games.

2.4 Developing Tools Research

When considering which game engine to use for a non-profit, motion-tracking game for children, I explored Unreal Engine, Unity, and Godot. My focus was on factors like ease of learning, cross-platform capabilities, community support, and system requirements. For a game targeting children on standard laptops, the system demands should remain low to ensure accessibility. While Unreal is known for stunning visuals, its high system requirements make it less suitable for the broad, family-oriented audience. Unity and Godot are far more lightweight, making them the better choices, with Unity being a good balance between performance and accessibility.

2.4.1 Learnability and Popularity

In terms of learnability, Unreal's steep learning curve, especially with its C++ language, is a challenge for beginners. Unity, using C, is much easier to pick up and has a user-friendly interface, with extensive tutorials and community resources. Godot, using GDScript, is the easiest to learn but less transferable for future projects. When it comes to popularity, Unreal is widely used in AAA games, while Unity dominates the indie game market and is also popular in other industries, like AR and VR. For my project, Unity stands out as the most suitable choice, offering both ease of learning and industry relevance.

2.4.2 Community Support and Asset Market

Unity's extensive community support and asset marketplace make it the ideal engine for beginners. It has a large user base and plenty of tutorials, which are helpful for resolving common issues. Unreal also has a strong community and asset store, but its complexity makes it harder for novice developers to find relevant support. Godot's community is smaller but very active, with an open-source model that provides access to many free assets. For my project, Unity's wealth of community resources and affordable assets makes it the clear winner, ensuring smooth development and support.

2.4.3 Conclusion

After carefully considering the different engines, Unity emerges as the best choice for this project. It balances accessibility, ease of use, and performance, making it well-suited for developing games aimed at children on standard laptops. Its widespread industry use and strong community support provide additional advantages, ensuring that I can learn from it while also creating a professional and accessible game. Unity's adaptability and resources make it the ideal platform for both the scope of this project and my future career development.

Chapter 3

Requirements and Analysis

Superhero Sportsday is a project initiated by MotionInput Games. The technology focuses on using motion tracking as an alternative input method to replace mouse and keyboard. In this project, the idea narrows down to how motion tracking could be a new input for desktop gaming. This project builds on the established MotionInput from the past three years, will be designing games that can utilise the features of motion input, as a showcase of this technology.

The following requirements are based on the MotionInput's demands, as well as the problem statement and inspirations from the research, it will be a starting point of the project.

3.1 Requirements

3.1.1 Design Requirements by MotionInput Games

ID	Requirement	Priority
SSR-1	The game is family-friendly and suitable for all children	Must have
SSR-2	The game will run smooth on most PC laptops with a webcam	Must have
SSR-3	The game will be suitable for majority of children with disabilities and other conditions such as autism	Must have
SSR-4	The input system has to be simple to control	Must have
SSR-5	No additional hareware or accesory to run the game	Must have
SSR-6	The background of the game is set in Mauritius Islands	Must have
SSR-7	The story is about superhero gathering for a sportsday	Must have
SSR-8	Family-friendly content only	Must have
SSR-9	2 sports categories should be made by each member	Should have
SSR-10	Accessibility for visual and audio-impaired	Won't have

3.1.2 Additional Requirements based on Problem and Research

ID	Requirement	Priority
SSAR-1	No finger required to control the game	Must have
SSAR-2	The game should be easy for children to learn	Should have
SSAR-3	Simple tutorial to guide new players	Should have
SSAR-4	The gameplay is cusotmisable for children to choose a challenging or relaxing experience	Could have
SSAR-5	Customisable input	Could have

3.2 Analysis

Based on the requirements above, the analysis will provide a guidedance for how I can implement my game design.

3.2.1 Target Users

Superhero Sportsday is designed as a family-friendly video game for the PC platform, with a particular focus on all children. Recognising that many families and schools, especially with disabled members may have limited access to gaming resources, the game will be both affordable and accessible in terms of hardware requirements. It should run smoothly on most standard PC laptops equipped with a webcam.

Given that the game is intended for all ages, particularly in educational settings, it will avoid featuring violence or any content unsuitable for children. Despite the superhero theme, which often involves violence and destruction, the game will present these elements in an educational and non-violent manner, ensuring that no harm comes to humans or animals within the gameplay.

To meet the hardware and content requirements, the game will be polished with a cartoon-like graphic style featuring vibrant and colourful imagery. The player character will be a child, allowing young players to feel represented and enhancing their immersive experience.

3.2.2 Fun Measures

Simplicity

Since the target players for *Superhero Sportsday* are children, the gameplay must remain simple and intuitive to ensure that they can easily engage with it. The game's setting should be clear and understandable, with in-game instructions and objectives that are easy to read and perceive. Since MotionInput limits the complexity of controls, the focus will be on ensuring that the gameplay remains fun while minimising the need for overly intricate mechanics. Games like *Flappy Bird*, which use a single tap as the entire control mechanism, serve as great examples of simplicity in game design. Children should be able to understand the gameplay either without a tutorial or with only a very brief one. Other than this, the game's goals should always be clear and achievable.

Appropriate Challenge Level

The difficulty of *Superhero Sportsday* must be carefully balanced to maintain children's interest. If the game is too easy, children may become bored quickly and lose interest; if it is too difficult,

they may give up in frustration. A key aspect of the game's design will be introducing a gradually increasing level of difficulty, ensuring that children feel challenged enough to stay engaged but not overwhelmed. The game will incorporate motivating feedback and a reward system to encourage players to improve and achieve better results without feeling discouraged. Achieving this balance is crucial to keeping children motivated and making the gameplay enjoyable.

Curiosity and Exploration

Children are naturally curious and enjoy discovering new things. Therefore, *Superhero Sportsday* will offer elements of surprise and discovery, similar to the awe children feel when watching a sci-fi or superhero movie. The themes encourage children to imagine possibilities beyond their everyday experiences. *Superhero Sportsday* will keep players curious and excited to explore further. This sense of novelty will keep the experience fresh and ensure children return to the game repeatedly.

Bright and Engaging Visuals

A key factor in making the game fun is the use of vibrant and engaging visuals. The cartoonish graphic style will be colourful and lively, creating a visually immersive world that children can easily connect with. In-game items, characters, and environments must be designed to be attractive and visually appealing so that children find the game world fascinating. Every element, from the animations to the colours, will contribute to making the game a fun and exciting space for children to play in. The design will ensure that children remain immersed in the experience.

3.2.3 Accessibility Measures

Considering the diverse range of ages and disabilities, and other conditions that may affect our users, the game must be compatible with the majority of children, including those with physical disabilities. Additionally, it's important that fully-abled children also find the game enjoyable. One of the primary challenges identified in the problem statement is that current gaming controllers rely heavily on fine motor skills, particularly finger movements, which poses significant accessibility barriers. Therefore, this game will be designed to minimise or eliminate the need for finger-based controls.

However, it is crucial to specify the types of disabilities this game will address. While there are many existing accessibility settings in video games, *Superhero Sportsday* is not intended to cater to all disabilities. As a technology developed for MotionInput Games, this game will focus on providing accessible controls for physical disabilities, such as for amputees and wheelchair users. Other disabilities, such as visual and auditory impairments, will not be the primary focus of this project. For instance, accessibility features like the high-contrast mode in *The Last Of Us Part II* [22] for visually impaired users will not be included in this project.

The accessibility requirements will be updated and refined throughout development, particularly as our team conducts user testing with the target audience. We anticipate that new and more specific requirements will emerge as we gather feedback.

3.2.4 Input Complexity

One of the issues we observed, as highlighted by MotionInput Games, is that many current video games are overly complex or physically demanding due to their input mechanisms. These games

often require challenging and sophisticated gameplay, which can make them difficult to control for users with physical disabilities.

In contrast, *Superhero Sportsday* will feature simpler controls while maintaining an engaging and enjoyable gameplay experience. Besides eliminating the need for finger-based controls, the number of input buttons will be minimised. This means that players won't need as many buttons as found on traditional controllers but will still have an equally fun experience.

I designed the game's input system to use only five to six buttons, taking inspiration from the Nintendo NES controller, which primarily consists of six inputs—four for directional control via the D-pad and two for other actions. The gameplay will also avoid requiring multiple simultaneous inputs, as this would add unnecessary difficulty.

Figure 3.1: Original NES controller [23]

Despite the simplicity of the control scheme, the game will not lack content. We will incorporate more automatic features, similar to the auto-acceleration feature in *Mario Kart 8*, which removes the need for players to hold down an acceleration button throughout the race. If an input needs to remain active for most of the game, it will be designed as an automatic feature, reducing the physical demands on the player while maintaining a rich gameplay experience.

3.2.5 Game Storyline

Mauritius Islands

The setting of the game is chosen by MotionInput Games, placing the virtual sports event on the Mauritius Islands, a country located in the Indian Ocean. Mauritius is renowned for its stunning natural landscapes and tropical climate, making it an ideal backdrop for a virtual sports event on the scale of the Olympic Games.

Setting the game on an island allows for the integration of beautiful landscapes, providing a refreshing and immersive experience, especially for children who may be in hospitals or confined indoors. The outdoor environment, depicted with the vibrant scenery of Mauritius, enhances the sense of exploration and freedom within the game, making it an engaging and uplifting experience for players.

Figure 3.2: Isla-Mauricio & Le Morne in Mauritius Islands [24]

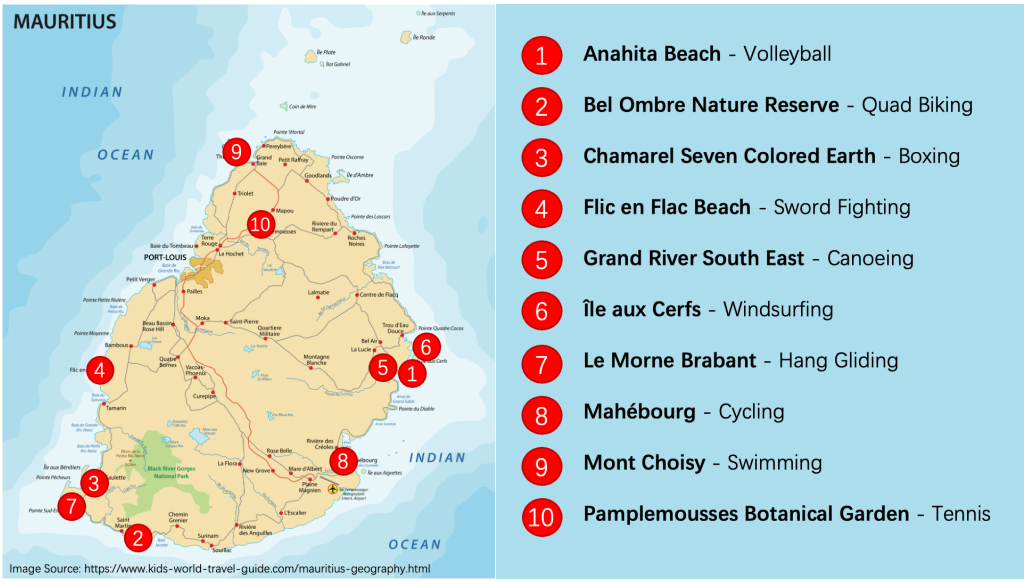

Figure 3.3: In-game map of Mauritius, implemented by Ying Huang

Superhero Theme

The theme of superheroes in a sports day adds an exciting layer to the game, where the participants are not just athletes but superheroes with unique abilities. This theme conveys the message that everyone has something special, much like a superhero, and can use their unique strengths strategically in the sports events. The goal is to empower children, particularly those with disabilities, by making them feel strong and capable, just like the superheroes they control in the game.

3.2.6 Sports Categories

The game will feature two distinct sports categories. While these categories may share some similarities, their gameplay will differ enough to prevent repetition and maintain player interest. The sports are not limited to real-world events; the focus is on ensuring they are fun and imaginative.

For example, as discussed with the client, an event like ski jumping on sand can offer a playful and creative twist, adding to the enjoyment and uniqueness of the game.

3.2.7 MotionInput Control Design

Each game will have its own unique control configuration. The primary goal is to use gestures to replace specific keyboard inputs, allowing players to seamlessly switch between using a keyboard and MotionInput without needing to reconfigure settings. Because of the varied gameplay across different games, the input methods will be customised to suit each game individually. As previously mentioned, with fewer input buttons required for these games, the corresponding gestures in the MotionInput system will also be simplified. If a particular button isn't used in a game, it won't have a corresponding gesture in MotionInput either.

3.2.8 Customisable Gameplay

While it would be ideal to offer fully customisable inputs similar to the Xbox Adaptive Controller, motion tracking is inherently different from keyboard inputs. Full customisation of gestures will not be necessary, and it might be too complex for children to manage. However, this does not mean the gameplay will lack customisation options. Players should be able to customise their experience for the difficulty of their skill level, ensuring an accessible and enjoyable experience for everyone.

3.2.9 Learnability

Motion tracking can be more challenging to grasp initially, as it lacks the clear input cues provided by keyboard letters. Children, in particular, may find it unfamiliar at first. Good learnability is crucial to keep children engaged and help them develop their skills. If the learning curve is too steep, children might become frustrated and lose interest.

Additionally, tutorials should be straightforward, emphasising graphics or illustrations over text to guide players. This visual approach will help children understand the controls more easily, ensuring a smoother learning process.

Other than that, the input gestures should be intuitive too. The simplest approach is to design gestures that closely mimic the real-life sports actions they represent. Ideally, children should be able to imitate the in-game character's movements, making the controls easier to remember and enhancing the immersive experience.

Chapter 4

Design and Implementation

The two sports categories I am developing are *Hang Gliding* and *Quad Biking*. Both are speed and race-oriented activities that require expansive terrains. During the games, players will travel across different parts of the terrain, allowing them to appreciate the landscape. They will not be confined to a single location. Children with disabilities are often restricted to their homes or limited spaces, so creating games where they can "travel" would be appealing to them. In terms of implementation, there are assets that can be shared between the two games due to their similar settings, which will save development time and allow me to focus on quality.

Although they share some similarities, the gameplay of the two games is not repetitive. *Hang Gliding* is a time-limited, point-based game, while *Quad Biking* is a time race. Each game has different objectives tailored for children.

4.1 Hang Gliding - Design

Figure 4.1: Screenshots of initial design of *Hang Gliding*

4.1.1 Basic Setting

- Single player
- Player's character is a child.

- The arena is set in a vast terrain inspired by Le Morne in Mauritius.

4.1.2 Goals

Numerous gems are scattered throughout the arena. Players must collect as many gems as possible within the time limit, with each gem contributing points to their score. The objective is to accumulate the highest score within the given time.

4.1.3 Gameplay

The game begins with a three-to-one countdown. During the countdown, the player will see themselves surrounded by fog. The fog obscures visibility, creating suspense and anticipation, as if entering a mysterious island. Once the countdown is over, the player will see themselves from a high altitude, allowing them to view most of the gems in the arena. Flying at a high altitude is designed to enable the player to plan strategically for gem collection.

The placement of gems on the map is carefully designed by me. I have placed the gems thoughtfully, ensuring they are reachable while also using them to guide players to different locations. Not all gems are equal. There are four tiers of gems in the game, each represented by different colors. The rarest gems have the highest value and are the hardest to find, while common gems have lower value and are easier to locate.

Figure 4.2: 4 tiers of gems worth different points in the arena

Challenge

Since this is a hang gliding game, the hang glider can only descend, but the rate of descent can be controlled. Players cannot easily move from one point to another.

However, hot steam is distributed across the arena, which can elevate the player's altitude. The player needs to collect as many gems as possible while heading to the steam zones to avoid crashing into the ground.

If the player does crash, it will not result in a game over. Instead, the player will be immobilized for 2 seconds as a penalty and then respawned at a high altitude.

Assistance (Superpower)

Superpowers in the game provide assistance to the player, offering temporary advantages. These superpowers are represented as power balls and are stored by the player after collecting them. Players can activate a superpower at any time, and its effect will last for 10 seconds. Players cannot pick up a new power or accumulate powers until the current one is used. Here are the three superpowers:

- **Speed Power:** Allows the player to gain altitude without entering a steam zone, while also boosting speed. Two jet engines appear while this power is active.
- **Super Magnet:** Expands the range for attracting score gems. A magnetic effect appears around the character.
- **Bullet Time:** For sharp turning and maneuvering. Time slows down, including the player's speed, but turning remains at normal speed.

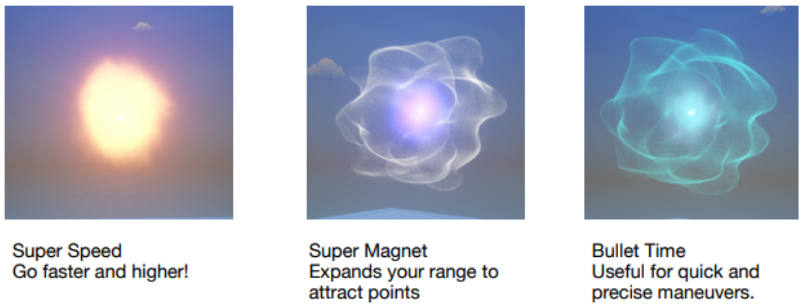

Figure 4.3: Power balls in *Hang Gliding*

4.2 Hang Gliding - Implementation

4.2.1 Terrain Creation

To create the terrain, I use Google Maps to trace the coastline. First, I locate Le Morne on Google Maps and take a screenshot of the location. I then import this screenshot into the Unity Editor, positioning it horizontally as a game object above the terrain. Setting the camera to a bird's-eye view allows me to see both the map screenshot and the flat terrain simultaneously. From there, I can raise or lower the terrain based on the geographical features.

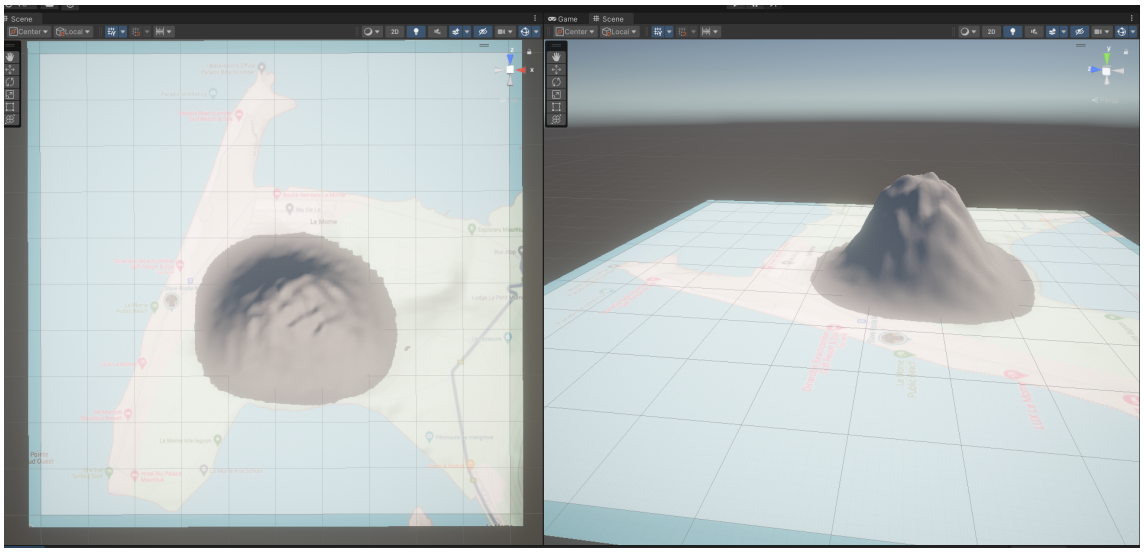

Figure 4.4: Sculpting Terrain based on real geography from Google Map

4.2.2 Control

In-game Control

The player controls the hang glider's movement with simple directional inputs: up, down, left, and right. There is also one key dedicated to using powers. The directional control is managed through the GliderController script.

The hang glider's movement is influenced by its Rigidbody (which determines how it is affected by gravity) and its Transform (which controls size, position, and rotation). These components are initialised at the start of the game, and the script operates based on the following variables, which can be adjusted in the Unity Editor:

- **public float speed:** The average speed of the hang glider.
- **public float drag:** The resistance force against the speed.
- **public float turningSpeedX:** The rate at which the glider changes its up-and-down angle.
- **public float elevateAngle:** The maximum angle for tilting upward.
- **public float diveAngle:** The maximum angle for tilting downward.
- **public float turnAngleY:** The maximum angle for turning left and right.
- **public float tiltAngleZ:** The tilt angle when turning left and right.

Figure 4.5: Part from the glider controller variables

The player controls the hang glider by manipulating the three-dimensional XYZ axis rotations, as described above. The script checks for user input in every frame within the Update() function. The X-axis rotation controls the up-and-down movement, managed by the W/S or Up/Down arrow keys. Pressing the Up or W key tilts the hang glider downward, while pressing the Down or S key returns it to a gliding position. As the X-axis rotation changes, the speed and drag adjust accordingly—the lower the angle, the faster the glider will dive.

Turning left and right involves the Y and Z axes. The Y-axis rotation adjusts the direction, controlled by the A/D or Left/Right arrow keys. As the hang glider continues to move forward and downward, changes in Y-axis rotation will exert extra force to alter its direction.

To make turns appear more natural, the Z-axis plays a crucial role in tilting the glider. To simulate the action of the player's character turning the glider, a tilting rotation is applied to the game object. The script not only implements the tilting and turning actions but also calculates a smooth transition when executing these actions and returning to the normal position.

Control with MotionInput

In addition to the traditional in-game controls, MotionInput offers an alternative input method for users. MotionInput translates the user's physical movements into keyboard inputs. The core idea behind this configuration is to simulate the hang gliding experience by mimicking the gesture of gripping the hang glider's rod. Consequently, my design requires players to hold their hands in fists and maintain a certain distance between them throughout the game.

Players keep their hands in a default position, which does not trigger any input. To intuitively replicate the action of tilting the glider to turn, players tilt their hands left or right, which naturally activates the corresponding trigger. Each trigger is activated by the respective hand.

To switch the tilting angle between gliding and diving, players need to bring their hands together and move them up or down to activate the W/S keys. The up/down triggers function slightly differently from the left/right triggers—they can be activated by one hand, though it is recommended to keep the hands together. This allows players to input up/down and left/right simultaneously by positioning their hands on separate triggers.

In the MotionInput window, I've added icons to indicate the recommended gestures and directions. Fist icons suggest that players should hold their hands as fists, showing which hand can trigger the corresponding hotspots. While MotionInput detects wrist movements rather than finger movements, these icons provide a visual guide for simulated control. Next to the fist icons, arrows indicate the directional inputs.

In addition to directional control, there is another key for activating the superpower. Players must reach their left hand to the upper-left corner. The icon for this action is smaller than the fist icons to avoid accidental triggers. The implementation of the superpower in the game will be explained in a later section.

Figure 4.6: MotionInput UI for *Hang Gliding*, gesture at default position

4.2.3 Steam Zone

In addition to controlling the glider in the GliderController script, this script also manages how the glider interacts with the steam zone. The steam zone is a crucial part of the game mechanics, as it is the primary way to raise the glider's altitude. Within the script, a boolean variable, inSteamZone, is used to activate the lifting behaviour. The steam zone game objects are tagged as "SteamZone" and have colliders. To trigger inSteamZone, the GliderController script checks the tag of the object with which the glider collides. If the object has the "SteamZone" tag, inSteamZone is set to true.

Figure 4.7: Steam zone in *Hang Gliding*

While inSteamZone is true, the script applies an upward force to the glider that is greater than the force of gravity, causing the glider to ascend. The glider will continue to rise until it exits the steam zone, at which point inSteamZone is set back to false.

4.2.4 Respawn

If the glider crashes onto the terrain, the GliderController script also handles the respawn process through the PauseAndWarp() function. This function utilises an IEnumerator, allowing the function to pause during execution.

When the script detects a collision involving the player, PauseAndWarp() is triggered. The function first stores the current speed and drag of the glider, then sets them to zero, immobilising the glider. This immobility lasts for 2 seconds, during which the player will see a notice informing them of the impending respawn. The IEnumerator pauses the function before the player is transported to a higher altitude. After the player is repositioned, the notice disappears, and the initial speed and drag values are reapplied to the glider, allowing the game to continue.

4.2.5 Point Gem Generator

The PointGemGenerator is a crucial component of the game. I designed it to make the gems orbit in a circular pattern, attracting players to enter the circle and collect multiple gems at once. This circular formation can also serve as a guide, leading players to different parts of the terrain. Additionally, the movement of the gems within the arena adds a visually appealing element to the game. However, manually creating each gem is challenging, inefficient, and difficult to modify, so the gem generator was created to handle this task.

The script is relatively complex, but I'll explain it at a high level. First, I created a cuboid game object to indicate where the circle will be placed. The PointGemGeneration script is then

attached to each cuboid game object. When the game starts, the cuboid's renderer is disabled, making it invisible in the game. Instead, the script instantiates gems around the cuboid. Once instantiated, the Update() function makes the gems orbit around the cuboid. Several variables can be directly manipulated in the editor:

- **GameObject gemPrefab:** The gem game object.
- **float scale:** The size of the gems.
- **Color colour:** The colour of the gems.
- **int numberOfGems:** The number of gems instantiated.
- **float radius:** The distance from the centre.
- **float orbitSpeed:** The speed of orbit around the centre.
- **bool clockwise:** The direction of orbit.
- **public float point:** The point value of each gem.

These variables are applied to the gems instantiated by each cuboid. Once all the gems are generated and visible in the game, they still lack behaviour. To address this, a new script is applied when the gems are instantiated.

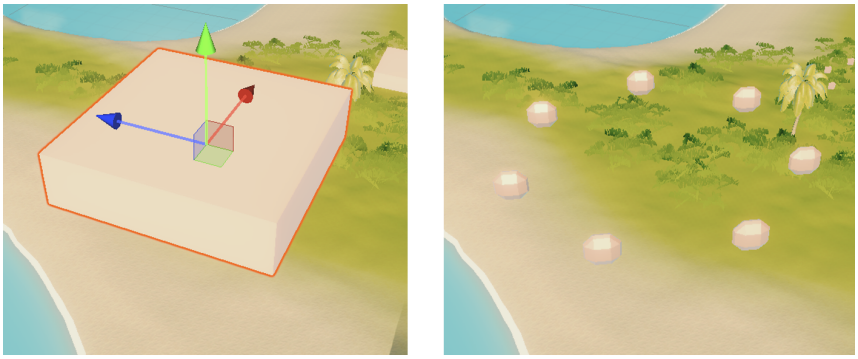

Figure 4.8: Point gems are instantiated from a cuboid prefab by Point Gem Generator

4.2.6 GravityPull

The GravityPull script manages how the player collects gems and power balls, as it would be challenging for the player to make direct contact with each gem to collect it. A better approach is to have the gem pulled toward the player once it is close enough. The script serves two main purposes: first, it recognises the player game object, ensuring that only the player can attract the gems. Second, it pulls the gems toward the player when they are within a certain range. Once a gem collides with the player, it is destroyed.

Since the gems are not instantiated in the editor but are generated only when the game starts, the parameters for influence range and pull intensity, which are used in the GravityPull script, can be adjusted in the cuboid's PointGemGenerator component.

```
1 void Start()
2     {
```

```
        objectRigidbody = GetComponent<Rigidbody>(); // Get the Rigidbody of the
            game object
        if (player == null)
        {
            player = GameObject.FindGameObjectWithTag("Player").transform;
        }
    }

    void Update()
    {
        distanceToPlayer = Vector3.Distance(player.position, transform.position);
        if (distanceToPlayer <= influenceRange)
        {
            // Move towards the player
            transform.position = Vector3.MoveTowards(transform.position, player.
                position, intensity * Time.deltaTime);
        }
    }

    private void OnTriggerEnter(Collider other)
    {
        if (other.CompareTag("Player"))
        {
            Destroy(gameObject);
        }
    }
```

Listing 4.1: How each gem is pulled towards the player when the player is close

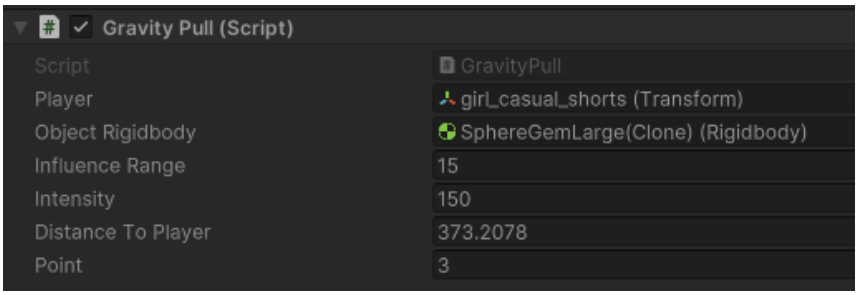

Figure 4.9: GravityPull component in Unity Editor. Values of the gems can be inspected in each gem.

4.2.7 Power Manager

Another script applied to the glider game object is the HGPowerManager. Since superpowers are one of the main features of the game, this script controls everything related to them. Here are the features of how this script works:

1. Check if the player has already obtained a power.
2. Determine which power, if any, is currently stored by the player.
3. Disable the power of all other power balls if a power is already obtained, so that even if the player catches a new power ball, only points are added, not the new power.
4. Activate the power when the player triggers the power button.

5. Manipulate the behaviour of game objects by accessing other scripts.

6. Countdown the power duration.

7. After each power is used, re-enable all other powers.

Each power ball is assigned a single power, with its behaviour described below.

Speed Power

Applies a new speed and elevation angle to the player's GliderController and adds jet engine game objects to the two wings. The jet engines represent the thrust of power. After 10 seconds, the settings return to normal.

Super Magnet

Increases the attraction range in the GravityPull script so that gems are attracted to the player from a greater distance. Some curved lines are attracted to the player to indicate the power. After 10 seconds, the settings return to normal.

Bullet Time

Adjusts the time scale of the entire scene, slowing down everything except behaviours that run on UnscaledDeltaTime [25]. To maintain the player's ability to turn, the turning movement in GliderController runs on UnscaledDeltaTime. Therefore, Bullet Time only needs to modify the time scale of the entire scene. The game time will also slow down, as seen on the countdown panel.

4.2.8 Time Manager

HGTimeManager handles the game's duration and the events when the game ends. The script begins with two crucial variables, Minute and Second, which determine the overall game duration. While it is straightforward to count down the game time using IEnumerator's WaitForSeconds function to end the game, the challenge lies in displaying the remaining time on the game scene's canvas.

The script is attached to an empty game object called Time Manager. Once it retrieves the values for minutes and seconds, it passes them to three float variables: minute, second, and millisecond. The script uses deltaTime to count the time accurately. Starting with milliseconds, when it drops below zero, the seconds decrease by one. When seconds drop below zero, the minutes decrease by one. These three values are updated every frame and displayed on the canvas.

At the end of the game, when all three values reach zero, the game will pause, and a game over screen will appear by enabling the Game Over Screen game object.

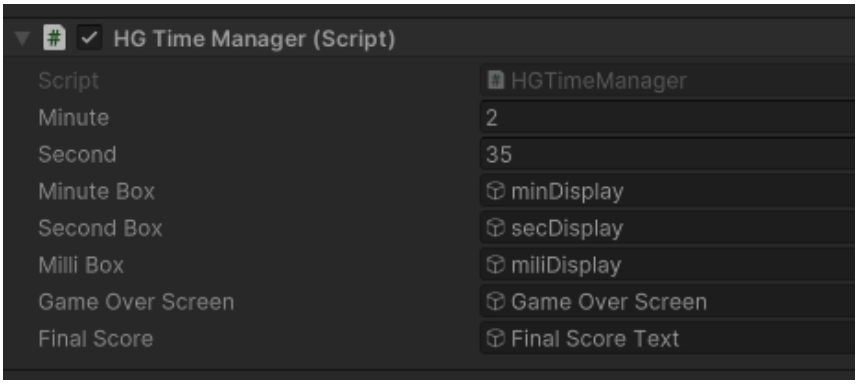

Figure 4.10: Time Manager in *Hang Gliding*, the duration of each game can be directly modified in this component

4.3 Quad Biking - Design

Figure 4.11: Initial Design of *Quad Biking*

Quad Biking is a time-based challenge designed to test players' skills. The game involves riding a quad bike and following a series of checkpoints until the lap is completed. *Quad Biking* was more thoroughly developed in the later stages of the project, with the initial design focusing primarily on the mechanics of the bike.

The game is set on the same terrain as the *Hang Gliding* game, but the terrain has been modified with irregular bumps for the player to navigate. These bumps are designed to challenge the player's skills and strategies as they attempt to complete the track in the shortest possible time.

As the bike rides over bumps and obstacles, it is expected to briefly lift off the ground, similar to a quad bike stunt show. This feature is designed to encourage players to drive towards the bumps, causing the bike to jump slightly into the air—recreating the excitement seen in quad bike races. The game aims to provide children with this sensation and simulation.

4.4 Quad Biking - Implementation

Control

The control of the quad bike is based on the D-pad control mechanism, using the WASD keys and arrow keys to control the bike's speed and direction.

The most challenging part is simulating the quad bike's physics while keeping the gameplay fun. It's crucial to set the correct mass for the bike; otherwise, if the mass is too light, the bike may bounce excessively. Another challenge is achieving the right balance, as I want the bike to lift off the bumps, which requires a relatively low mass. However, this can create issues with steering, as the inertia might cause the bike to flip or slip.

Based on the tutorial by Youtube Channel Nanousis Development [26], The BikeController script handles all the bike's behaviour and controls. Several variables can be adjusted in the Unity Editor:

- **public float motorPower:** The force that moves the bike forward.
- **public float brakePower:** The force that moves the bike backward.
- **public AnimationCurve steeringCurve:** The steering angle relative to the speed.

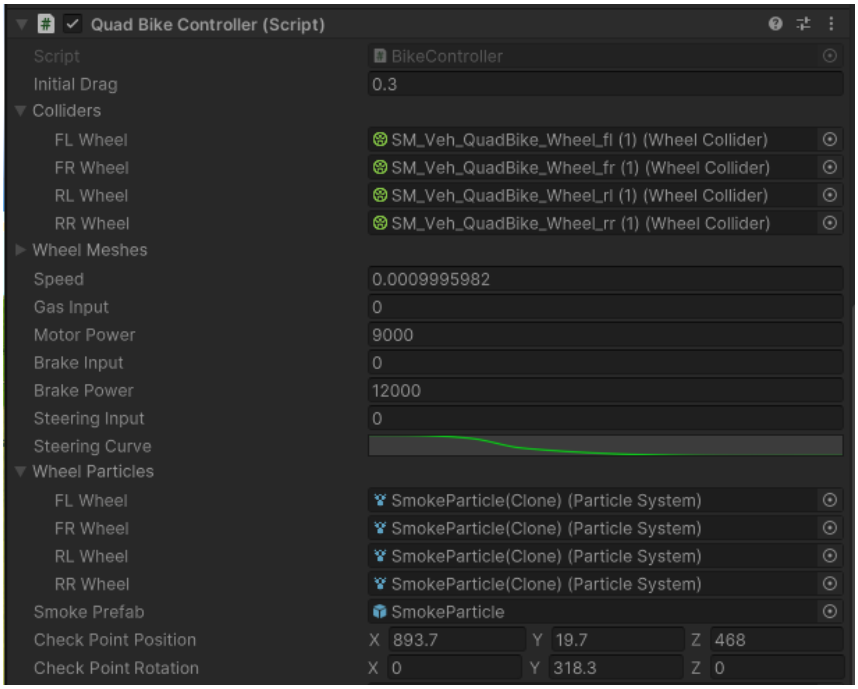

Figure 4.12: Full controller component of Quad Bike. Developers can directly modify the above values in the editor.

To simulate realistic car physics, the bike's body does not have a unified force for movement. Instead, motorPower and brakePower are applied to the wheels individually. MotorPower is applied only to the rear wheels, while brakePower is applied to all four wheels.

To control the bike, the BikeController's Update() function checks for the player's input and manages the behaviour of all four wheels. For acceleration and deceleration, it detects user input and applies the appropriate force to the wheels. To enhance accessibility, the player does not need to continuously hold the Up key to keep accelerating; the script applies motor and brake forces automatically. When the bike is stationary, the player only needs to press the Up key once to initiate acceleration. To slow down or reverse the bike, the player must hold the Down key. Here is the logic in pseudocode:

```
if bike\_velocity == 0 then
    press once to accelerate or decelerate
else if bike\_velocity > 0 then
    it continues accelerating
    hold Down key to decelerate until bike\_velocity == 0
else if bike\_velocity < 0 then
    it continues decelerating
    hold Up key to accelerate until bike\_velocity == 0
```

In addition to moving the bike forward and backward, the BikeController also handles steering. Steering is controlled using the A/D keys or the left/right arrow keys. Steering is applied only to the front wheels, as is typical for most vehicles. A crucial aspect of preventing the bike from slipping or flipping is adjusting the steering angle based on speed. Higher speeds generate greater inertia, which increases the likelihood of slipping if the same steering angle is applied at all speeds. To address this, an animated curve is used for the steering angle. As the bike's velocity increases, the steering angle decreases, as illustrated in the curve below.

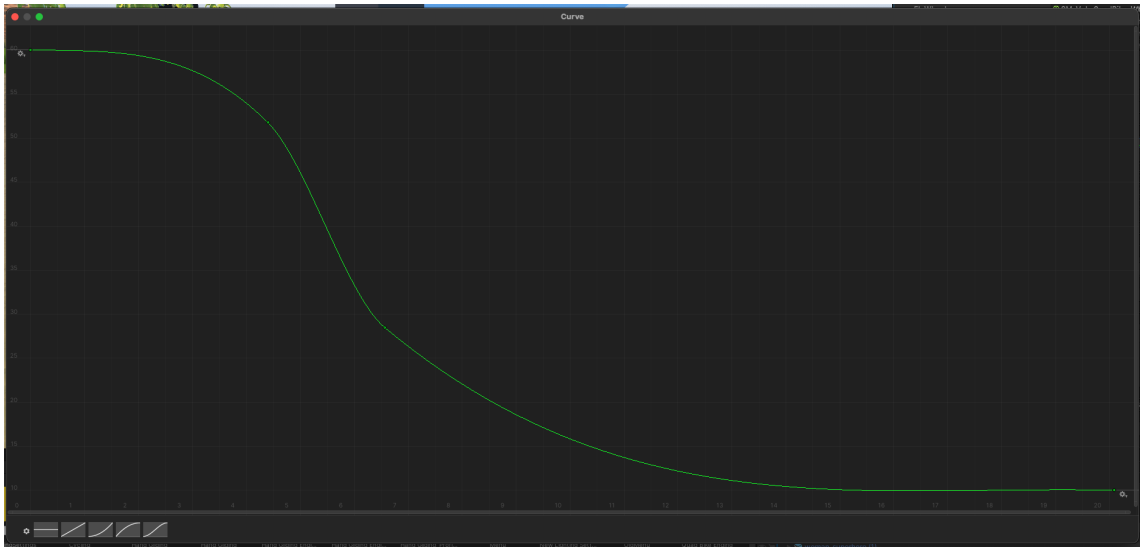

Figure 4.13: The steering angle decreases as the bike's velocity increases, as shown by the curve

The BikeController not only manages the movement of the bike but also its appearance. Although the script causes the wheels to "move," their physical transformation does not occur automatically—it must be manually manipulated. In the Update() function, the wheel positions are adjusted whenever the bike is in motion. The same applies to the smoke particles: a smoke effect prefab is instantiated when the bike is moving.

4.4.1 Dynamic Speed Camera

Because *Quad Biking* is a time race game, I wanted to emphasise the effect of speed through the camera. Originally, the camera game object remained in a fixed position relative to the bike, resulting in very unnatural and rigid camera movement.

To achieve this, a package called Cinemachine is used. It simulates camera movement akin to that seen in films. Since the speed of the quad bike is constantly changing, I aimed to highlight the sensation of high velocity. When the quad bike is slow or stationary, the camera stays close to the vehicle. However, as the bike accelerates, the camera gradually moves farther away, giving the impression that it is struggling to keep up. This not only enhances the feeling of speed but also serves a practical purpose, as the player gains a wider view at higher speeds, which is convenient for gameplay.

Additionally, the camera has a slight delay in reacting when the bike turns, mimicking the sensation of a car chasing the bike from behind. This camera delay further emphasises the speed and adds a dynamic, cinematic feel to the game.

Figure 4.14: Camera view when the bike is stationary(left), and when the bike is travelling at a high speed(right)

4.4.2 Countdown Manager

This script [28] was initially developed for the *Quad Biking* and later applied to the Hang Glider game, so it is explained here. In most races, there is a countdown that allows the player to prepare before the race officially begins. During this countdown, the player has no control over the bike until the countdown finishes.

At the start of the game, the QBCountdown script disables the BikeController component on the quad bike game object and the Lap Time Manager, which tracks the player's lap time.

During the countdown, each second has its own animation, displayed through a GUI text component on a canvas. The QBCountdown script uses an IEnumerator to execute the countdown. It first displays the text "3," then disables the UI game object. After pausing for one second, the UI text is replaced with "2," and it reappears. Each countdown number is accompanied by an audio clip. The countdown continues with "1" and finally reaches zero, at which point another audio clip is played, and the BikeController component and Lap Time Manager are re-enabled.

4.4.3 Lap Time Manager

Once the game starts, the Lap Time Manager [27] operates similarly to the Time Manager in *Hang Gliding*, tracking minutes, seconds, and milliseconds. It begins with milliseconds; when they reach their limit, seconds increment by one, followed by minutes. The key difference is that the Lap Time Manager starts counting from zero, whereas the *Hang Gliding* Time Manager counts down toward zero.

4.4.4 Checkpoint

The checkpoint system is a central feature of the gameplay, determining the track's logic and how the game will end. It controls the flow of the game and is managed by the QBCheckPointManager script, which is attached to the Check Point Manager game object. The primary purpose of this script is to manage all the checkpoints within this game object.

Similar to the Gem Generator in *Hang Gliding*, placeholder cuboid game objects are placed in the Editor. These cuboids do not appear in the game because the checkpoint effects spawn at their exact locations, replacing them.

The script stores all these checkpoints, which are child objects under the Check Point Manager, as an array. Before the game starts, the script preloads these checkpoints. The index of each cuboid in the array represents the order of the checkpoints that the player must follow.

When the game starts, the script disables all the mesh renderers of the cuboids, making them invisible to the player, though their colliders remain active for trigger detection later. At the same time, the script instantiates a checkpoint effect at the cuboid with index 0 in the array and adds another script, QBCheckPoint, to this cuboid object.

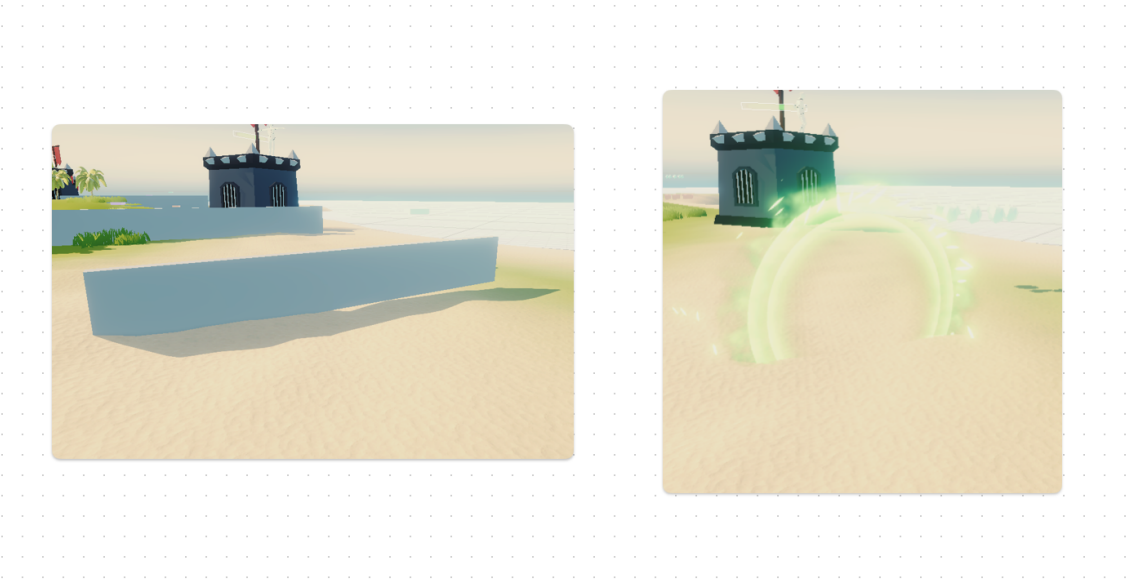

Figure 4.15: A cuboid becomes a checkpoint effect game object

The QBCheckPoint script in the cuboid game object has a single purpose: to detect collisions with the player. Once a collision is detected, the script increments the index of the checkpoint array and triggers the function to instantiate the effect at the next checkpoint. It also disables the current cuboid game object, ensuring that neither the effect nor the cuboid can be detected again. A crucial aspect of this script is that the QBCheckPoint script is only added to the cuboid game

object if it is the current checkpoint, rather than being added to all cuboids from the beginning. This prevents the player from accidentally triggering other checkpoints on the track.

Finally, when the last checkpoint is triggered, the index of the current checkpoint is incremented once more, matching the length of the array. When this condition is met, the game concludes.

4.5 Design Thinking Session

Figure 4.16: *Hang Gliding* presented in Design Thinking Session

IBM Design Thinking is a human-centred approach to problem-solving and innovation, developed and applied by IBM. It adapts traditional design thinking principles to tackle complex, enterprise-level challenges. IBM Design Thinking emphasises user-centred outcomes, ensuring that the products and services created are meaningful, valuable, and efficient for users.

This session was not a testing phase but took place during the early development of *Quad Biking*. We applied the Design Thinking approach in this phase. Our lead from MotionInput, Professor Dean Mohamedally, and Anelia, along with some of our target users, participated in this session to review our progress.

The approach was that I presented my game concept, and representatives from MotionInput and our target users provided feedback. The focus was primarily on gameplay and the input system. Since this was the early stage of development, MotionInput had not yet been implemented, so the discussion centred around how MotionInput could be integrated into the game.

This session provided valuable insights into how MotionInput functions, including its capabilities and limitations. Based on the suggestions made, I was able to further develop my game to be compatible with MotionInput. In fact, several key requirements were identified during this session.

4.5.1 Feedback on Quad Biking

During the session, it was suggested that I should design a track for Quad Biking, rather than allowing players to free-roam across a terrain. The game should follow a structured approach, with

a defined beginning and end, making it a complete level to play through.

Another key recommendation was to add an input for an emergency stop. Some players may have slower reaction times, and relying solely on acceleration and deceleration is not sufficient for effective control, as it requires precise timing and adjustments. By implementing an emergency stop feature, players can use it when they lose control of the bike, making the game more accessible and easier to manage.

4.6 Session with HCI Expert (Professor Dean Mohamedally)

An additional session was held with Professor Mohamedally, a Human-Computer Interaction expert, focusing on my *Hang Gliding* game during the later stages of development. This was the final feedback I received for the game's final build.

Gameplay and Visual Effects

Dean emphasised the importance of keeping the gameplay simple and minimising visual effects. While I had attempted to introduce more game rules and mechanics, he pointed out that some children might struggle to focus on multiple objects floating in the air at once. The added effects and gameplay elements could become distractions rather than enjoyable surprises.

UI Design

The UI design needed improvement, particularly in terms of size. Enlarged font is crucial for accessibility, not only for players with visual impairments but also to help children easily focus on and interact with buttons.

Replayability

A well-designed game should encourage players to replay it multiple times. At the time, I had only developed one game level, with no variations. Instead of creating multiple new levels, Dean recommended incorporating a mechanism that randomises the gameplay to provide a fresh experience each time, enhancing replayability.

Chapter 5

Experiment Stage 1: Testing

The design and implementation of *Hang Gliding* and *Quad Biking* were initially based on my personal preferences in video games and research for this project. To understand the actual preferences of our target users, we needed to have children, families, and children with disabilities test the games and provide feedback. Both qualitative and quantitative testing were crucial to the project to gather comprehensive data. Once I received feedback and comments, I worked on iterations to improve the games.

During these testing sessions, glitches were discovered that I had not previously noticed. Additionally, testers introduced new requirements too, many of which I had not considered necessary. These tests had a significant impact on my games, helping to correct some of my initial ideas and offering new insights.

Experiment Stage 1 contains the two testings conducted and how it contributed to the later iterations and final build of the games.

All children were tested with consent given, by their parents and supervised by teachers. The company, MotionInput Games, organised the visits, having de-risked with the occupational therapist. For the festival, UCL managed all of the consents and risk assessments.

5.1 Mass Audience (Survey) at Festival of Engineering

The Festival of Engineering is an event co-organised by UCL, attracting an estimated 700 families. During this 3-day festival, our team presented our project at one of the booths. Each team member had an individual game build, allowing visitors to choose the sports they were interested in. The goal was to gather general feedback from a large group of children and families. The participants were not from specific groups; they could be fully abled or have various conditions. It was an excellent opportunity to gather feedback from a wide range of children and their parents, helping us explore the broader needs of our users.

To streamline the process, some team members were responsible for teaching the kids how to play, while others conducted surveys after each test. With the help of student ambassadors, we had more people facilitating the tests. Each participant at our booth was taught the basic controls of the game. We also prepared a simple tutorial on an A4 sheet for each game, which participants could read before starting. Since each participant could try only one game, we could assess how quickly they learned in a single session.

Figure 5.1: Press release photo at the launch of Festival of Engineering, I am introducing *Hang Gliding* to a visitor (photo from UCL Engeinering social media account) [29]

We collected data through a survey. The questionnaire was created by our project supervisor, Professor Dean Mohamedally, and our team. It collected basic information such as age and gender and allowed visitors to provide direct feedback on the game they played. The aim was to gather general feedback and understand their preferences in video games. Knowing that children (and most people) generally dislike long surveys, we kept it short and avoided questions that could introduce bias. While we supervised the sessions, we could also observe their performance and identify any game issues, such as areas where children struggled. Since I had played the game extensively during development, there was highly possible that I missed certain issues because of my familiarity with it.

5.1.1 Result

Over the two days of the open event, a total of 259 questionnaires were completed. The majority of participants were children aged 6-12. For my *Hang Gliding* demo, 40 surveys were collected. The feedback was mostly positive, but I was especially pleased to receive numerous suggestions for improving my game. Despite the setup not being perfect and some tests not being conducted under ideal conditions, the feedback was valuable.

Data Summary

Type	**Category**	**No. of Comments**	**Notes**
Positive	Enjoyable Experience	9	Game is fun and enjoyable, similar to classic games like Wii Sports.
Positive	Responsiveness and Smooth Controls	3	Good experience, responsive control system.

Continued on next page

Type	Category	No. of Comments	Notes
Positive	Intuitive and Fun Gameplay	2	Intuitive technology, with a slight learning curve.
Positive	Unique and Engaging Experience	2	Players enjoyed the hand controls, finding them unique and engaging.
Positive	Touch-Free Control	2	Appreciated using motion controls without touching physical devices.
Negative	Difficulty in Control	9	Controls were hard to manage, especially for steering or making quick adjustments.
Negative	Lag or Slow Detection	5	Players experienced slow or laggy detection, especially in hand movements.
Negative	Accuracy and Sensitivity Issues	3	Control system felt too accurate, requiring too much precision.
Negative	Technical Bugs and Visual Issues	2	Occasional visual glitches and detection delays were reported.
Negative	Tiring for the Arms	1	Some players felt the physical motions were tiring after extended play.

5.1.2 Positive Feedback

Figure 5.2: A child trying *Hang Gliding* with MotionInput

Most of the positive feedback revolves around the gameplay and game design. Out of the collected responses, nine participants specifically mentioned that the game provided an enjoyable experience, with many appreciating its overall fun and engaging nature. One player compared it to classic games like *Wii Sports*, a nostalgic game that resonated with several users. Furthermore, some participants highlighted the gem-collecting objective as a particularly fun aspect of the game, adding purpose and an extra layer of engagement to the experience. Another player described the game as imaginative, complemented features such as the superpower mechanic, which they found especially enjoyable. The visual effects, despite not the core elements, were considered as a nice addition.

Additionally, several participants found the hang glider controls to be highly intuitive. They noted that they did not require much time to understand how to navigate the game. Some players even quickly understood the concept of the default hand position, which is key to controlling the glider, further illustrating the ease of learning. For many, the novelty of controlling the game without physically touching anything was a standout feature. Two comments specifically emphasised how much they appreciated the touch-free control system, describing it as a fresh and exciting approach to gaming. The responsiveness of the controls also received praise, with three participants pointing out how smoothly the game reacted to their movements, contributing to the overall positive gameplay experience.

5.1.3 Criticism

Control

Despite the design being intended to make the controls intuitive, control issues were one of the main criticisms. My control system uses MotionInput hotspots, and it's challenging to pinpoint the exact contact points on the camera frame. For example, when children were instructed to raise or lower their hands to move the glider up or down, they were not always sure how much to move their arms. Many raised their hands too high, sometimes even out of frame, because they instinctively wanted the glider to fly higher.

The precision issue extended to turning left and right. The original design required children to rotate both hands to trigger directional input and turn the glider. However, this worked well only if the player consistently maintained the default position. During the demo, participants often moved away from the default position, losing track of the required hand placement. This caused them to miss the hotspots entirely at times. Even for children who managed to control the glider, they had to constantly look at the MotionInput window to ensure they were hitting the hotspots, which distracted them from focusing on the game screen. It is unproductive as if looking at the controller when gaming.

Figure 5.3: An exmaple of losing control of the hang glider

Gameplay

Several unexpected issues occurred during testing. One of the biggest problems was that players frequently left the game arena. Since the controls were difficult for some children, they lost control of the glider at times, causing it to drift off the map. Once they flew too far, the terrain stopped rendering, making it impossible for them to return to the arena. Initially, I did not consider this a priority, assuming it would take time for players to reach the map's boundary. However, I did not expect the possibility of players losing control, which made leaving the map inevitable in certain cases.

Another recurring bug involved the respawn mechanic not working as intended. The glider was supposed to stop upon collision and then respawn at a high altitude. However, an extra force continued to apply to the glider, causing it to drift too far. This bug also contributed to players leaving the map. From my own observations, one player attempted to return to the terrain but the glider was flying too low already and ended up gliding beneath it—a situation that should never happen in any game.

Unclear Instructions

Despite the presence of tutorials and in-person guidance, many children misunderstood the core concept of hang gliding. They believed that hang gliding was more like flying rather than gliding. I had allowed this game rule to persist during the design phase because it presented a challenge for the game. However, it was clear that children frequently raised their hands throughout the game in an attempt to increase altitude. Some kept their hands raised for most of the game. It appeared that the relationship between the steam zone and the glider was not clear to them—they simply wanted to experience a flight simulator.

Other Issues

Holding both hands in the default position for the entire game requires the player to extend their arms forward for about 3-4 minutes, which can lead to fatigue.

Performance issues also arose. The game occasionally became too slow, causing delays with MotionInput. Additionally, MotionInput had trouble identifying body parts when there were multiple players or if the camera frame was crowded, leading to constant distractions and incorrect body part detection.

5.2 Focus Group at Sybil Elgar School

Sybil Elgar School is a specialist school for autistic children and teenagers. Unlike the mass survey conducted at the Festival of Engineering, this testing was done as a focus group, aiming to gather qualitative data through in-depth study and close observation. More importantly, since the games are designed for children with special needs, it was crucial to test with them to understand their specific needs.

The testing took place during a school visit, with our entire team present to observe and take notes while the children played. This testing required close attention because each student was considered a special case study. As a result, we focused on a small number of children instead of trying to collect large amounts of data through a survey. The students had varying degrees of autism, allowing us to understand how their capabilities differed.

Figure 5.4: First testing at Sybil Elgar School

Similar to the questionnaire-based survey, the children were not always able to analyse the game or provide direct feedback. Instead, the school teachers on-site supervised the sessions and provided us with feedback based on their knowledge and experience working with autistic children. Their insights were incredibly valuable.

Since we used the same build from the Festival of Engineering, glitches were still present, but most had already been noted. During the visit, we concentrated on how the input method worked for children with autism.

5.2.1 Observation

Some participants did not understand the control method because it is too complex. It generally requires high precision to trigger the hotspots, as the same problem when testing with public. Additionally, the control was confusing for them. Going up/down requires two hands put together while turning left/right requires hands separating. The intention was to make it intuitive, but for some children, it is no longer intuitive if instruction is not clear.

As one of the children needed to hold a metal rod as if he was holding the bar of a hang glider so that he could stay at the default position. The intuitiveness and learnability need to improve. This case shows that autism is a diverse group of their conditions. The input method has to be way easier.

Lastly for the MotionInput configuration, the user interface is rather unclear too. First of all, there are too many icons on the screen which obstructed the player from seeing their hands. I created the icons to be relatively big so it could cover more trigger areas. However, the icons also blocked the player from seeing their hands. Another problem is The trigger feedback was not clear enough. I added green outline to the icons for the trigger effects. However, colour outline might not be the best idea since they are not very visible enough to players.

Chapter 6

Iterations & Final Design

6.1 Hang Gliding

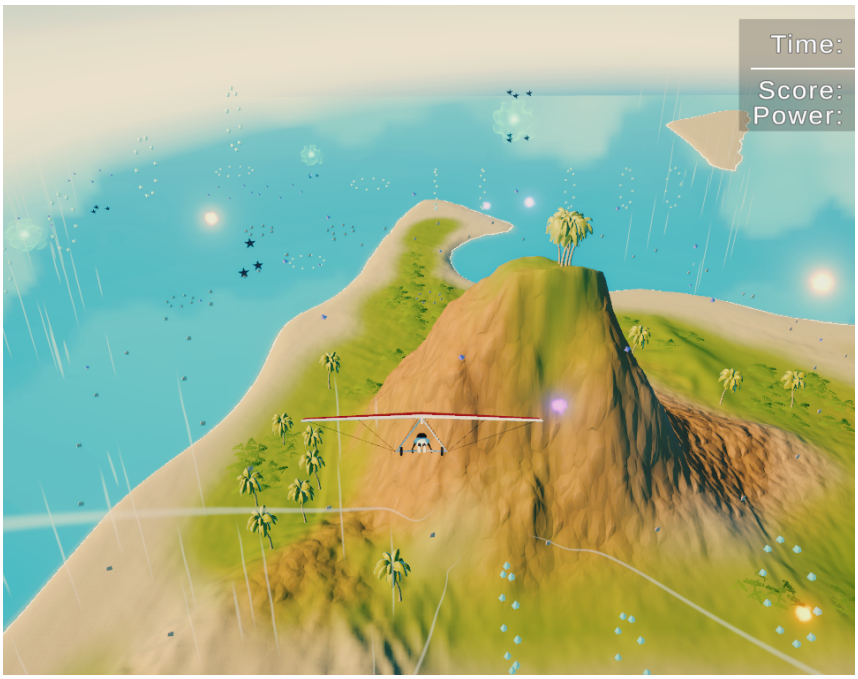

Figure 6.1: Screenshot of the new *Hang Gliding*

6.1.1 Improved MotionInput Configuration

The input configuration for MotionInput was completely redesigned based on feedback from testing. The new design no longer relies on precise gestures for detection.

Thanks to Peter Ling for building the new MotionInput, the redesign replaces the hotspot system with a joystick mechanism. The joystick system detects when a body part moves outside the frame, meaning that as long as the player's wrist moves beyond the left side of the centred frame, it automatically inputs the left key. Frequently used inputs now use the joystick control, which covers a larger detection area. In contrast, the hotspot system is reserved for specific action keys, such as ESC or using powers.

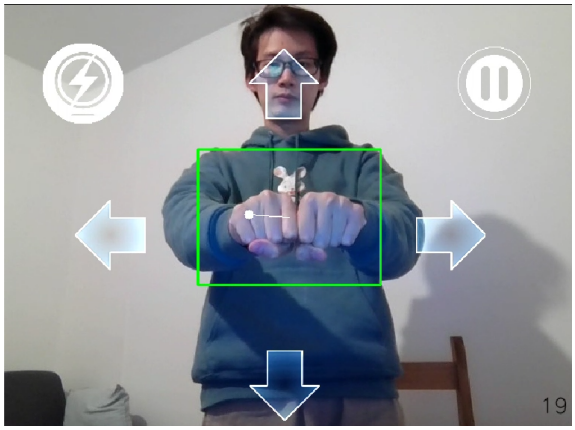

Figure 6.2: New user interface of MotionInput for *Hang Gliding*

With this new joystick system, players can even move their hands beyond the camera frame, and MotionInput will still detect the inputs.

Although the hotspots are no longer used for movement, they are still included in the MotionInput UI design for feedback purposes. Hotspots provide visual feedback when an action is triggered. In *Hang Gliding*, actual movement is controlled by the joystick, but input feedback uses the hotspot system. For example, when a player raises their hands to lift the glider, the hotspot is triggered simultaneously. However, the hotspot does not control movement—it merely acts as a non-functional icon for instructional purposes.

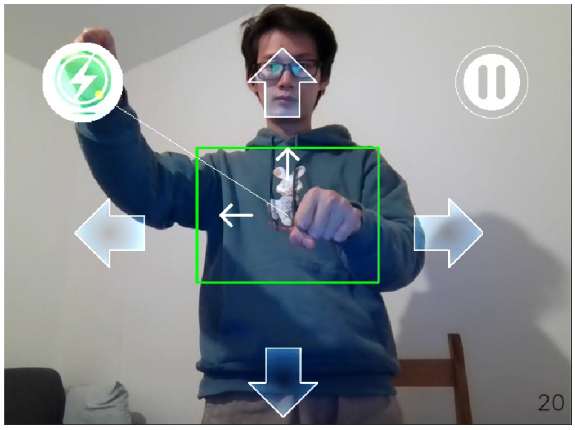

Figure 6.3: Demonstration of using power key

The icons were also updated. Instead of fist icons, they were replaced with arrow icons to indicate direction. The reason for this change is that the fist icons dominated the screen, while the arrow icons were too small. I abandoned the fist gesture because MotionInput detects the wrist rather than the hands. I decided to prioritise providing clear directional controls instead.

6.1.2 Heroes & Villains

During the later iterations of development, I realised that the superhero theme was not strongly emphasised in the game. While there were superpowers, simply having them did not tie closely to the superhero concept. This led me to consider adding an element that would enhance the theme while keeping the primary objective intact.

I reflected on a fundamental aspect of superhero movies — as I learned from my film degree. One of the main elements is the binary opposition between heroes and villains. A hero's story is incomplete without the presence of a villain. For example, Batman's legend is tied to his nemesis, The Joker. I wanted to incorporate this natural dynamic into the game. Since Superhero Sportsday already has a simple narrative of superheroes having a sports day on Mauritius Island, I could easily introduce a storyline where villains interrupt the sports day.

To create an immersive story, the player had to be an important part of this new feature. Initially, I considered giving the player control of the hang glider to shoot at enemies, but this idea would not work. The core control should focus on flying and gliding, not shooting. Additionally, aiming and shooting would be too difficult for disabled children and children with autism. My goal was to add a story element without altering the core gameplay.

The final idea was to introduce two superheroes as companions to the player. While the player flies, the heroes would shoot at villains. The player only needs to get close to the enemies for the heroes to attack. This approach maintains the immersive experience of being a superhero without complicating the controls. The player still feels special, as they are the one who "saves the day." Every defeated enemy gives the player extra points, while gems remain part of the scene. Villains only appear in the second half of the game, adding more content and challenges for advanced players and boosting their score.

Figure 6.4: Heroes auto-aim at villains and shoot

Dialogue boxes were added to enhance the story and guide the player. When villains appear, the heroes' dialogue boxes inform the player of the event, signalling that they need to fly close to the enemies to attack.

Figure 6.5: Hero dialogues to guide the player

A key design requirement was to maintain appropriate values for children, especially since superhero themes can often be associated with violence. To address this, I chose cartoon-like, non-threatening assets, such as mummies, and avoided depictions of physical or gun violence. The heroes shoot lasers, a non-violent and fantastical form of attack, to prevent any real-world imitation.

To implement this feature in the game, there are three main elements:

Villain Event Manager

This script is attached to an empty game object and controls the timing of when the villains appear. The timing is set as public variables that can be adjusted in the Unity Editor. Once configured, the event will trigger at the designated time, and the script will also activate the heroes so that the Hero Manager can enable their behaviour.

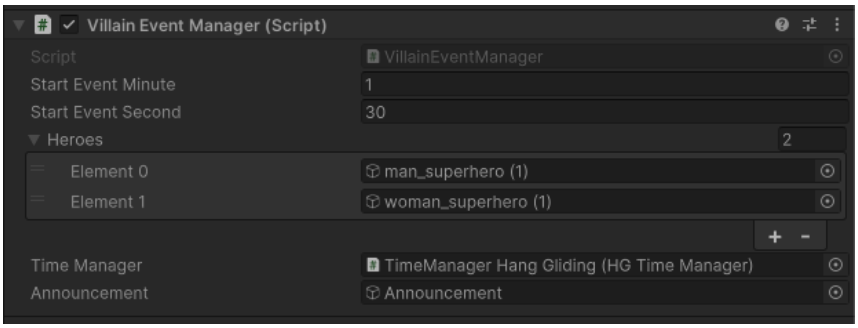

Figure 6.6: The moment of triggering villain event can be edited directly in editor

Hero Manager

Since the heroes are not directly controlled by the player but respond to the player's input, the Hero Manager script controls their behaviour. At the start of the game, the two heroes are inactive until the Villain Event Manager triggers, which then activates the Hero Manager. The heroes are

initially positioned high in the sky. When the event occurs, they fly towards the player from a distance, as if they are entering the scene to assist.

To keep the heroes positioned relative to the player, they follow two empty game objects placed on either side above the player. This way, when they fly toward the player, they maintain a fixed position unless the player accelerates suddenly. To give the appearance that the heroes are following the player, their movement reacts with a slight delay to the player's movements, making it look as though they are following rather than fixed in place.

Laser

The final element of this event is the laser, which determines the attack mechanism. The original asset, found in the Unity store, was designed for shooting with a mouse by clicking on an object. Once clicked, the laser is instantiated and transported to the target.

For *Hang Gliding*, since aiming with a mouse is not implemented, I adapted the script so that the laser is fired from the heroes' palms. Instead of manually aiming, the laser is instantiated automatically when the distance between the enemy and the hero reaches a specified threshold.

The laser script also handles damage values. When the laser hits an enemy, it decreases the UI health bar's fill amount. Once the health bar's amount reaches zero, the enemy game object is destroyed, and an explosion effect is instantiated at the same spot.

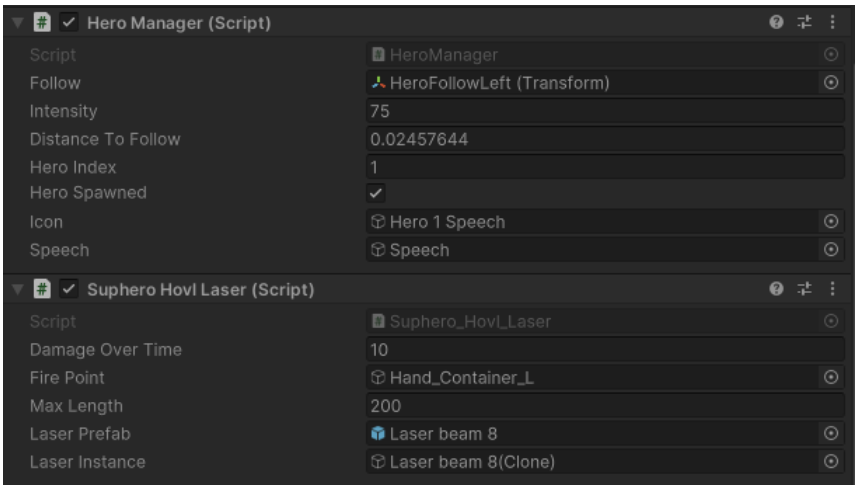

Figure 6.7: The behaviour of the heroes and laser can be accessed in these components within each hero respectively

6.1.3 Tutorial & Customisable Gameplay

Testing at the Festival of Engineering revealed that even with a written tutorial, it was not enough to fully inform players about how to play the game. To address this, I implemented an interactive tutorial within the game that players must complete before starting. The key difference between the two types of tutorials is that the in-game tutorial is interactive and responsive. Players are guided step-by-step, and the tutorial progresses only when the correct input is held for approximately two seconds. This approach ensures that players fully understand the controls. Additionally, the tutorial acts as a calibration tool, helping players naturally adjust their position as they go through the instructions.

Figure 6.8: One of the pages of *Hang Gliding*'s tutorial

```
switch (currentPageIndex)
        {
            case 0: // Glide input
                // Activate the current page
                tutorialPage[currentPageIndex].SetActive(true);
                up.gameObject.SetActive(true);
                upTriggered.fillAmount = 0;

                if (Input.GetKey(KeyCode.S) | Input.GetKey(KeyCode.DownArrow)) //
                    Example input for page 1
                {
                    up.gameObject.SetActive(false);
                    holdTime += Time.unscaledDeltaTime;
                    upTriggered.fillAmount = holdTime/holdDuration; // To show how
                        much it shows up

                    if (holdTime >= holdDuration)
                    {
                        tutorialPage[currentPageIndex].SetActive(false);
                        NextPage();
                        holdTime = 0.0f; // Reset hold time for the next page
                    }
                }
                else
                {
                    holdTime = 0.0f;
                }

                break;
```

Listing 6.1: The code that verifies the player is holding the input for the 2 seconds before moving to the next step of tutorial

Since the tutorial includes text explaining the controls, I also used it to reinforce the story. At the beginning, one of the superhero mentors addresses the player as a "hero trainee," encouraging them to improve and progress in the game. The tutorial also foreshadows the later event where villains appear, explaining that two superheroes will join the player to fight the enemies. This

further enhances the narrative.

At the end of the tutorial, since flexibility is key to accessibility, as discovered during research [17], I included options for players to customise their gameplay style to suit their abilities. There are two adjustable features.

The first option allows the player to choose between flying and gliding. During the Festival of Engineering, I observed that many children did not understand that hang gliding naturally only moves downwards — they instinctively assumed it could fly upward like a plane. Rather than insisting they adapt to the original gameplay, I accommodated their preference by enabling a flying mode. I learned from the creator of Celeste that the designer's intentions are not always the most important factor—making sure players have fun is the priority. On this mode selection page, I labeled the options as "Fly Up (Easy)" and "Glide (Challenging)" to make it easy for players to understand.

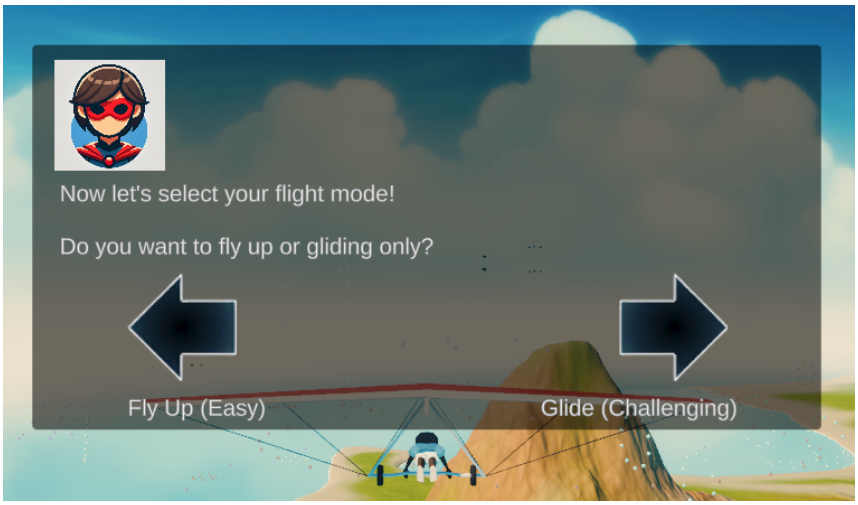

Figure 6.9: Mode selection in *Hang Gliding* before the game starts

The second option lets the player choose whether they want enemies to appear in the game. Although I added enemies to enhance the immersive experience, the effects and additional objectives could be distracting for some players, as Professor Mohamedally suggested. On this selection page, using simple wording, players can choose between "Relaxing Mode," where they can enjoy collecting gems and roaming the skies, or a mode with enemies for added challenge.

6.1.4 Use Case Diagram of Hang Gliding

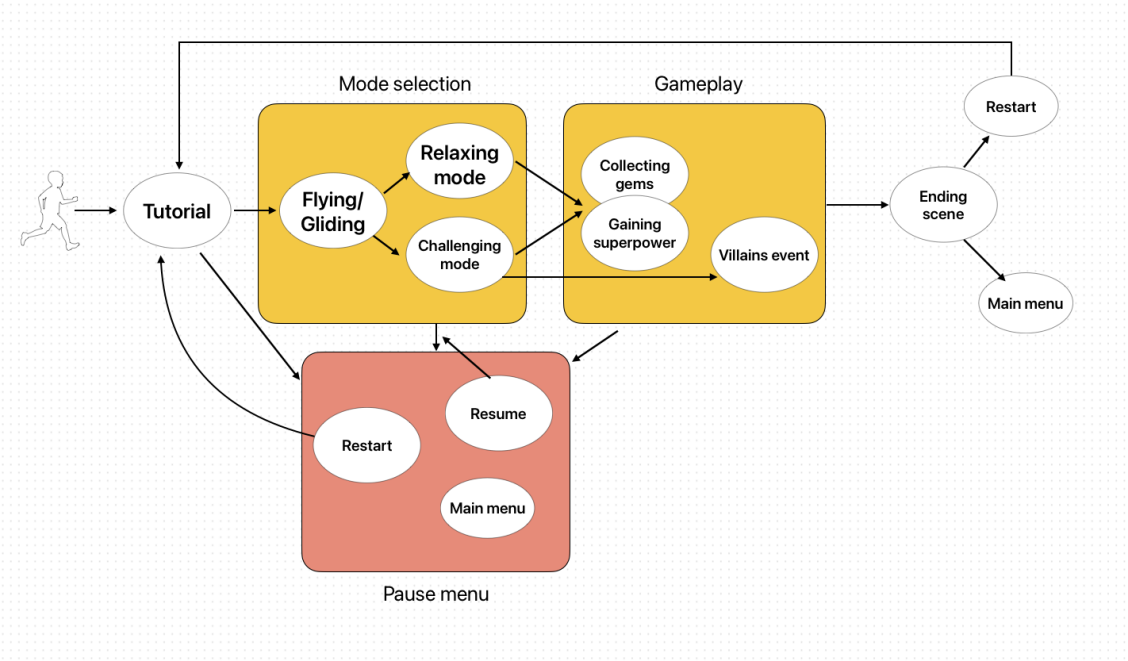

Figure 6.10: Use case diagram for the final design of *Hang Gliding*

6.2 Quad Biking

Figure 6.11: New design of *Quad Biking*

Although *Quad Biking* was not tested during the testing events, insights gained from the research and testing of *Hang Gliding* influenced its design principles. *Quad Biking* is an initial demo for future development, with the final build showcasing the potential bike mechanics.

6.2.1 Heroes & Villains

Since the superhero theme includes the presence of heroes and villains, I applied this concept to *Quad Biking* as well. However, the gameplay and objectives differ significantly from *Hang Gliding*. Players will encounter similar assets but with a refreshing new experience.

The hero-villain interaction mechanism, adopted from *Hang Gliding*, remains the same: heroes attack enemies when they get close, firing lasers from their palms, while hovering above the player.

However, the gameplay in Quad Biking remains a time race rather than a score-based game. The player's mission is to complete a lap as quickly as possible. Enemies serve as obstacles, blocking access to shortcuts. Players can collect gems as fuel to shoot enemies. Once an enemy is defeated, a shortcut opens. The player must decide when to use the limited fuel to shoot enemies, but they can also choose to ignore them and simply focus on riding the quad bike and exploring the terrain.

6.2.2 MotionInput in Quad Biking

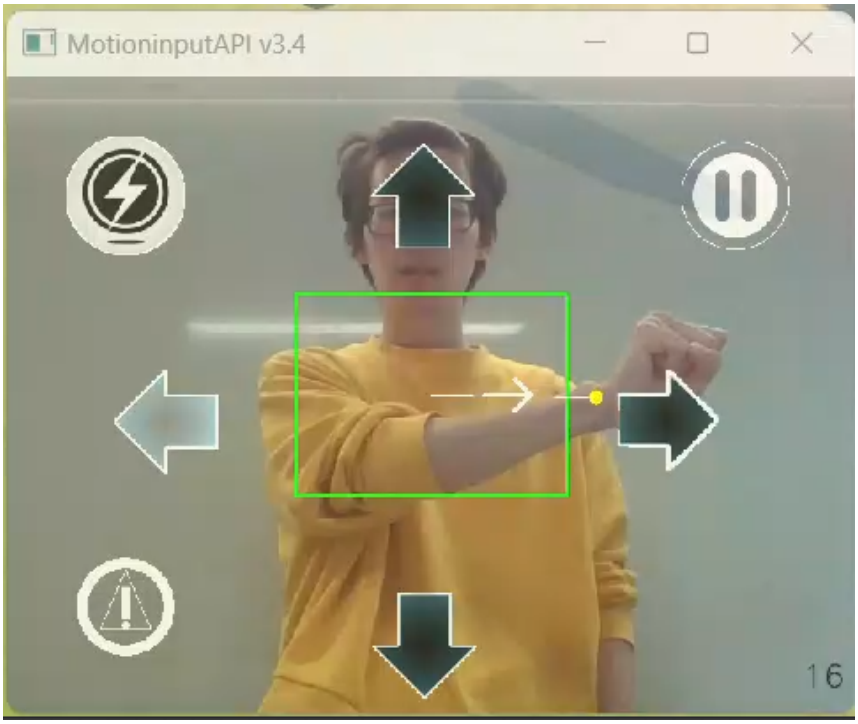

Figure 6.12: Turning right in *Quad Biking*

MotionInput for *Quad Biking* inherits the control scheme from *Hang Gliding*. Based on feedback and improvements made to *Hang Gliding*, a joystick mechanism is also used for directional input in *Quad Biking*. To control the motion of the quad bike, raising the left hand accelerates the bike, lowering the left hand decelerates and reverses, and panning the left hand turns the bike left or right. The left hand serves as the primary control in this game.

Other inputs are executed through hotspot triggers. While the icons from *Hang Gliding* are reused, they serve slightly different purposes here. Since the left hand controls the motion, the right hand handles other keys. The power key is positioned in the top left corner, while the pause key is in the top right corner. As recommended by Anelia from MotionInput, an emergency stop feature has been added. This provides an overriding input, allowing players to stop the bike in case they lose control.

6.2.3 Use case diagram of Quad Biking

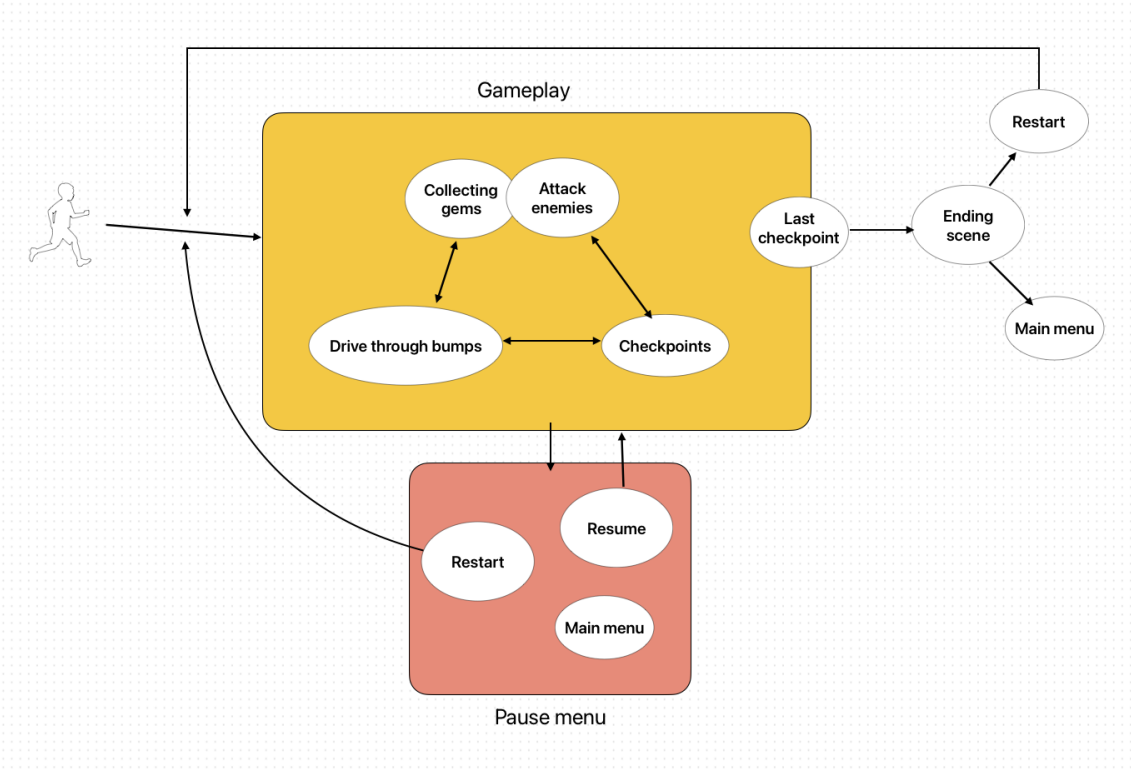

Figure 6.13: Use case diagram for the finalised design of *Quad Biking*

6.3 Additional Implementations

6.3.1 Terrain Redo

To improve the visual quality and better represent Mauritius Island, I decided to redo the terrain. The initial terrain lacked a coherent visual style, and the trees appeared unnaturally dense. Drawing inspiration from images of Le Morne, where the landscape is covered with dense vegetation, my terrain looked more like a collection of individual trees rather than a natural landscape. Clearly, this approach did not working.

Additionally, covering the entire land with trees would significantly increase rendering costs. In most video games, trees far in the distance are not rendered individually, not even with LODs (Levels of Detail). Instead, wide areas of vegetation are often represented by meshes or 2D images. To address this, I replanted the trees in a more scattered arrangement, creating a more open, relaxing environment for players to explore.

Another improvement involved creating the terrain itself. Sculpting it manually took too much time, and the results looked artificial due to my inexperience. I found an efficient solution by using a height map from Google Maps to generate a realistic terrain based on real geographic data. Terrain Party offers a time-efficient approach and also results in a landscape that is much closer to reality. By simply selecting the area on Google map, it generates a black-and-white height map which could be directly imported to Unity Editor to create a terrain.

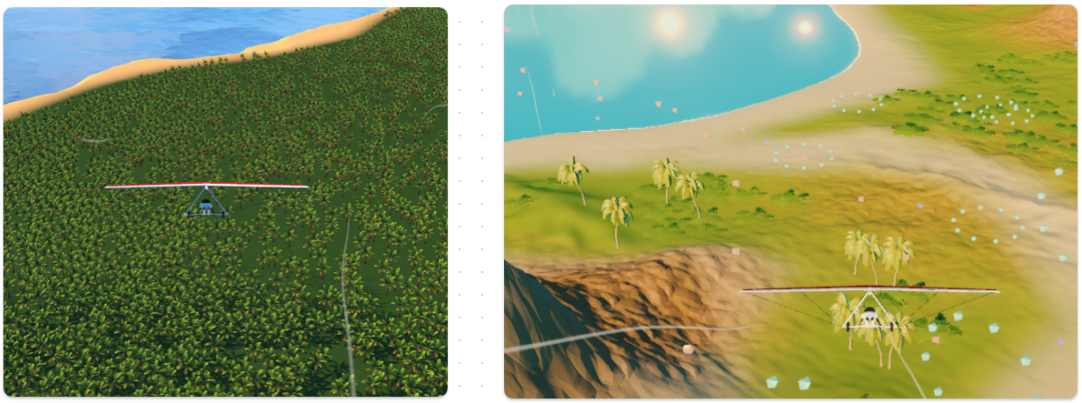

Figure 6.14: Vegetation comparison. Old terrain (left), new (right)

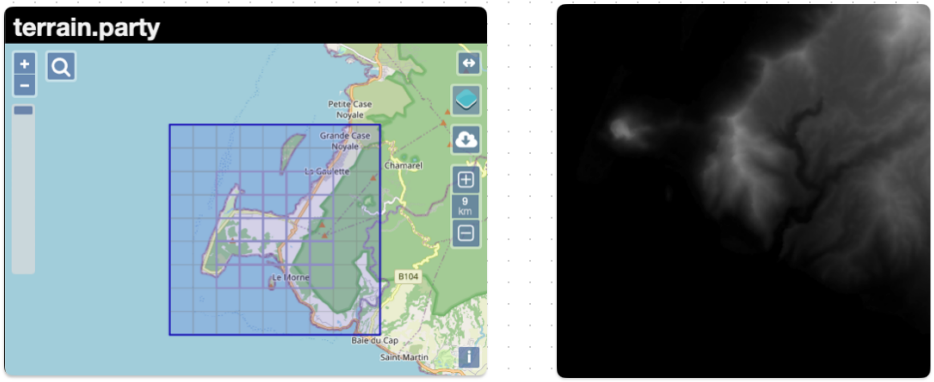

Figure 6.15: Using Terrain Party [30](left) to generate a height map(right)

Figure 6.16: New terrain generated with a height map

6.3.2 Graphic Improvement

Graphics have always been one of my main focuses because, for players, they mostly do not care about the technology and coding behind the game. When they first glance at the game, they

immediately decide whether they are interested. Although we acquired assets for the tropical theme of Mauritius, such as palm trees, realistic terrain, a skybox, and the reflections on the sea, there is still one more key element to define the overall "look" of the game. I decided to create a dreamy, soft-glow effect to best capture the scenery of Mauritius.

This effect is primarily achieved through post-processing in the camera. The game's graphics are enhanced to create a more polished and cinematic experience. The main visual effects include Bloom, Tonemapping, and Colour Lookup. Bloom adds a soft glow to bright areas, making the visuals more dynamic and immersive by allowing light to bleed into the surroundings. This is the element that gives the graphics a dreamy, diffused quality. Tonemapping, using the ACES profile, ensures that the scene retains detail in both shadows and highlights, making the lighting appear more balanced and cinematic. I also applied a Colour Lookup Table (LUT) for specific colour grading, which adjusts hues and tones to create a particular mood. Together, these effects give the Mauritius islands a vibrant, tropical colour palette.

Finally, with Colour Adjustments, Post Exposure is slightly increased to brighten the overall scene, enhancing visibility and adding vibrancy. This makes the scene feel sunnier, matching the pleasant weather in Mauritius. The contrast is set to -10.6, softening the shadows and highlights to create a more even tone across the visuals.

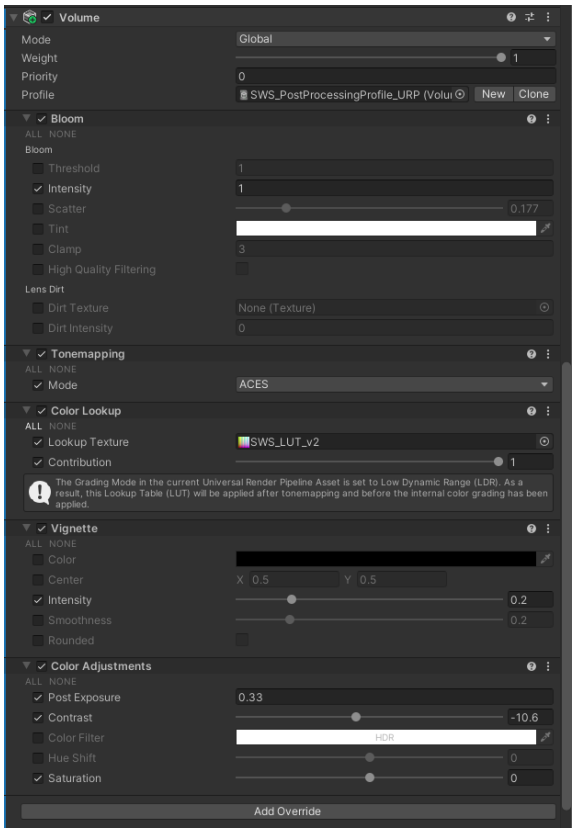

Figure 6.17: Post-processing component in camera

6.3.3 Improved Render Performance

One of the main features of *Hang Gliding* is the abundance of gems scattered throughout the map, which are dynamically moving. However, this core feature may cause performance issues, especially on lower-end laptops.

To reduce the rendering costs of the gems, I added LODs to my gem prefabs. Using a Mesh Simplifier, I reduced the number of vertices in the gems when viewed from a distance. The gems can be simplified to basic geometry, appearing as coloured spots that are still recognisable in terms of their score tier.

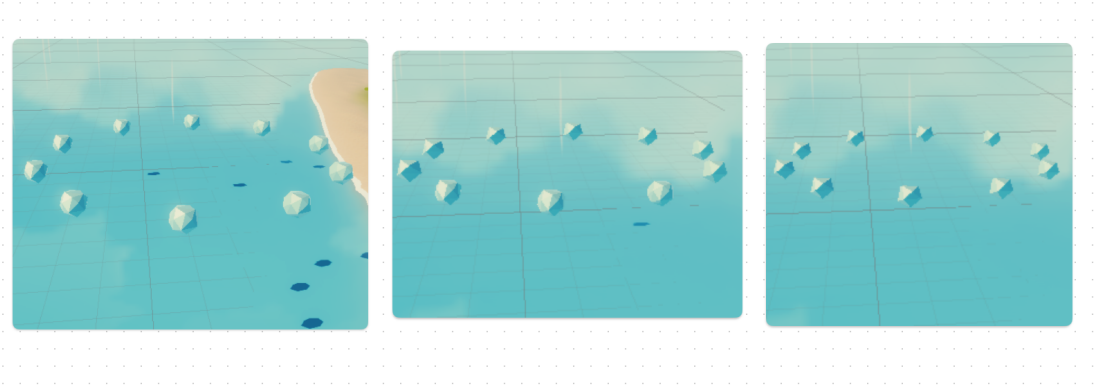

Figure 6.18: Number of vertices decreases as the camera becomes further (the leftmost is closest and the rightmost is farthest view)

While the actual performance improvement still needs to be tested, I believe the change will make a difference. Although the gems did not have many vertices to begin with, the LODs make them appear more natural — just as objects in real life become blurrier when viewed from afar. Additionally, this optimisation should save performance in the long run as more gems are added to the scene.

6.3.4 Random Gem Spawner

The Random Gem Spawn feature adds replayability to the game. Since there is only one terrain and one character, the gameplay could become repetitive over time. Introducing more random factors and elements can ensure that each game feels different and refreshing.

In this script, it reads the prefab that the developer has assigned in the component. Each assigned prefab also has an integer representing the number of instances to spawn. As the script generates each prefab, it randomly selects a position within the parameters of width, length, and height, ensuring that the gems spawn inside the arena. The dimensions of the arena can be set in the editor.

In *Hang Gliding*, not all gems are randomly spawned, as some are essential to the terrain, such as the circular ones orbiting around Le Morne, which highlight the spectacular rock formation. The Random Gem Spawner should be used only to add supplementary content.

```
1  void SpawnObjects()
2      {
3          // Check if the quantities array is the same length as the prefabs array
4          if (quantities.Length != prefabs.Length)
5          {
```

```
            Debug.LogError("Quantities array length must match the prefabs array
                length.");
            return;
        }

        for (int i = 0; i < prefabs.Length; i++)
        {
            GameObject prefab = prefabs[i];
            int count = quantities[i]; // Number of times this prefab should be
                spawned

            for (int j = 0; j < count; j++)
            {
                Vector3 position = new Vector3(
                    Random.Range(terrainWidth,0),
                    Random.Range(minimumAltitude, maximumAltitude),
                    Random.Range(terrainLength,0)
                );
                Instantiate(prefab, position, Quaternion.identity);
            }
        }
    }
```

Listing 6.2: Function of random gem spawner

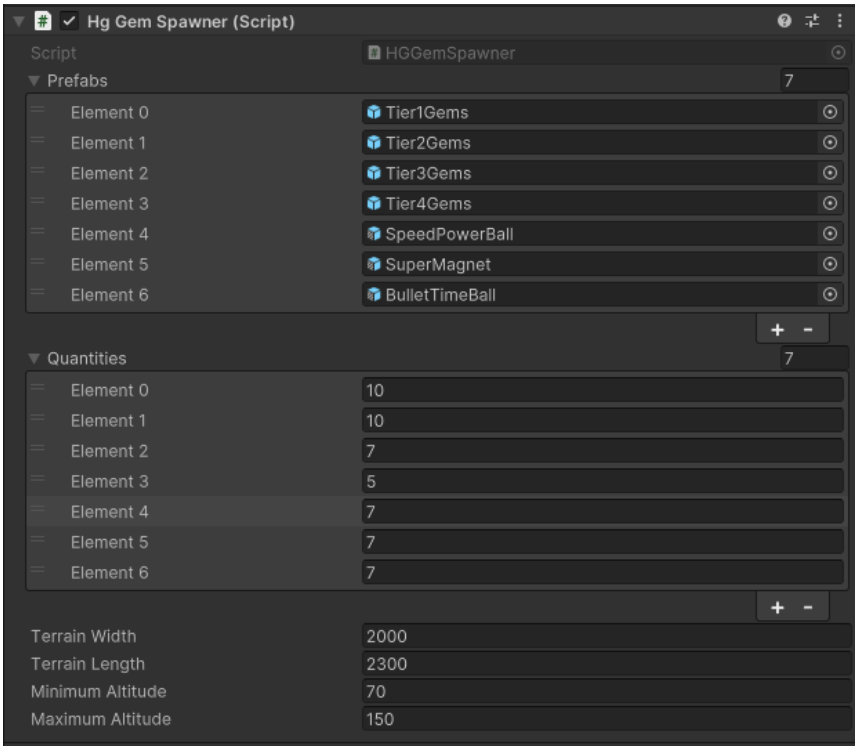

Figure 6.19: Setting up the prefabs and number to spawn in the editor

6.3.5 Pause Menu

In addition to the gameplay, a pause menu is an essential feature that allows users to access other options outside the game. The original pause menu was implemented by our team member Ying

Huang and serves three main purposes. First, it offers a break for players, especially since my games require them to keep their arms raised in the air, which can be tiring. Second, it allows players to restart the game if they choose, and third, it provides an option to quit the game and return to the main menu.

For consistency, the pause menu was implemented in both *Hang Gliding* and *Quad Biking*. Using the script created by Ying, which already provided the basic navigation functions, I added compatibility with MotionInput, so the menu can be controlled without a mouse or keyboard. Players can use the same MotionInput configuration from the game to interact with the pause menu.

The same mechanics used in *Hang Gliding*'s tutorial — where players must hold a control for two seconds to confirm their choice — were applied to the pause menu to prevent accidental triggers. Players can use the up, left, and right controls to choose to resume, restart, or go to the main menu, respectively. The down button was intentionally omitted, as the purpose of the pause menu is to give children a break. If they lower their hands, nothing is triggered.

Later, in a session with Professor Mohamedally, he suggested enlarging the buttons to improve visibility, particularly for children with visual impairments. This feedback was incorporated into the final build of the game, with larger buttons for easier navigation.

Figure 6.20: Pause menu in *Hang Gliding*, with animation of an input being triggered

6.3.6 Ending Scene

At the conclusion of both games, I added an ending scene to display the player's score or result. Character animations were added for the two heroes and the player's character. This scene is designed as a reward for players who complete the games. The idea was inspired by fighting and racing games like *Street Fighter* and *Mario Kart*, where character animations celebrate the victory. I implemented this as a new scene, which features only the animations and a menu. The menu offers two options: restarting the game or returning to the main menu. Similar to the pause menu, players can activate an option by moving their hands left or right for two seconds.

As ending scenes are separate game scenes, the data does not remain. Therefore, it requires a script to pass data from one scene to the next so it can display the result in the ending scene. When the game ends, the manager that handles the score (or time) will change the result to static data.

In the game scene, the manager that handles the value of the result first changes it to a string,

and then passes it on to a class called StaticData. This class is created to keep the value of the result as a string and then pass it on to the local manager in the ending scene. Here is the class StaticData:

```
public class StaticData : MonoBehaviour
{
    public static string dataToKeep;
}
```

Listing 6.3: StaticData

The ending scene is intended to enhance the immersive experience by reinforcing the superhero theme. During most of the gameplay, players don't get to see the superheroes up close, which may reduce their sense of connection to the characters. This ending scene aims to bridge that gap, celebrating the victory with the heroes and fostering a stronger bond between the player and the superhero characters while enjoying the beautiful landscape of Mauritius.

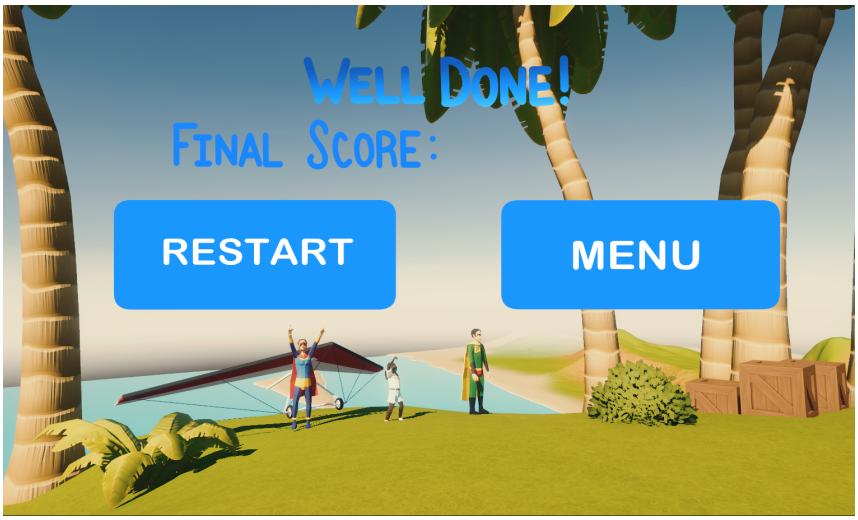

Figure 6.21: Ending scene of *Hang Gliding* at the top of Le Morne

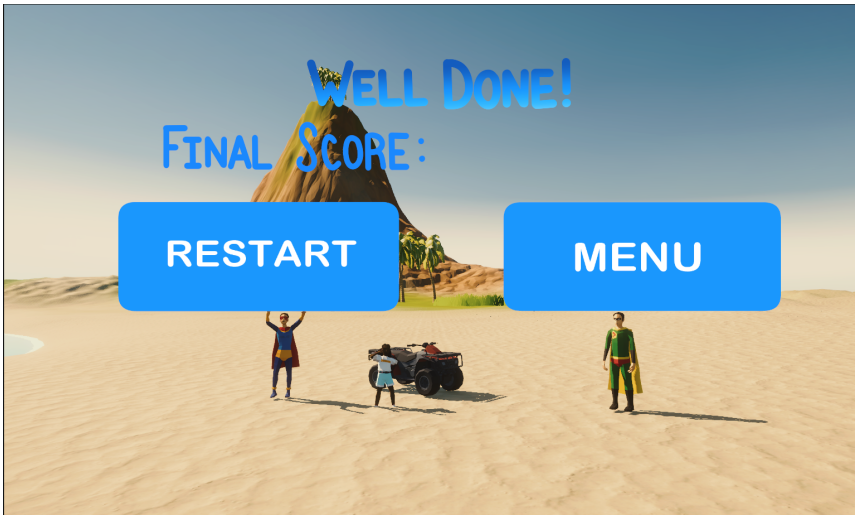

Figure 6.22: Ending scene of *Quad Biking* near the coastline

Chapter 7

Experiment Stage 2: Testing

As the project approached its conclusion, our team revisited Sybil Elgar School for final testing. This event was significant as it showcased the results of our efforts over the past few months. Although it marked the final test for us, it is not the end for the game; this will serve as the foundation for future teams to further improve it.

Figure 7.1: One of our teammates Nondu giving an introduction for our second visit

The testing followed a similar schedule to our previous visit. As a focus group, each team member supervised and guided the children while they played the game. Three children participated in the final testing—the same children as last time—so they could evaluate our updated versions and compare them to the original. Jack and Gurpreet, both diagnosed with level 1 autism, and Abu, diagnosed with level 2 autism, took part in the session. Due to time constraints, we only had two hours to conduct the tests. Jack and Gurpreet were grouped together, we required one of them to play each game to ensure most of the games were tested by at least one group of children with autism.

We collected data primarily through observation, focusing on aspects such as how well the children controlled the game, how much they enjoyed it, and what they understood about the gameplay. Direct feedback from the children was also important. Abu, who requires more specialised attention and cannot express himself with words, was assessed through my own observations and feedback from the teachers.

7.1 Hang Gliding

Jack's Performance

Jack and Gurpreet both performed well during the testing. Jack demonstrated a clear understanding of the controls and was able to complete the tutorial on his own without any external guidance. However, I noticed that the holding delay for the mode selection screen was too short, leading to accidental triggers if the player did not keep their hand within the joystick frame. Jack played the flight mode and the relaxing mode. Due to the time constraints and the fact that relaxing mode does not feature the villain event, the game ended halfway because no new content would appear.

Gurpreet's Performance

Gurpreet also played *Hang Gliding* in relaxing mode and showed a strong grasp of the controls. The tutorial was highly effective, thanks to the fill amount effect and arrows that clearly indicated the required input. Once the tutorial was completed, Gurpreet had no trouble picking up the controls. He commented that the control method was much easier for him. However, there was an issue that impacted his gameplay: as Gurpreet controlled the glider with his left hand, his right hand often accidentally triggered the escape key, causing the pause menu to appear. Since his left hand was still outside the joystick frame, this unintentional action caused the game to restart.

The game's design intended for the player to keep their hands close together, but Gurpreet sometimes stretched his arms in opposite directions. To help with this, the teachers provided him with a plastic stick to hold, keeping his hands together. This assistance noticeably improved his performance, and he was even able to pick up a power ball and use the speed superpower. Gurpreet not only managed to control the hang glider, he could also use a superpower. The icon of the hotspot is at the similar position with the first test, but Gurpreet could look at the camera screen and direct his wrist to touch the power ball. The little detection spot (front the joy stick mechanism) on his wrist really helped Gurpreet to know where is being detected right now.

Figure 7.2: Tester Gurpreet reaching for a power ball by himself in *Hang Gliding*

Abu's Performance

Abu also tested the game, and like Gurpreet, he was given a stick to help keep his hands together. Initially, Abu was not able to navigate the glider on his own. However, he could imitate the controls

when I performed them, and he managed to control the glider for short periods before asking me to play with him. For the second half of the game, he preferred that I assist him by holding his arms as we played together. His reactions made it clear that he enjoyed the game, particularly when we played cooperatively. Like the others, Abu also accidentally triggered the pause menu multiple times.

Figure 7.3: Abu successfully controls the hang glider with the assistance of holding a plastic stick

7.2 Quad Biking

Quad Biking was tested by Gurpreet and Jack, as Abu had limited time and could not participate. The game has more complex controls, as the input is tied to speed, making it more suitable for players with higher capabilities at this stage.

Gurpreet's Performance

Gurpreet tested the game first. Since there was no tutorial, I instructed him on the basic controls when he started. Gurpreet is relatively quiet, so he did not comment much, but I was able to gather a lot by observing his actions. Initially, he was confused by the controls of *Hang Gliding*, as both games were developed by me. Once I explained the correct controls, he was able to perform basic manoeuvres, such as accelerating, reversing, and steering. After a few minutes of practice, Gurpreet successfully steered around an enemy game object and returned to the track. When he only wanted to keep the bike moving forward, he kept his left hand in a neutral position instead of putting down. He had no issues controlling the bike, but as a right-handed player, he occasionally switched to using his right hand instinctively. Gurpreet rated the game a solid 5/10, as there was still room for improvement, particularly for right-handed users.

Jack's Performance

After Gurpreet, Jack a "left-hander" tried *Quad Biking* for the first time. He described the controls as "easy," "intuitive," and "natural." Jack also appreciated the visual effects, particularly the explosions when enemies are defeated, and enjoyed riding the bike around and attacking enemies.

Figure 7.4: Gurpreet steers around an enemy

He felt that the hero-villain feature added a meaningful objective to the game. For improvement, he suggested adding sound effects to provide better feedback to the player. However, he thoroughly enjoyed the game, even though he ignored the checkpoints and simply roamed the terrain. He mentioned that he did not realise the circles were race checkpoints but still had fun in his own way. In the end, Jack rated *Quad Biking* 9/10, calling it the best game!

Jack also provided helpful feedback for the team. He suggested that some elements across the games could be standardised for consistency, as this was lacking since the games were developed individually. He also emphasised the need for more intuitive controls and better feedback mechanisms, which would enhance the overall gaming experience.

Figure 7.5: Jack shooting down an enemy post

7.3 Result Summary

7.3.1 Hang Gliding

The testing for *Hang Gliding* and *Quad Biking* was a success. *Hang Gliding* reached its second round of testing with autistic children, and all the major issues were resolved after I reconfigured the MotionInput settings. Testers no longer felt confused when controlling the glider, as the controls were now very straightforward. Ensuring responsive and intuitive control was the top priority before focusing on making the game fun. MotionInput integrated seamlessly without detecting any delay, and the control was responsive.

With the assistance of the tutorial, I did not need to teach them how to control the game; they were able to learn on their own. This proved that the tutorial was both informative and simple enough for children to understand. Both testers chose the relaxing mode, showing they knew which gameplay style they preferred. The game successfully catered to both challenging and casual gaming experiences.

For the level 2 autistic tester who has limited speech, the tutorial was not applicable, but this did not prevent him from enjoying the game. Whether imitating my actions or co-piloting with me, he was engaged by the visual elements and the controls. This demonstrated that the game was physically accessible to him without any issues. Even though he may not have fully understood the context of the game rules, the experience still offered an enjoyable flight simulation. The goal of *Hang Gliding* was successfully achieved.

7.3.2 Quad Biking

Quad Biking was the first hands-on experience for the testers. Although I anticipated many issues and faults, the outcome was very satisfying. First of all, there were no major issues or bugs found. The main focus of this test was whether the testers could control the basics of riding a quad bike, and they were able to do so effectively. This proves that the MotionInput configuration works well for autistic children. Thanks to the earlier testing of *Hang Gliding*, I gained insights into their challenges, which helped me adjust the controls for *Quad Biking* accordingly. Their control performance was as good as in *Hang Gliding*, and the children were able to drive with good control after just a few minutes of practice.

From the testing, it was clear that the driving simulation was already fun for the children. However, the checkpoint system was not thoroughly tested due to time constraints, as the focus was primarily on practising the controls. I believe that adding a tutorial, similar to the one in *Hang Gliding*, would improve their understanding of the game's rules. Before deciding to make *Quad Biking* a time-race game, my intention was to give players the sensation of flying over bumps while driving. *Quad biking* is a sport known for its wild and exciting stunts, and this game successfully captured that essence.

7.3.3 Extra Discovery

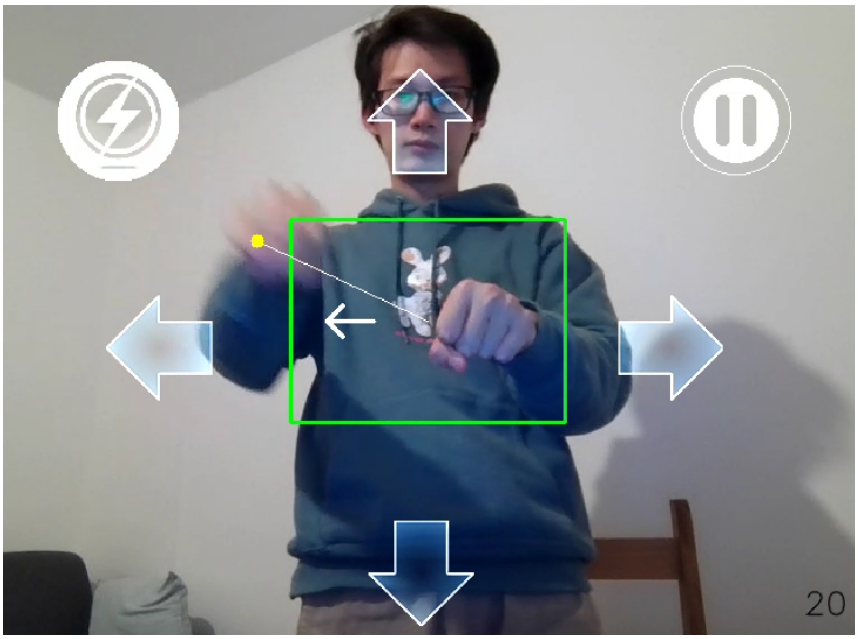

Figure 7.6: The yellow dot indicates the detection which can also be used in other builds

Beyond the game design, there was a new discovery for MotionInput: children can understand the camera window. They regularly checked the camera screen to calibrate their position as long as they knew what was happening. The detection spot associated with the joystick mechanics helps players locate which body part is being tracked. One of the recurring points of confusion for testers was being instructed to place their hand at the hotspot, when in fact, MotionInput is tracking the wrist. Sometimes, when trying to position themselves correctly, they realised the hotspot was not triggered and could not figure out why. Now, with the joystick providing a point of reference, this spot can also be used for hotspot detection, not just for the joystick system.

Another discovery is that children can enjoy a game with a very simple concept. I was initially concerned that children might not find the game engaging, so I tried to add more content and events. However, during the test, due to time limitations and the fact that not all features could be tested, the children still had fun in their own ways.

The test was a success, but the design journey does not end here. This was only the second test with autistic children, and there is always room for improvement. These improvements will be explained in detail in the next chapter.

7.4 Unit Test

To ensure stable performance across most Windows devices, as specified in the initial requirements set by MotionInput Games, a unit test must be conducted on laptops before delivering the final game build. I will be testing the games on two non-gaming laptops, which are similar in performance to typical household laptops. While the games are running smoothly, it is equally important to verify that the integration with MotionInput performs well.

As requested by MotionInput, a minimum FPS (frames per second) of 8 must be met to pass the test. Below are the two devices used for testing:

1. Lenovo, Windows 11, 16GB RAM, 12th Gen Intel(R) Core(TM) i5-12450H processor
2. MSI, Windows 11, 16GB RAM, 12th Gen Intel(R) Core(TM) i7-1280P processor

Lenovo

Game	**Lowest FPS**	**Highest FPS**	**Notes**
Hang Gliding	9	20	Frame rates slightly drop at times when too many gems are in the frame at once
Quad Biking	10	15	Stable

MSI

Game	**Lowest FPS**	**Highest FPS**	**Notes**
Hang Gliding	15	18	Stable
Quad Biking	15	16	Stable

The unit tests conducted on both the Lenovo and MSI laptops demonstrated that the games performed within acceptable parameters, meeting the minimum required FPS of 8. On the Lenovo device, *Hang Gliding* experienced occasional frame rate drops, with a lowest FPS of 9, especially when many gems appeared on the screen. However, it still remained within the acceptable range. *Quad Biking* on the Lenovo maintained stable performance, with FPS between 10 and 15. On the MSI device, both games ran more smoothly, with *Hang Gliding* reaching a lowest FPS of 15 and *Quad Biking* maintaining a stable range of 15 to 16 FPS. Overall, the test results indicate that the games are able to run satisfactorily on non-gaming laptops, ensuring stable performance with MotionInput integration, even on devices comparable to typical household laptops.

Chapter 8

Conclusions

8.1 Achievements & Evaluation

The experiences of driving and flying are amazing for children. However, the potential to empower both fully-abled and autistic children with such experiences, like flying and driving, has yet to be fully explored. This thesis has presented a complete solution to begin fostering creative interactions for children, based on the way they move.

I conducted a thorough investigation into the requirements, and I modelled how children mimic flying and driving through our design thinking process. I explored the state-of-the-art technologies and compared the best performance in relation to the level of interaction.

This section will outline the achievements of *Hang Gliding* and *Quad Biking* and will evaluate both the accomplishments and the project as a whole.

8.1.1 Gameplay

Simplicity & Learnability

Hang Gliding and *Quad Biking* each have a simple, clear objective. Testing showed that children were able to understand the controls and objectives of *Hang Gliding* from the tutorial, with no difficulty in controlling the glider and capturing the gems. For *Quad Biking*, as this is an early demo, it currently lacks a tutorial, but testing revealed that children were able to quickly grasp the gameplay with a little guidance and practice. During the tests, children could efficiently control both the bike and the glider within a matter of minutes.

Challenge Level & Customisable Gameplay

Initially, as the game designer and developer on this project, I deliberately set a challenge level for all players, as I believed it was an essential element of the game, providing the necessary stimulation that video games offer. Generally, a game without any challenge would not keep children engaged.

However, during this project, it became clear that different children have different levels of ability. A challenging game may not always be the most important factor in making a game enjoyable; the experience of driving and flying can be entertaining regardless of the difficulty. Therefore, it became important to allow children to choose their preferred level of difficulty. They could add more constraints to their character and gameplay or, alternatively, ignore objectives entirely and simply enjoy the driving and flying experience. For *Hang Gliding*, I expanded the

range of difficulties in the mode selection. It can be as easy as a flying simulator, allowing the hang glider to soar, or as challenging as a superhero game where players must defeat villains.

Curiosity & Exploration

Curiosity is often a stronger trait in children than in adults, encouraging them to explore. As mentioned earlier, my games are designed to allow children to explore in their own way. Testing showed that children did not always require guidance to play the game; they set their own pace and figured things out by themselves. This is the exploratory quality that the game offers to players.

Even in *Quad Biking*, the lack of a tutorial during testing provided more space for players to discover the objective on their own. While some children ignored the goal of the game as a time-race, they still found enjoyment in roaming around and flying over the bumps.

Kinaesthesia

As the target audience includes both fully-abled and autistic children, their age and abilities limit their life experiences. With this in mind, I decided to create games that allow them to experience sports they might not otherwise have the opportunity to engage in.

It was observed that children could have fun simply by roaming around the arena, and they agreed that the game felt intuitive. This demonstrates that my games successfully offer a sense of body simulation to the children.

Visual Elements

The simplicity of the visual elements is also a key aspect of the games. Firstly, it aligns with the tropical themes and beautiful landscapes of Mauritius. The colour grading reflects the imagery people typically associate with Mauritius. Superpower and superhero elements are incorporated to reinforce the theme and objectives. Visual feedback is provided when events occur, such as when gems are collected or superpowers are activated. Testers praised the execution of the special effects.

Despite the inclusion of these visually impressive elements, all content, game objects, and effects are designed to serve a purpose while enhancing the immersive experience. I ensured the visuals remained simple enough for children. The visual elements are not overwhelming and have been added with precision.

8.2 Future Work

As the project was a success, but the journey of design never ends, especially as the games were only three months into development. With the work of future developers, the games will definitely improve, providing a better flying and driving experience.

The future work outlined below summarises the tasks that need to be completed, as requested by Professor Dean Mohamedally and based on feedback from our testing. It will also provide brief guidance on how to implement these as a starting point.

8.2.1 Hang Gliding

Daylight/Night System

Currently, there is only one skybox set up; the player only sees one visual setting. Therefore, adding a new environment will enrich the visual content and enhance the landscape of Mauritius. Future developers will need to create or acquire new skyboxes to add to the hierarchy, allowing the player to choose on the menu scene or randomise it to offer a surprise.

Optional Tutorial

Currently, the tutorial is set to appear every time the player enters the game. I suggest that players can choose whether they want to go through the tutorial before the game starts. After all, it would be annoying if experienced players still had to complete all the steps in the tutorial every time.

Future developers can set up the options in the main menu scene before entering the *Hang Gliding* scene. The option chosen by the player will set the Tutorial game object inside Canvas to be on or off.

Additional Optimisation

Although the game was tested on two laptops, the performance could still be improved as the FPS dropped to 9, which is close to the minimum requirement. The laptop tested uses a 12th Gen Intel i5 processor with 16GB RAM. It is expected that many family laptops with less powerful processors might experience delays; therefore, additional optimisation is recommended. Future developers can start by using the Profiler in the Unity Editor to inspect the cause of the delay, likely due to the massive terrain and countless gems orbiting and rotating at the same time. This would be a good starting point for investigation.

8.2.2 Quad Biking

Full Game Level Design

A full game level design is still required. As this is only a demonstration of the mechanics, it might not provide the full experience for players, especially if they seek challenges. My current game has a beginning and an end (when one lap completes), but it still requires fine-tuning. For example, how the enemies become actual obstacles so that the player will have to navigate through difficult bumps if they lack energy fuel to attack. A track still needs to be designed, as currently, it is only one circle around Le Morne.

Bike Mechanism + More Vehicles

Creating a land vehicle with good control is difficult as it requires very precise values for the bike physics, as explained in Chapter 4. I believe this is a task that could be improved or requires more work. I recommend that future developers take inspiration from real vehicles and study their physics as a starting point. You may conceive new concepts and create more exciting gameplay. You do not have to only improve the current bike; there could be a variety of quad bikes or even vehicles for players to select and experience different driving experiences.

Potential Game Objective Redesign

Although *Quad Biking* was designed as a time race, I did not intend to limit the gameplay to one style only. What I discovered during the testing was that players really enjoyed the superhero and villain features; one tester had a lot of fun just chasing after the villains and defeating them.

This example prompted me to open up and reconsider other possibilities for the game. For instance, if this game becomes a free-roaming, score collection game, similar to *Hang Gliding*, it could even open up the map and encourage exploration instead of limiting children to follow only the designed track. The gameplay would be more free and experimental too.

8.2.3 Enhancements for Both Games

More Game Levels & Variations

As previously mentioned, more variations will keep the games replayable. Currently, there is only one setting in each game. Future developers can work on adding multiple new levels; this could involve adding more randomised features to the games or even building new terrains so that players can travel to more locations on the beautiful islands of Mauritius.

Using a height map to generate realistic terrain is more time-efficient. My current scene of *Hang Gliding* and *Quad Biking* contains a terrain with terrain assets, such as paint and plant assets, which could be reused when building new terrain to maintain consistency. If you enjoy challenges, procedural generation could be a good option too. It will provide an infinite possibilities of geography for the games.

Right-handed Option

The current configuration favours left-handed users as the joystick mechanics track the left wrist for control. Although for *Hang Gliding* it was recommended for players to use both hands for the full simulation experience, the left hand is still the default dominant hand.

Future developers can create a new JSON configuration file for right-handed users. When the user selects their dominant hand, it swaps the JSON file inside the "MotionInput Manager" component(developed by Eric Cui) under the Canvas game object in the scene.

8.2.4 Final Thoughts

Approaching the end of the project, it was a great honour to be part of the team working with MotionInput Games as a student this year. The main reason I joined this team was primarily because it was a game design and development project. However, there is an extra mission that I am proud of undertaking. This project has the potential to change and encourage more work to provide children, including those with disabilities, with new experiences of travelling and exploring.

This project reminds me of my childhood when curiosity always drove me to be excited about my surroundings, especially technology. The graphics in video games and media were not as advanced as they are now, but I had infinite imaginations when I had access to them. Playing a superhero game made me feel empowered; playing a racing game made me lean my body sideways when turning in the game. These were fascinating experiences that felt like touching the outside world. It offered me the first view of looking at the land from the sky before I had a chance to travel abroad. This experience made me realise the importance of this project and how much joy and value I could provide to children.

It was a different era when video games were considered merely a form of entertainment. But technology in the gaming industry has changed a lot ever since; video games have contributed to films and interactive media. Nowadays, video games can be educational material. I do not see my project as merely a video game; it has proven how it can inspire children too. I am thankful for this opportunity.

I believe this project and many others at UCL will continue to be the many steps that change and help children, under different conditions. Making technology more accessible, affordable, and equal.

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Appendix A

System Manual

A.1 Requirements

- **Git**: Version control system for cloning the repository.
- **Unity Editor**: To open and work on the project.

A computer with Git installed is required to clone the repository from GitHub. Unity Editor is needed to open, edit, and compile the project for various platforms.

A.2 Setup and Installation

A.2.1 Cloning the Repository

1. Open a terminal or command prompt.
2. Navigate to the directory where you want the project.
3. Clone the repository using:

```
git clone https://github.com/Emotional-Yam8367/superhero-sportsday
```

4. This will create a new directory containing the project files.

A.2.2 Opening the Project in Unity

1. Open Unity Hub.
2. Click on 'Add' and navigate to the directory where you cloned the project.
3. Select the project folder to add it to the Unity Hub.
4. Click on the project in Unity Hub to open it in the Unity Editor.

A.3 Additional Setup

- **Dependencies**: Check the `README.md` file in the project repository for any dependencies or special setup instructions.

- **Unity Version**: Ensure you are using a compatible Unity version as specified in the project's `ProjectSettings`.

A.4 Running and Editing the Project

A.4.1 Running the Project in Unity

1. Open the project in Unity Editor.
2. Navigate to the `All Assets/Scenes` directory in the Project window. This folder contains all the game scenes.
3. Double-click on any scene you want to load.
4. Press the 'Play' button in the Unity Editor to start the scene and test the game within the editor.

A.4.2 Editing a Scene

1. After opening a scene, you can modify it by adding, deleting, or altering game objects in the scene.
2. Use the Hierarchy window to select and organize the components of your scene.
3. Adjust properties and add components to the selected objects using the Inspector window.
4. To save changes, use `File > Save Scene` or press `Ctrl+S` (or `Cmd+S` on macOS).

A.4.3 Building the Project

1. To create a game that can be run outside of the Unity Editor, go to `File > Build Settings`.
2. Select the target platform for which you want to build.
3. Click 'Build' and select where to save the compiled game.

Appendix B

User Manual

B.1 Video Tutorial for Hang Gliding

https://mediacentral.ucl.ac.uk/Player/FDGH5GIH

B.2 Video Tutorial for Quad Biking

https://mediacentral.ucl.ac.uk/Player/JeCige59

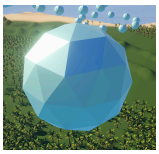
Appendix C

Printed Tutorial of Hang Gliding For Festival of Engineering

Hang Gliding MotionInput Tutorial

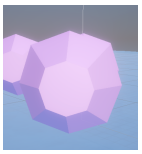
Goal:

Collect as many points as possible within the time limit!



3 points

10 points



20 points

40 points

Control:

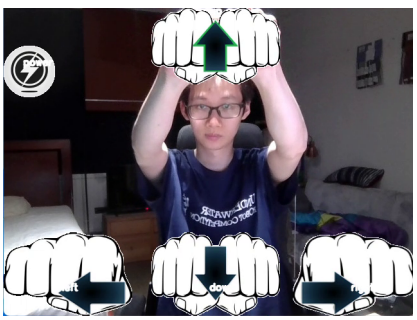
Follow the on-screen positions of the fists!

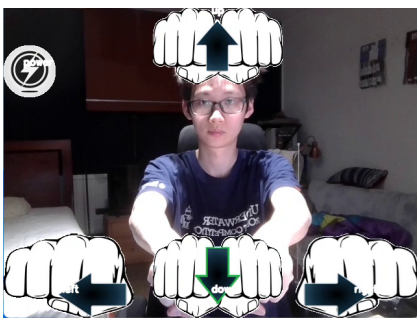
Neutral position:

Maintain your hands in fists and hold them at the middle of the frame.

Gliding and Diving down:

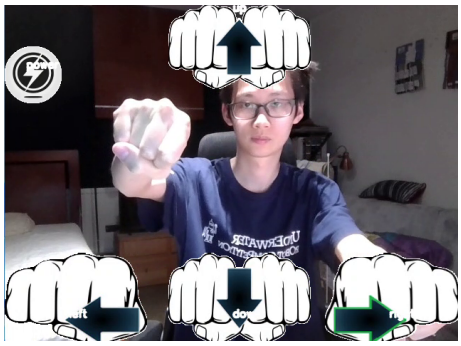
To glide or dive, keep your fists together and move them up or down accordingly.





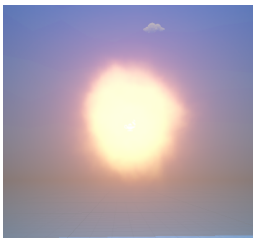
Turn left and right:

Move your fist to the desired side to turn.

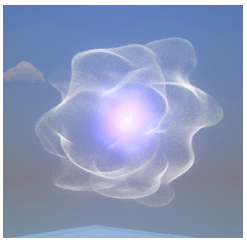


Superpower!

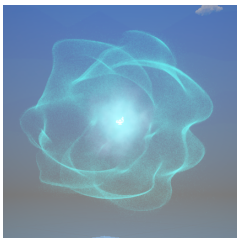
Utilise three types of superpowers for a strategic advantage and to earn more points. Collect these powers by gliding towards them!



Super Speed
Go faster and higher!

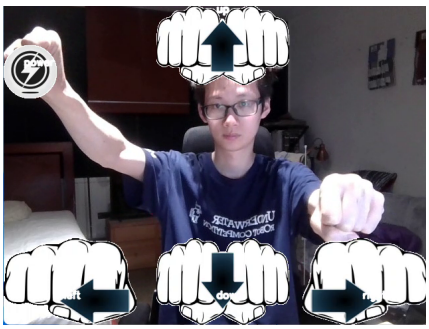


Super Magnet
Expands your range to attract points



Bullet Time
Useful for quick and precise maneuvers.

Power up!



Assume a Superman pose to activate your collected power. Position your left hand over the power icon to use it.

Appendix D

Data Collection from Festival of Engineering

MotionInput User Tests(1-258) 1(Sheet1)

ID	Start time	Completion time	Email	Name	Last modified time	Do you wish to remain anonymous?	Full name (and if under 18, names of parent and child)	Your email address to join our community and receive announcements of the software launch.	Your Organisation, School or Company, and Title	Age group	Gender	Levels or games tested	Comments about what was played / used	Your wishlist for what you would like to see with this technology (as many as you like)	Your top 5 games and on what machines - e.g. Angry Birds on Android, Sonic on Xbox	Who filled in this form (name/ abbreviation):	If you are from a school, what could you see this being used with and do you have any examples of teaching materials?
1	7/18/24 16:46:54	7/18/24 16:47:34	ucabyyc@ucl.ac.uk	Yucong Cai		Yes				Adults 18 - 35	Female	Boxing;	Exciting game for disabled children				
2	7/18/24 16:47:57	7/18/24 16:48:38	ucabyyc@ucl.ac.uk	Yucong Cai		Yes				Adult 35 - 69	Female	Boxing;	Good game and UI design, not intuitive enough for non gamers				
3	7/18/24 16:39:01	7/18/24 16:54:23	ucabc32@ucl.ac.uk	Victor Chan		Yes		qingyu.zhang.23@ucl.ac.uk	icl	Adults 18 - 35	Male	Hang Gliding;	has to be too accurate to the hotspots for control. too similar too xbox. could use two cameras for depth detection.	rotation detection	pc: gta5, cs go		
4	7/18/24 16:48:40	7/18/24 17:06:30	ucabyyc@ucl.ac.uk	Yucong Cai		No	Kai bristow	kaibristow08@gmail.com	Haberdashers Crawford academy	teenagers 13 - 18	Male	Boxing;	Fun, needs some calibration	Sword game	Sekiro: shadows die twice, Elden ring, Black ops 3 zombies, Dark souls 3, bloodborne		
5	7/18/24 17:11:07	7/18/24 17:12:49	ucabs48@ucl.ac.uk	Ying Huang		Yes			University of Bath	Adults 18 - 35	Male	Windsurfing;	Difficult to move forward but turning is cool. Perhaps could use more influence from actual windsurfing for more fluid movement patterns	Applications in more seemless VR			
6	7/18/24 16:54:25	7/18/24 17:14:37	ucabc32@ucl.ac.uk	Victor Chan		No	Ethan Benjamin Golin	ethangolin1@gmail.com	Sackville School	teenagers 13 - 18	Male	Hang Gliding;	good experience. responsive.	implement this to a football game.	rocket league, pc gta, rainbow 6 siege		
7	7/18/24 17:14:40	7/18/24 17:31:19	ucabc32@ucl.ac.uk	Victor Chan		No	Daniel Phillips	daniel.phillips@urbanandmainlines.com	Hitachi Rail	Adult 35 - 69	Male	Hang Gliding;	Intuitive. Interesting technology. some visual cue to direct the player to. more accurate icons for detection.	More than keyboard inputs.	sports game, fifa Mario games, nintendo strategy & rpg - civilisation 6. baldur's gate 3		
8	7/18/24 17:12:55	7/18/24 17:33:14	ucabs48@ucl.ac.uk	Ying Huang		Yes						Windsurfing;Boxing;Fencing;	Hard at first learn		Strategy games		
9	7/18/24 17:56:46	7/18/24 17:58:51	ucabyyc@ucl.ac.uk	Yucong Cai		No	Yoshi kosaka		UCL	Adults 18 - 35	Male	Boxing;	The tracking was pretty accurate	Tactic feedback	2048		
10	7/18/24 18:00:59	7/18/24 18:04:15	ucabyyc@ucl.ac.uk	Yucong Cai		Yes			UCL Computer Science Masters Student	Adults 18 - 35	Male	Boxing;Volleyball;	Volleyball has a high learning curve and needs to be calibrated well for movement (green box) Boxing is good, I wish I could punch both bags with either hand and the jumping can be a separate feature				
11	7/18/24 18:08:46	7/18/24 18:10:12	ucabyyc@ucl.ac.uk	Yucong Cai		No	Sam stockdale	s.stockdale@ucl.ac.uk	UCL	Adult 35 - 69	Male	Boxing;	Fun to play - and the controls felt very accurate				
12	7/18/24 18:12:54	7/18/24 18:19:04	ucabyyc@ucl.ac.uk	Yucong Cai		No	Ahmad alduweesh	uceeldu@ucl.ac.uk	Ucl	Adult 35 - 69	Male	Hang Gliding;	Resistant simulation for the movement. Wider detection.	Car simulation, sports simulation	Elden Rings Platformer, Celeste Civilization 6,		
13	7/18/24 18:22:48	7/18/24 18:23:52	ucabs48@ucl.ac.uk	Ying Huang		Yes				Adults 18 - 35	Male	Windsurfing;	Dolphins slower than player		FF7, counterstrike, half life, transformation, resident evil 2		
14	7/18/24 18:23:54	7/18/24 18:25:36	ucabs48@ucl.ac.uk	Ying Huang		Yes		Paul.beard@ucl.ac.uk				None;					
15	7/18/24 18:19:12	7/18/24 18:29:29	ucabyyc@ucl.ac.uk	Yucong Cai		Yes			City University of London	Adult 35 - 69	Male	Boxing;	Feedback not in real time				
16	7/18/24 18:31:59	7/18/24 18:35:43	ucabs48@ucl.ac.uk	Ying Huang		Yes		Markjdduncombe@gmail.com	Cytiva	Adults 18 - 35	Male	Windsurfing;	Was really fun . Good back workout	Could be good with vr	Disco elysium Tf2 Assassin's creed Counter strike TABS		
17	7/18/24 18:37:38	7/18/24 18:40:54	ucabc32@ucl.ac.uk	Victor Chan		Yes			HCVC	Adults 18 - 35	Female	Hang Gliding;	sometimes it's missing detection. sometimes some lagging of input. Field of vision is restricted at times.	For navigation, integration with google maps.			
18	7/18/24 18:42:02	7/18/24 18:44:55	ucabs48@ucl.ac.uk	Ying Huang		Yes		luchen.li.23@ucl.ac.uk	Ucl	Adults 18 - 35	Female	Windsurfing;	its really sensitive	touchless full body gaming	fall guys on laptop		
19	7/18/24 18:45:27	7/18/24 18:47:56	ucabs48@ucl.ac.uk	Ying Huang		No	Polly Van Alstyne	P.vanalstyne@ucl.ac.uk	Ucl	Adult 35 - 69	Female	Multi touch ;					
20	7/18/24 18:48:33	7/18/24 18:52:34	ucabc32@ucl.ac.uk	Victor Chan		No	dave hayden	dave.hayden@cytiva.com	Cuties	Adult 35 - 69	Male	Hang Gliding;	Enjoyable. Need to spend a little time learning. Some people might struggle with using arms up.	For disabled children too.			
21	7/18/24 18:49:45	7/18/24 18:58:27	ucabs48@ucl.ac.uk	Ying Huang		No	Emma Price	Emma.price@ucl.ac.uk	UCL	Adult 35 - 69	Female	Multitouch ;	Multitouch programme - was interactive and engaging				
22	7/18/24 18:52:36	7/18/24 19:01:21	ucabc32@ucl.ac.uk	Victor Chan		Yes			UCL	Adults 18 - 35	Female	Hang Gliding;	very good.	integrated in one window instead of two	Jurassic Park, world of warcraft on pc Monopoly on switch It takes two on pc		
23	7/18/24 19:01:35	7/18/24 19:03:30	ucabs48@ucl.ac.uk	Ying Huang		Yes				Adults 18 - 35	Female	Windsurfing;	Moving forward effect is tooooo subtle, could have multiplayer, bigger input areas				
24	7/18/24 19:22:33	7/18/24 19:26:08	ucabc32@ucl.ac.uk	Victor Chan		No	Yan Zhuang	yan.zhuang.17@ucl.ac.uk	UCL, IOE	Adults 18 - 35	Female	Hang Gliding;	Whole experience is nice. Tell user how to place the neutral position.	Driving simulation	Mario kart on switch		
25	7/18/24 19:44:26	7/18/24 19:44:53	ucabyyc@ucl.ac.uk	Yucong Cai		Yes				Adult 35 - 69	Female	Boxing;	Good design. Improve punching feedbacks				
26	7/19/24 10:15:25	7/19/24 10:17:24	zcabdk0@ucl.ac.uk	Danila Kozlov		Yes				Young children < 6	Male	Windsurfing;Volleyball;	I really liked the game, in the future can be used in daily life	Can be more sensitive and detect more		DK for a guest	Friends
27	7/19/24 10:14:56	7/19/24 10:17:49	ucabhgo@ucl.ac.uk	Matthew Goh		No				children 6 - 12	Male	Swimming;	Good, don't have to touch anything	More stuff in the sea, more movements available, shows the person swimming and not just moving	Minecraft, FIFA on Nintendo	Dhruv	
28	7/19/24 10:17:54	7/19/24 10:18:37	zcabdk0@ucl.ac.uk	Danila Kozlov		Yes				children 6 - 12	Male	Volleyball;Windsurfing;	I liked it a lot		Angry birds	DK for guest	
29	7/19/24 10:18:00	7/19/24 10:24:09	ucabhgo@ucl.ac.uk	Matthew Goh		Yes				children 6 - 12	Male	Swimming;	Quite nice, can just swim around with hands. But something more interactive would be nice. Moderately easy to control, could maybe use one arm and twist it to swim.		Robots, Fortnite Mobile and PC	Augustine Kwon	
30	7/19/24 10:16:56	7/19/24 10:24:46	ucabhcp@ucl.ac.uk	Viviann Zhao		Yes				teenagers 13 - 18	Male	Boxing;					
31	7/19/24 10:18:39	7/19/24 10:25:21	zcabdk0@ucl.ac.uk	Danila Kozlov		Yes				children 6 - 12	Male	Swimming;	Yeah it's good	Controls are quite difficult	Redox and Fortnite	DK	
32	7/19/24 10:24:12	7/19/24 10:26:16	ucabhgo@ucl.ac.uk	Matthew Goh		Yes				children 6 - 12	Male	Swimming;	Quite good, able to use hands to move around, nice graphics	Controls could be more sensitive, not that easy to move	Xbox and Minecraft	Finn	
33	7/19/24 10:25:12	7/19/24 10:27:52	ucabyyc@ucl.ac.uk	Yucong Cai		Yes				teenagers 13 - 18	Male	Boxing;			Fifa		PE classes
34	7/19/24 10:28:44	7/19/24 10:28:54	ucabhgo@ucl.ac.uk	Matthew Goh		Yes				children 6 - 12	Male	Swimming;	Really cool how sensors are used to move, really detailed graphics	Some movements weren't working, could be more clear.	Football, Mario Kart on Nintendo Switch	Eashan	
35	7/19/24 10:27:59	7/19/24 10:29:03	ucabyyc@ucl.ac.uk	Yucong Cai		Yes				children 6 - 12	Male	Boxing;	Very good game could use more instruction				Experiments in physics lessons
36	7/19/24 10:15:01	7/19/24 10:29:26	ucaboay@ucl.ac.uk	Oluwaseun Ayegbusi		No	Julia Kwon	ninja.home.ed@gmail.com	Home Education	children 6 - 12	Female	Swimming;Boxing;				Mum	
37	7/19/24 10:29:09	7/19/24 10:29:48	ucabyyc@ucl.ac.uk	Yucong Cai		Yes				children 6 - 12	Male	Boxing;	Good			YC	
38	7/19/24 10:29:07	7/19/24 10:33:22	ucabhgo@ucl.ac.uk	Matthew Goh		Yes				children 6 - 12	Female	Swimming;	Good, very interactive and realistic especially above water	Need to sense the movements better Could be more like Wii		Mysa	Could make simulations about specific time periods
39	7/19/24 10:33:24	7/19/24 10:35:41	ucabhgo@ucl.ac.uk	Matthew Goh		Yes				children 6 - 12	Male	Swimming;	Interesting	Sense the movements better		Matthew	
40	7/19/24 10:35:43	7/19/24 10:38:36	ucabhgo@ucl.ac.uk	Matthew Goh		Yes				children 6 - 12	Female	Swimming;	Interesting and fun, the plants in the sea were good	Camera screen can be bigger, could be easier to move		Monica	
41	7/19/24 10:37:23	7/19/24 10:39:04	ucaboay@ucl.ac.uk	Oluwaseun Ayegbusi		Yes		349219404@qq.com	School	children 6 - 12	Female	Swimming;	Amazing	Don't yet			
42	7/19/24 10:40:38	7/19/24 10:40:48	zcabdk0@ucl.ac.uk	Danila Kozlov		No				teenagers 13 - 18	Male	Angry birds;	It's really cool	Really hard to control	Don't really play	DK	
43	7/19/24 10:38:42	7/19/24 10:41:39	ucabhgo@ucl.ac.uk	Matthew Goh		Yes				children 6 - 12	Female	Swimming;	Liked it, no use of hands		Nintendo Switch		
44	7/19/24 10:40:50	7/19/24 10:42:05	zcabdk0@ucl.ac.uk	Danila Kozlov		Yes				teenagers 13 - 18	Female	Angry birds;	I really liked it	Not really	Don't play video games	DK	
45	7/19/24 10:41:53	7/19/24 10:43:20	ucabyyc@ucl.ac.uk	Yucong Cai		Yes				children 6 - 12	Female	Hang Gliding;Fencing;	Very good games, the hang gliding motion input could have more instructions			YC	Can be used for flying simulators, classes where students want to see things virtually
46	7/19/24 10:42:07	7/19/24 10:44:13	zcabdk0@ucl.ac.uk	Danila Kozlov		Yes				teenagers 13 - 18	Female	Angry birds;	I really liked	Incredibly hard to control	Don't really play	DK	In art or Design, PE for sports (group answer)
47	7/19/24 10:42:37	7/19/24 10:44:18	ucabs48@ucl.ac.uk	Ying Huang		No	Judy			Adults 18 - 35	Female	Windsurfing;	Nice				
48	7/19/24 10:44:21	7/19/24 10:45:10	zcabdk0@ucl.ac.uk	Danila Kozlov		Yes				teenagers 13 - 18	Female	Angry birds;	Quite liked it	Better controls, should be easier to learn	No	DK	Yes! For PE lessons to exercise or for design/art to design things
49	7/19/24 10:45:13	7/19/24 10:50:59	zcabdk0@ucl.ac.uk	Danila Kozlov		Yes				teenagers 13 - 18	Female	Angry birds;	It could be really nice	But the technology didn't really work for me, the white box kept resizing	N/A	DK	
50	7/19/24 10:41:44	7/19/24 10:51:08	ucabhgo@ucl.ac.uk	Matthew Goh		Yes				Adult 35 - 69	Female	Swimming;	Nice, like swimming	Difficult to move			

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51	7/19/24 10:51:09	7/19/24 10:52:29	ucabhgo@ucl.ac.uk	Matthew Goh		Yes				teenagers 13 - 18	Female	Swimming;	Good concept, nice graphics	Picking up the hand movements could be better Could have more things under the sea		Mayan	
52	7/19/24 10:52:32	7/19/24 10:54:21	ucabhgo@ucl.ac.uk	Matthew Goh		Yes				children 6 - 12	Female	Swimming;	Quite good in how it works	Sometimes glitched Could have more things in the environment, could go down further		Alli	
53	7/19/24 10:38:23	7/19/24 10:55:04	ucabhgo@ucl.ac.uk	Viviann Zhao		Yes				children 6 - 12	Male	Boxing;	The recognition was not accurate and reflected at the same time	Gun games		Richard	
54	7/19/24 10:54:28	7/19/24 11:02:27	ucabhgo@ucl.ac.uk	Matthew Goh		Yes				teenagers 13 - 18	Female	Swimming;	Pretty cool to see movements reflected in game, quite easy to control	Need a goal or objective		Olivia	
55	7/19/24 10:56:01	7/19/24 11:02:50	ucabte4@ucl.ac.uk	Ying Huang		Yes		ehou.edward@hotmail.com		teenagers 13 - 18	Male	Windsurfing;	Good	Game	Genshin impact on ps5 Pokémon on switch	Edward	Studying
56	7/19/24 11:02:54	7/19/24 11:03:48	ucabte4@ucl.ac.uk	Ying Huang		No				teenagers 13 - 18	Female	Windsurfing;	Good		No		Shencheng foreign language school
57	7/19/24 11:02:34	7/19/24 11:06:03	ucabhgo@ucl.ac.uk	Matthew Goh		Yes				Adults 18 - 35	Female	Swimming;	Interesting, gestures can move the player	Could have more animals and other stuff in the sea		Chen Hang	
58	7/19/24 10:55:06	7/19/24 11:08:47	ucabvyc@ucl.ac.uk	Viviann Zhao		Yes				children 6 - 12	Male	Windsurfing;	The motion cannot be captured fast and the moving was too slow	The computer should scan the whole background not just one person			
59	7/19/24 11:08:52	7/19/24 11:09:46	ucabvyc@ucl.ac.uk	Yucong Cai		Yes				children 6 - 12	Female	Windsurfing;	Good game love the control	Could be used in cars and driving		YC	Could be used for students to take exams, move their heads to tick boxes etc
60	7/19/24 11:09:19	7/19/24 11:11:44	ucabhgo@ucl.ac.uk	Viviann Zhao		Yes		Irfanullah.contactel@gmail.com	Buxton school	teenagers 13 - 18	Male	Angry birds;	We used our hands, they were tracked to move the mouse.	It would be nice to see it used more in other games.	I prefer pc, games like undertale or angry bird.	Irfan Ullah	Maybe for answering questions on the board.
61	7/19/24 11:05:38	7/19/24 11:11:50	ucabte4@ucl.ac.uk	Ying Huang		Yes		anacepeng2136@gmail.com	Birkbeck	Adult 35 - 69	Female	Windsurfing;	interesting		none	Grace	Hyflex teaching
62	7/19/24 11:11:47	7/19/24 11:14:30	ucabhgo@ucl.ac.uk	Viviann Zhao		Yes				children 6 - 12	Male	Angry birds;	Good	More challenging game		Stanley	
63	7/19/24 11:06:04	7/19/24 11:14:48	ucabhgo@ucl.ac.uk	Matthew Goh		Yes				Adults 18 - 35	Male	Swimming;	Fun, liked how interactive it is and the pretty graphics	More different possible actions, like up and down Other games that are more realistic Could even use goggles to make it feel immersive			
64	7/19/24 11:14:49	7/19/24 11:18:15	ucabhgo@ucl.ac.uk	Matthew Goh		Yes				teenagers 13 - 18	Male	Swimming;	Really cool but didn't really work when moving forward Need to move up and down, not just forward and back		Nintendo Switch	Shay	
65	7/19/24 11:16:03	7/19/24 11:18:26	ucabel1@ucl.ac.uk	Peter Ling		No	Kavitha Soundararajan (Mum) Oscar			children 6 - 12	Male	Angry birds ;		Make the AOI whole camera		Peter	
66	7/19/24 11:15:41	7/19/24 11:19:22	ucabte4@ucl.ac.uk	Ying Huang		Yes		Felixhan2009@gmail.com	Parent	children 6 - 12	Female	Windsurfing;Swimming;	Get the children understand a bit of computer science.	How to react with human	Windsurfing, swimming	Parent	
67	7/19/24 11:14:36	7/19/24 11:24:26	ucabhgo@ucl.ac.uk	Viviann Zhao		Yes				children 6 - 12	Male	Angry birds ;	The capture of releasing was not very exact and it is very easy to overact	The capturing gesture was too tricky for the mouse that it must me specific angle			
68	7/19/24 11:30:17	7/19/24 11:30:23	ucabhgo@ucl.ac.uk	Matthew Goh		Yes				children 6 - 12	Male	Volleyball;	Quite realistic, interesting Different to grasp the controls				
69	7/19/24 11:25:16	7/19/24 11:30:29	ucabhgo@ucl.ac.uk	Viviann Zhao		Yes				children 6 - 12	Male	Angry birds;	Generally nice	The mouse was somehow too overactive. When I wanted it to move slowly, it moved fast and when I wanted to stay it moved slowly.			
70	7/19/24 11:27:56	7/19/24 11:30:35	ucabdk0@ucl.ac.uk	Danila Kozlov		Yes				teenagers 13 - 18	Male	Angry birds;	Really innovative and interesting as well as exciting way to explore games in a new way, but would not use day to day	It should be at a larger scale and better control	Switch games (Super smash bros, Zelda)	DK	Could be more appealing way to learn!
71	7/19/24 11:20:30	7/19/24 11:31:26	ucabkcu@ucl.ac.uk	Cui Eric		Yes		agalva1@hotmail.com	ucs hampstad	children 6 - 12	Male	Swimming;	fun	crazy games friv	crazy games friv	mehran	na
72	7/19/24 11:30:27	7/19/24 11:31:37	ucabnmn@ucl.ac.uk	Nondumiso Mndzebele		Yes				children 6 - 12	Male	Swimming;	Set in water, actions making it fun to play around,	A treasure hunt, prize			
73	7/19/24 11:30:24	7/19/24 11:33:50	ucabhgo@ucl.ac.uk	Matthew Goh		Yes				children 6 - 12	Male	Volleyball;	Creative, nice environment Difficult to control with wrist, maybe with a VR headset				
74	7/19/24 11:34:08	7/19/24 11:37:16	ucabte4@ucl.ac.uk	Ying Huang		Yes				children 6 - 12	Female	Windsurfing;	It was really fun	Maybe more power ups and also more things that could also de crease your score			I could yes
75	7/19/24 11:33:47	7/19/24 11:37:20	ucabdk0@ucl.ac.uk	Danila Kozlov		No	Duncan Young	d.bloomyoung@qeaschool.org.uk	Queen Elizabeth's Girls' School	Adult 35 - 69	Male	Angry Birds;	Angry Birds	Multiplayer	The in a line games	Duncan Young	Accessibility for classroom
76	7/19/24 11:34:00	7/19/24 11:38:10	ucabhgo@ucl.ac.uk	Viviann Zhao		Yes				children 6 - 12	Male	angry birds;	The mouse cannot stay at one place for a long time. When it was hold for some time, it automatically double clicked and caused some problems in Angry birds				
77	7/19/24 11:37:36	7/19/24 11:38:31	ucabnmn@ucl.ac.uk	Nondumiso Mndzebele		No					Female	Swimming;	Graphics	More subtle movement to movers freely			
78	7/19/24 11:32:44	7/19/24 11:38:36	ucabkcu@ucl.ac.uk	Cui Eric		Yes			The American School of London	teenagers 13 - 18	Male	Swimming;	The system is cool and funny. Need more functions like turning around, etc.	legend of zelda	Legend of zelda	Josiah	
79	7/19/24 11:40:11	7/19/24 11:41:31	ucabel1@ucl.ac.uk	Peter Ling		Yes				Adult 35 - 69	Female	Swimming;	Amazing	Eyetracking	Minecraft	Peter	
80	7/19/24 11:41:33	7/19/24 11:42:59	ucabel1@ucl.ac.uk	Peter Ling		Yes				teenagers 13 - 18	Male	Swimming;	Great progress over the years	More accessible for people around the world	COD CSGO	Peter	
81	7/19/24 11:43:04	7/19/24 11:43:11	ucabhgo@ucl.ac.uk	Viviann Zhao		Yes				children 6 - 12	Female	Angry birds;	Hard to control the mouse				
82	7/19/24 11:34:10	7/19/24 11:44:36	ucabhgo@ucl.ac.uk	Matthew Goh		Yes		anthuse@gmail.com		Adults 18 - 35	Male	Volleyball;	Liked the creativity, easy to learn A bit hard to control at first		FPS games		
83	7/19/24 11:38:42	7/19/24 11:44:56	ucabkcu@ucl.ac.uk	Cui Eric		Yes			Wimbledon high	children 6 - 12	Female	Swimming;Windsurfing; Angry birds;	Game is cool, the system is very interested. More objectives should be set to make the games more funny.	Mario Party			
84	7/19/24 11:45:16	7/19/24 11:47:07	ucabel1@ucl.ac.uk	Peter Ling		Yes				teenagers 13 - 18	Male	Angry birds;	Very accurate tracking	Some kind of fail safe for releasing the click (make it harder to accidentally unclick)	Subway surfers	Peter	
85	7/19/24 11:44:40	7/19/24 11:47:47	ucabhgo@ucl.ac.uk	Matthew Goh		Yes				teenagers 13 - 18	Male	Boxing;	Seems really fun Didn't understand the yellow circle at the top Camera just needs to be adjusted				Using motion controlled apps in class to teach basic things like matching colours to shapes
86	7/19/24 11:43:57	7/19/24 11:48:36	ucabnmn@ucl.ac.uk	Nondumiso Mndzebele		Yes						Swimming;	Cool, the water features	Stiff, fish, sharks			
87	7/19/24 11:43:12	7/19/24 11:51:37	ucabhgo@ucl.ac.uk	Viviann Zhao		Yes				children 6 - 12	Female	Angry birds;	Very cool! And some skills needed for mouse control	The current capture is somehow linear in practical. I hope it got more directions in capturing.		Bella	
88	7/19/24 11:48:07	7/19/24 11:51:44	ucabte4@ucl.ac.uk	Ying Huang		Yes				Adult 35 - 69	Female	Windsurfing;	Easy to play, responsive		Windsurfing	Sz	
89	7/19/24 11:54:27	7/19/24 11:54:33	ucabdk0@ucl.ac.uk	Danila Kozlov		Yes				children 6 - 12	Female	Angry Birds;	Harder than normal, but I don't normal play	The box could bigger	Nitebdo games	DK	Computer class, chorus, classes that are not as fun
90	7/19/24 11:48:44	7/19/24 11:55:08	ucabnmn@ucl.ac.uk	Nondumiso Mndzebele		No				children 6 - 12		Swimming;	Smartness to know the motions				
91	7/19/24 11:55:10	7/19/24 11:55:58	ucabnmn@ucl.ac.uk	Nondumiso Mndzebele		No				children 6 - 12		Swimming;	The hand motions				
92	7/19/24 11:54:34	7/19/24 11:56:58	ucabdk0@ucl.ac.uk	Danila Kozlov		Yes				Young children < 6	Male	Angry Birds;	Really liked it	N/A	N/A	DK	
93	7/19/24 11:28:44	7/19/24 11:57:04	ucabyyc@ucl.ac.uk	Yucong Cai		Yes				children 6 - 12	Male	Boxing;	Can add a human target or opponent to hit		Minecraft	YC	Can be used in school video game club for minecraft
94	7/19/24 11:57:05	7/19/24 11:57:44	ucabyyc@ucl.ac.uk	Yucong Cai		Yes				Adults 18 - 35	Female	Boxing;	Very good game a bit too fast, could have more instructions			YC	
95	7/19/24 11:58:09	7/19/24 11:59:09	ucabnmn@ucl.ac.uk	Nondumiso Mndzebele		Yes				children 6 - 12		Swimming;	Simplicity	Detecting who's actually playing the game , have a green screen behind player			
96	7/19/24 11:47:51	7/19/24 12:02:11	ucabhgo@ucl.ac.uk	Matthew Goh		Yes				teenagers 13 - 18	Male	Volleyball;	Fun, like how you can use your hands Graphics were good	A bit hard to control at first			
97	7/19/24 12:03:13	7/19/24 12:04:04	ucabnmn@ucl.ac.uk	Nondumiso Mndzebele		No				children 6 - 12		Swimming;	Aesthetics are nice,	Detection, more underwater Features			
98	7/19/24 11:51:53	7/19/24 12:04:09	ucabte4@ucl.ac.uk	Ying Huang		Yes		Jeanhsiangsarie@gmail.com	-	teenagers 13 - 18	Female	Windsurfing;	Funl	-	-	Jean Tsang	-
99	7/19/24 11:57:00	7/19/24 12:09:29	ucabdk0@ucl.ac.uk	Danila Kozlov		Yes				Young children < 6	Female	Angry Birds;	Really good	Faster		DK	Would be fun
100	7/19/24 11:53:19	7/19/24 12:10:01	ucabhgo@ucl.ac.uk	Viviann Zhao		Yes				children 6 - 12	Female	Angry birds ;	Love it			Lora	
101	7/19/24 12:09:30	7/19/24 12:10:30	ucabdk0@ucl.ac.uk	Danila Kozlov		Yes				children 6 - 12	Female	Angry birds;	Fun	Good		DK	Would be really nice!
102	7/19/24 12:10:31	7/19/24 12:14:14	ucabdk0@ucl.ac.uk	Danila Kozlov		Yes				teenagers 13 - 18	Male	Angry Birds;	Nice	Camera could be more stable, hard to aim	Warthunder	DK	Would be nice to use in school, but I am not sure if it would be better than using a normal keyboard
103	7/19/24 12:11:21	7/19/24 12:14:32	ucabhgo@ucl.ac.uk	Viviann Zhao		Yes				teenagers 13 - 18	Male	Angry birds;	It is different from other games				
104	7/19/24 12:14:33	7/19/24 12:16:13	ucabhgo@ucl.ac.uk	Viviann Zhao		Yes				children 6 - 12	Male	Angry birds ;	Like it				Uten

105	7/19/24 12:12:18	7/19/24 12:16:47	ucabes8@ucl.ac.uk	Ying Huang		Yes				children 6 - 12	Female	Windsurfing;	The circles are a bit too far apart, so I have to really lean to turn. But otherwise, it's amazing					
106	7/19/24 12:13:50	7/19/24 12:17:23	ucabhgo@ucl.ac.uk	Hristijan Bosilkovski		Yes				children 6 - 12		Angry Birds;	Accesible for everyone	More exhibits, spreading the word		Minecraft, Mario		Hristijan B	
107	7/19/24 12:14:49	7/19/24 12:17:53	ucabnmm@ucl.ac.uk	Nondumiso Mndzebele		Yes				children 6 - 12	Female	Swimming;	The trees and the ocean and the features e.g. corals,	Smoother motions, less stiff				NM	
108	7/19/24 12:02:16	7/19/24 12:20:40	ucabhgo@ucl.ac.uk	Matthew Goh		Yes				teenagers 13 - 18	Male	Volleyball;	Quite fun, nice graphics and environment Controls need a bit of time to learn						
109	7/19/24 12:17:02	7/19/24 12:21:03	ucabyyc@ucl.ac.uk	Yucong Cai		No	Luis Calde	Lcaldelli@icloud.com)	Willowfield school	teenagers 13 - 18	Male	Boxing;	Boxing control is a bit laggy but overall good design.					Luis	Used for teachers to show things on whiteboard
110	7/19/24 12:24:07	7/19/24 12:24:12	ucabsay@ucl.ac.uk	Oluwaseun Ayegbusi		Yes			Centrica	Adult 35 - 69	Female	Swimming;	Amazing use of tech so impressed with the comp sci students and their achievement	Accessibility- in all spheres				Sarah Jafri	
111	7/19/24 12:16:16	7/19/24 12:26:43	ucabhgo@ucl.ac.uk	Viviann Zhao		No	Dominique Sleet	Dominique.sleet@learng.org.uk	Royal academy of engineering	Adult 35 - 69	Female	Not yet;	Impressive	More applications in daily life					
112	7/19/24 12:21:08	7/19/24 12:26:45	ucabdk0@ucl.ac.uk	Danila Kozlov		Yes				children 6 - 12	Male	Angry Birds;	I liked it, it's so much better, it's nice to have a different experience! So exiting	Everything was great		Super Mario, Minecraft		DK	Would be so fun, computering!
113	7/19/24 12:27:15	7/19/24 12:28:45	ucabdk0@ucl.ac.uk	Danila Kozlov		Yes				children 6 - 12	Male	Angry Birds;	I really liked, a little more fun, wouldn't play on the daily	Not really		Ninja Master, Fortnite		DK	Would be fun to have in school, in art!
114	7/19/24 12:24:13	7/19/24 12:29:08	ucabsay@ucl.ac.uk	Oluwaseun Ayegbusi		Yes		7vzqmrw1@ucl.ac.uk	UCL students	Adults 18 - 35	Female	Hang Gliding;	The guest detection take some times, it's a little hard to control with big movements. And the program take more time than expected to give control feedback. But overall it is super fun	It could be used as a new way to play with video games! Like a cheaper VR? Could be applied on some games on Switches to remove the extra equipment(but may need a bit of improvement at current stage since the detection and effect take too many time	Angry birds, I only played this one			Rui	It's more likely for entertainment
115	7/19/24 11:45:04	7/19/24 12:35:37	ucabkoz@ucl.ac.uk	Cui Eric		No	Humayrah		Home school	children 6 - 12	Female	Angry birds;	Scorch	no		no			
116	7/19/24 12:36:59	7/19/24 12:37:02	ucabhgo@ucl.ac.uk	Matthew Goh		Yes				children 6 - 12	Male	Hang Gliding;	Using hands and flying was nice, visuals were good Need a bit of time to get the hang of the controls, crashing was frustrating						
117	7/19/24 12:50:57	7/19/24 12:53:43	ucabdk0@ucl.ac.uk	Danila Kozlov		No	Parish Valand Moushmi Valand	avuthvaland@gmail.com		teenagers 13 - 18	Male	Jetpack;	Really fun and interactive	More action games		FIFA ps5 Fall guys ps5		DK	Yes and could he be a playtester
118	7/19/24 12:37:03	7/19/24 12:55:05	ucabhgo@ucl.ac.uk	Matthew Goh		Yes				teenagers 13 - 18	Female	Volleyball;Boxing;	Not easy to control with motioninput and detect movements - not user-friendly for new players						
119	7/19/24 12:58:50	7/19/24 12:58:55	ucabdk0@ucl.ac.uk	Danila Kozlov		Yes				children 6 - 12	Male	Jetpack;	Very smooth, worked quite well	Not really		Shooters		DK	Would be really nice to use in CS class
120	7/19/24 12:54:39	7/19/24 13:00:38	ucabyyc@ucl.ac.uk	Yucong Cai		Yes			Home schooling	children 6 - 12	Male	Boxing;	Good game, control needs more introduction , hard to see what the player should do or is doing					YC	Can be combined with AI online tutors for lessons
121	7/19/24 12:58:57	7/19/24 13:00:40	ucabdk0@ucl.ac.uk	Danila Kozlov		Yes				children 6 - 12	Female	Jetpack;	It was good, but i don't like games	Not		Doesn't like games		DK	Would love to use in school
122	7/19/24 12:58:11	7/19/24 13:00:46	ucabnmm@ucl.ac.uk	Nondumiso Mndzebele		No	N/A	N/A	N/A	children 6 - 12	Male	Boxing;	Controls were effective once one was able to understand the game.	Larger sensors to accommodate for people with different heights.		N/A		NM	N/A
123	7/19/24 13:03:05	7/19/24 13:04:37	ucabhgo@ucl.ac.uk	Hristijan Bosilkovski		Yes				children 6 - 12	Male	Angry Birds;Boxing;	Liked pinching controls	Problems with sensitivity		Minecraft		Hristijan B	
124	7/19/24 13:00:42	7/19/24 13:05:10	ucabdk0@ucl.ac.uk	Danila Kozlov		Yes		Christine.smith@stmo.ac.uk	Merton College	teenagers 13 - 18	Female	Windsurfing;	Didn't get to play					DK	Used in SEND schools for interactive lessons
125	7/19/24 13:01:59	7/19/24 13:06:00	ucabyyc@ucl.ac.uk	Yucong Cai		Yes				children 6 - 12	Male	Jetpack joride ;	Really fun, smooth			Minecraft Roblox Fortnite Pokémon scarlet Pokémon unite		YC	Edutional games
126	7/19/24 13:01:08	7/19/24 13:08:58	ucabnmm@ucl.ac.uk	Nondumiso Mndzebele		Yes		N/A	Home schooled	children 6 - 12	Male	Windsurfing;Fencing;Boxing;	Easy - fencing. The simplicity of the game makes it fun.	Better and easier motions for volleyball e.g., just moving left and right instead of backwards		N/A		NM	N/A
127	7/19/24 13:02:16	7/19/24 13:09:05	ucabhgo@ucl.ac.uk	Matthew Goh		Yes				teenagers 13 - 18	Male	Boxing;	Using hands instead of mouse was good Confused about how to control the game at first						
128	7/19/24 13:13:31	7/19/24 13:13:34	ucabhgo@ucl.ac.uk	Viviann Zhao		Yes				Adult 35 - 69	Female	angry birds;	amazing	Video games seem to be next step for motion capturing in games. Also it would be quite nice to apply in home like curtain controllers				cathy goyton	
129	7/19/24 13:13:35	7/19/24 13:18:36	ucabhgo@ucl.ac.uk	Viviann Zhao		No	Alex Donald	k_donald@2004@yahoo.co.uk		teenagers 13 - 18	Male	Angry birds;	A little bit hard. Background noise is affecting. Recognition of the valuable movement to pick up.	Navigating menus				Alex	
130	7/19/24 13:05:13	7/19/24 13:19:30	ucabdk0@ucl.ac.uk	Danila Kozlov		Yes			St Mary's colchester	teenagers 13 - 18	Female	Fruit ninja;	It was a good idea but a bit confusing to use	To make it more easier to use		Subnautica, proteus, Minecraft, all xbox		..	..
131	7/19/24 13:18:38	7/19/24 13:26:33	ucabhgo@ucl.ac.uk	Viviann Zhao		Yes				Adult 35 - 69	Female	Angry birds;	Very impressive.	If this can be applied in writing, for example, children writing in the air, that would be very helpful and clean and even memorable sometime					
132	7/19/24 13:09:13	7/19/24 13:30:05	ucabhgo@ucl.ac.uk	Matthew Goh		Yes				children 6 - 12	Female	Volleyball;	Fun to play, control without hands, nice interface Motion sensing not sensitive enough						
133	7/19/24 13:30:08	7/19/24 13:30:16	ucabsay@ucl.ac.uk	Oluwaseun Ayegbusi		Yes			Avenue house	children 6 - 12	Male	Fruit slice ;	It was good fun						ICT, online learning at school.
134	7/19/24 13:26:35	7/19/24 13:33:43	anonymous			No	Zaki Barnsdale, Alice Barnsdale (mother)	aclbarnsdale@gmail.com		children 6 - 12	Male	Windsurfing;	Raise hand to type - test Zaki is partially sighted						
135	7/19/24 13:30:18	7/19/24 13:38:12	anonymous			Yes		1702178@ss.wre.uk	School	teenagers 13 - 18	Male	Fruit slash;	Hand tracker	Video games		Brawl stars, phone FIFA, Xbox Minecraft,xbox		Leo	Presentations, educational games
136	7/19/24 13:35:12	7/19/24 13:39:28	anonymous			No	N/A	N/A	St Paul's School	teenagers 13 - 18	Male	Hang Gliding;	Robust and highly enjoyable	Clearer recognition of movements would be appreciated		N/A		NM	Physical education games to make them more entertaining and engaging
137	7/19/24 13:35:12	7/19/24 13:48:43	anonymous			Yes		hakecrow@hotmail.co.uk	Individual	Adult 35 - 69	Female	Fruit ninja;	It was ok My kids didn't seem too enthusiastic but the idea of using their hands was school			They like the joyride game		DK	
138	7/19/24 13:30:07	7/19/24 13:51:03	anonymous			Yes		andbolcar@gmail.com		Adults 18 - 35	Male	Volleyball;	Delay between movement and action in game Simple enough Not the best quality visuals (not high resolution)	Minecraft type games where you can interact with the world		FIFA, Minecraft			
139	7/19/24 13:29:03	7/19/24 13:54:11	anonymous			Yes		ilsarc13@gmail.com		teenagers 13 - 18	Male	Windsurfing;	???although I thought ?? player character moved too slow						
140	7/19/24 13:51:04	7/19/24 13:57:25	anonymous			Yes				children 6 - 12	Female	Volleyball;	Liked the use of the camera for motion controls Hard to control the game, takes time to learn						
141	7/19/24 14:44:50	7/19/24 14:47:18	anonymous			Yes				Adult 35 - 69	Male	Boxing;	Overall good design, having to look in both the game screen and motioninput screen is distracting.	In driving and medicine applications				YC	
142	7/19/24 14:39:02	7/19/24 14:50:37	anonymous			No	Ivo Lazarov	ivocreate@gmail.com	Digitas, senior creative	Adults 18 - 35	Male	Angry Birds;	Controls feel really smooth and an unique way to play	Seeing how it would work in a competitive game environment					
143	7/19/24 13:57:27	7/19/24 14:52:00	anonymous			Yes				children 6 - 12	Male	Volleyball;	Easy to move but hard to hit the ball in the controls						
144	7/19/24 14:52:01	7/19/24 14:56:22	anonymous			Yes				teenagers 13 - 18	Female	Windsurfing;Volleyball;	Fun, amusing - physically control the game Didn't really understand volleyball without someone giving instructions						
145	7/19/24 14:56:23	7/19/24 15:01:26	anonymous			Yes				teenagers 13 - 18	Female	Windsurfing;	Good that it was sensitive to movement, very fun						
146	7/19/24 15:06:13	7/19/24 15:13:35	anonymous			Yes				Adult 35 - 69	Female	Volleyball;	Ball hitting looks nice and the game is fun, but it was too hard to control the movement with motioninput						
147	7/19/24 15:07:59	7/19/24 15:15:15	anonymous			Yes		evawisbe@live.co		Adult 35 - 69	Female	Boxing;Windsurfing;	Boxing fist can be bigger.	Swimming, Fencing		Palworld on steam , Pokémon go on iPhone iPads , brawl stars on iPhones and iPads , Minecraft on iPad,		Eva	
148	7/19/24 15:13:37	7/19/24 15:25:49	anonymous			Yes				children 6 - 12	Male	Windsurfing;Hang Gliding;	Hang gliding - difficult to move sideways Windsurfing - doesn't look like it's moving forward						
149	7/19/24 15:27:14	7/19/24 15:29:01	anonymous			Yes			avenues, scientist	Adults 18 - 35	Female	Hang Gliding;	fun concept, a bit like the old wii sport games, graphics were quite nice too! broke down when more people entered the camera view though :(						
150	7/19/24 15:26:50	7/19/24 15:29:23	anonymous			Yes				teenagers 13 - 18	Male	Boxing;Jetpack Joyride;	I played Boxing and Jetpack Joyride and it was fantastic because I was able to control the game with hand motion!	Perhaps add more motion controls for more interactions like jumping.				Mel	
151	7/19/24 15:25:50	7/19/24 15:33:04	anonymous			Yes				children 6 - 12	Female	Volleyball;	Game looks nice, but hard to control, especially when you have to move and coordinate both hands						
152	7/19/24 15:07:56	7/19/24 15:42:26	anonymous			Yes				children 6 - 12	Female	Boxing;	Can be more intense					YC	Can be used to teach children to organize things

153	7/19/24 15:45:08	7/19/24 15:50:26	anonymous			Yes			Family	children 6 - 12	Male	Hang Gliding;	Like: menu for direction Doesn't detect when hands outside the frame	Control without the hands	Minecraft on switch mario kart on switch chess fifa on switch	Victor	
154	7/19/24 14:13:38	7/19/24 15:59:33	anonymous			Yes				children 6 - 12	Female	Windsurfing;	Good fun		Hay day		
155	7/19/24 13:48:45	7/19/24 16:00:19	anonymous			Yes		Yahassim@gmail.com	University of Extremadura	Adult 35 - 69	Male	Angry birds;	Amazing ??		Minecraft	Pedro	Definitely
156	7/19/24 16:00:23	7/19/24 16:07:20	anonymous			No	Isabel	Pamelkvdge@icloud.com		children 6 - 12	Female	-;					
157	7/19/24 15:50:28	7/19/24 16:10:33	anonymous			Yes			Family	Young children < 6	Male	Hang Gliding;	control not sensitive enough. More items to catch. A system to go back when off the edge.		Wii sports	Victor	
158	7/19/24 15:33:06	7/19/24 16:20:26	anonymous			Yes				children 6 - 12	Male	Volleyball;	Nice that you can use hands to play, but movement detection was not sensitive enough, so hard to control the game				
159	7/19/24 16:00:24	7/19/24 16:21:13	anonymous			No	Hong Ling Dyer	enlyhong@yahoo.co.uk	SCS JV Infrastructure	Adult 35 - 69	Female	Windsurfing;	Excellent explanation by Professor Dean of the real world uses. Succinct and engaging.				
160	7/19/24 16:10:34	7/19/24 16:23:47	anonymous			Yes			Family	children 6 - 12	Female	Hang Gliding;	Very fun. Easy to understand how the movement works. Sometimes doesn't detect movement.		Mario Kart on switch Animal Crossing on switch Zelda on switch	Victor	
161	7/19/24 16:20:27	7/19/24 16:32:06	anonymous			Yes				Adult 35 - 69	Female	Volleyball;	Movement detection could be more fluid, there seemed to be a lag that made it hard to control				
162	7/19/24 16:32:07	7/19/24 16:32:41	anonymous			Yes				Young children < 6	Male	Volleyball;	Would be easier if the ball was hit directly to the player. Too hard to control.				
163	7/19/24 16:31:20	7/19/24 16:36:09	anonymous			No	Angela Defoe	adefoe@lau.camden.sch.uk	LA Sainte Union School	teenagers 13 - 18	Female	Angry Birds;	Potential savings of thousands of pounds for classroom use	Multiple body part recognition for voting etc		Hristijan B	
164	7/19/24 15:59:35	7/19/24 16:38:37	anonymous			Yes				teenagers 13 - 18	Female	Windsurfing;	It was fun	More games like tennis or basketball or swimming	Minecraft, among us, and that's all. iPhone:)	MISSISIPI	Homeschool
165	7/19/24 16:23:50	7/19/24 16:42:40	anonymous			Yes			Family	children 6 - 12	Male	Hang Gliding;	Hard to control, coordinate. Only use one hard to go up and down.		stadobat on pc Slither on pc	Victor	
166	7/19/24 16:42:41	7/19/24 16:44:38	anonymous			Yes			Family	children 6 - 12	Male	Hang Gliding;	control was okay. like collecting the coins,		Mario kart on switch minecraft on switch	Victor	
167	7/19/24 16:44:39	7/19/24 16:47:30	anonymous			Yes			Family	children 6 - 12	Male	Hang Gliding;	Hard to steer. Hard to go up anymore.		Slither	Victor	
168	7/19/24 16:49:17	7/19/24 16:50:05	anonymous			Yes				children 6 - 12	Male	Boxing;	Good game but bad control, can't hit the target.			YC	For exercises, PE classes
169	7/19/24 16:38:45	7/19/24 16:54:53	anonymous			Yes				children 6 - 12	Male	Windsurfing;	Good		Mine craft		
170	7/19/24 16:32:42	7/19/24 16:59:07	anonymous			Yes				children 6 - 12	Male	Volleyball;	Liked how you can use hands to control. Able to learn how to play quite quickly. But hard to control moving forward.				
171	7/20/24 9:58:55	7/20/24 10:06:52	anonymous			Yes			family	children 6 - 12	Female	Hang Gliding;Windsurfing;	HG: i don't really know Windsurfing: i don't know, i don't really know. generally easy to control.	surfing: add something to get forward	Sonic, mario party on switch	Victor	
172	7/20/24 10:20:17	7/20/24 10:22:01	anonymous			No	Simon Thompson	simon@expo.xyz		Adult 35 - 69	Male	Na;		Interest in workplace accessibility			
173	7/20/24 10:00:26	7/20/24 10:29:22	anonymous			Yes				Young children < 6	Male	Volleyball;	Couldn't really control the game due to too many people in the background whose hands were being detected				
174	7/20/24 10:22:05	7/20/24 10:34:25	anonymous			Yes		N/A	N/A	children 6 - 12	Male	Hang Gliding;Volleyball;	Technique - you don't have to touch anything, very interactive.	Background sensitivities e.g., volleyball features affected by people walking in the background	N/A	NM	N/A
175	7/20/24 10:34:28	7/20/24 10:36:41	anonymous			No	James	N/A	N/A	children 6 - 12	Male	Windsurfing;	Easy to play	Too easy to play. Would like some more movement features e.g., moving forward instead of side to side.	N/A	NM	N/A
176	7/20/24 10:37:46	7/20/24 10:39:06	anonymous			Yes			family	children 6 - 12	Male	Hang Gliding;	the game was so hard. the control, hard to hit the icon.			Victor	
177	7/20/24 10:29:23	7/20/24 10:39:42	anonymous			Yes				children 6 - 12	Female	Windsurfing;	Good, liked artwork, cool that they can move your body, stars looked very nice				
178	7/19/24 14:50:39	7/20/24 10:41:41	anonymous			Yes				teenagers 13 - 18	Male	Bubbles;	The mouse is quite active and the capturing window can adjust on time no matter how far the distance is from the camera	Sometimes jumping happens causing some instability			rafia
179	7/20/24 10:37:42	7/20/24 10:41:45	anonymous			Yes				children 6 - 12	Male	Bubble Blast;	Prefers over using screen	Would like to use it in school		HB	
180	7/20/24 10:39:44	7/20/24 10:42:29	anonymous			Yes				children 6 - 12	Male	Volleyball;	Motioninput wasn't working well, left wrist not always detected in right position. Slightly difficult for young children to grasp the required movements on the spot.				
181	7/20/24 10:39:07	7/20/24 10:43:08	anonymous			Yes			family	children 6 - 12	Male	Hang Gliding;	Hard to control, has to be too accurate to control. It's fun, creative, it gives a lot imagination	actual joystick is easier		Victor	
182	7/20/24 10:35:51	7/20/24 10:46:56	anonymous			Yes				teenagers 13 - 18	Male	Angry birds;	It was quite fun, and I didn't expect the clicking to work by using the index finger and thumb.	A system for resting the pointer to the middle of the game window because I found the movement with the hand a bit confusing at times.	Minecraft on pc		
183	7/20/24 10:41:43	7/20/24 10:48:00	anonymous			Yes				children 6 - 12	Male	Bubble game;	Very fun			James	
184	7/20/24 10:46:59	7/20/24 10:51:02	anonymous			Yes			Chislehurst and Sidcup Grammar school	teenagers 13 - 18	Male	Angry Birds;	I think it was impressive how micro the movements needed to be to actually move the cursor	Be able to play games on large screens whilst using this technology to play the game without a controller.	I enjoy crossy road, subway surfers although I cannot think of 5 different games	Alex	I'm not completely sure although it could be used for children to interact in the classroom
185	7/20/24 10:42:30	7/20/24 10:51:39	anonymous			Yes				children 6 - 12	Male	Fencing;	Liked the use of motion controls, but not so easy to capture the movements - camera could be more sensitive. Didn't like the sword slashing the player, feel sensitive about the violent action. Maybe use a non-sharp weapon.		Sonic		
186	7/20/24 10:43:12	7/20/24 10:51:43	anonymous			Yes			family	teenagers 13 - 18	Male	Boxing;	The camera detected movement well. It could be more responsive, detects faster	For home use, switching on/off lights with motion, etc.	COD, minecraft, tetris on pc	Victor	
187	7/20/24 10:49:39	7/20/24 10:53:12	anonymous			Yes				children 6 - 12	Male	Windsurfing;	Fun to play and easy to navigate	Tech to be more accessible	N/A	Mother (nm)	Learning how to make advanced games
188	7/20/24 10:51:44	7/20/24 10:55:51	anonymous			Yes				children 6 - 12	Female	Hang Gliding;	A bit hard to control with the movements. Children need a bit of time to learn the controls, especially with different controls for each game.				
189	7/20/24 10:54:45	7/20/24 10:55:56	anonymous			Yes				teenagers 13 - 18	Male	Jetpack joyride;	It was good but box needed to be bigger			KP	Interactive learning?
190	7/20/24 10:51:45	7/20/24 10:56:49	anonymous			Yes			family	children 6 - 12	Female	Hang Gliding;	Fun, enjoyed the experience.	First person view	Roblox capture the flag: animal edition	Victor	
191	7/20/24 10:55:50	7/20/24 10:58:48	anonymous			Yes				children 6 - 12	Male	Bubble game;	The game itself a little bit hard. But fun the mouse is too accurate it would be better if bigger	Write on the computer without holding a pencil		Oliver	
192	7/20/24 10:55:53	7/20/24 11:00:11	anonymous			Yes				children 6 - 12	Male	Volleyball;	Hard to move (motions not always captured), have to move forward a lot after serving. Would like to see buildings and colours in the background. A recognisable cartoon character that children know from other games or TV shows would attract their interest more.				
193	7/20/24 10:56:50	7/20/24 11:00:18	anonymous			Yes			family	children 6 - 12	Male	Cut the rope 2;	kind of hard. keeping the hand up is tiring	to play Roblox		Victor	
194	7/20/24 11:02:32	7/20/24 11:07:03	anonymous			Yes				children 6 - 12	Male	Volleyball;	Hard to control the movements - moving the hand Like that it can be controlled with hands without buttons Graphics could look a bit more realistic				
195	7/20/24 10:58:50	7/20/24 11:08:56	anonymous			Yes				children 6 - 12	Male	Bubble and puffy cat;	Like the bubble games cuz it's challenging and more different from playing on the phone than puffy cat			Alex	

196	7/20/24 11:07:07	7/20/24 11:11:22	anonymous			Yes				children 6 - 12	Female	Boxing;	I loved it - so easy to play. Nothing needs to be improved.		Pokémon on Nintendo Switch		
197	7/20/24 11:00:19	7/20/24 11:13:20	anonymous			Yes			family	children 6 - 12	Male	Hang Gliding;	Like the idea, flying around collecting gems. Cannot go up sometimes. Better detection		Fortnite, brawstar on mobile	Victor	
198	7/20/24 11:13:21	7/20/24 11:15:49	anonymous			Yes			family	children 6 - 12	Male	Hang Gliding;	Like how we don't have to touch to control. It doesn't detect if hands are too high up.		Brawlstar on mobile Subway surfer on mobile + ipad	Victor	
199	7/20/24 11:11:23	7/20/24 11:18:43	anonymous			Yes				children 6 - 12	Female	Hang Gliding;	Overall very good, fun when the movements were detected but sometimes it wasn't detected. Environment looked very nice.				
200	7/20/24 11:08:58	7/20/24 11:20:09	anonymous			Yes				children 6 - 12	Female	Bubble game;	Sometimes the hands are missed	Smart home settings eg controlling the lights		Oliver	
201	7/20/24 11:20:46	7/20/24 11:23:43	anonymous			Yes				children 6 - 12	Female	Bubble game ;	Awesome. Love the idea of hand free	Video game to feel more real		Astrid	
202	7/20/24 11:18:44	7/20/24 11:24:27	anonymous			Yes				children 6 - 12	Male	Angry Birds;	Like it, but it didn't work when I pull the bird back. Camera not very sensitive. If other children are standing behind, their hands also get captured.				
203	7/20/24 11:23:44	7/20/24 11:25:32	anonymous			Yes				children 6 - 12	Male	Bubble game;	Love it			Felix	
204	7/20/24 11:24:51	7/20/24 11:27:22	anonymous			Yes				children 6 - 12	Male	Volleyball;	It was hard to control the character movement. Moving too fast sometimes. But fun overall.	Tennis game would be fun, rounders too	Xbox and Wii - car driving games		
205	7/20/24 10:53:25	7/20/24 11:29:27	anonymous			Yes		Sabina_0418@yahoo.com	Clarence House prep school	children 6 - 12	Female	Windsurfing;	A bit difficult to go forward	Less sensor			
206	7/20/24 11:27:19	7/20/24 11:29:27	anonymous			Yes			family	children 6 - 12	Male	Volleyball;	Many chances to try.	character can go faster	Starship games on pc	Victor	
207	7/20/24 11:29:29	7/20/24 11:32:56	anonymous			Yes			family	children 6 - 12	Male	Boxing;	sophisticated more things to hit	for more gaming	FC24, nintendo sports, zelda, mario on switch	Victor	
208	7/20/24 11:32:57	7/20/24 11:34:48	anonymous			Yes			family	children 6 - 12	Female	Boxing;	Nice to be able to feel like as if actually punching	no controller at all	FC24, mario kart, nintendo sports on switch	Victor	
209	7/20/24 11:27:23	7/20/24 11:36:56	anonymous			Yes				children 6 - 12	Female	Volleyball;	Fun but movements not always detected Looked realistic and pretty Could make the character jump		Sports games - FIFA		
210	7/20/24 11:34:50	7/20/24 11:37:34	anonymous			Yes			family	children 6 - 12	Male	Boxing;	fun to try out a sport i never tried	more in gaming	fortnite on ps5	Victor	
211	7/20/24 11:37:36	7/20/24 11:41:06	anonymous			Yes			family	children 6 - 12	Male	Boxing;	need better accuracy of detection assets can look more interesting, like monsters to hit.	can detect speed to measure strength	fortnite, clash royal on ipad + mobile	Victor	
212	7/20/24 11:36:57	7/20/24 11:41:44	anonymous			Yes				children 6 - 12	Male	Boxing;	Fun but movements not always detected, camera should be more sensitive. Otherwise a good experience.		Xbox games		PE classes for disabled children, like online tournaments
213	7/20/24 11:41:07	7/20/24 11:42:37	anonymous			Yes			family	teenagers 13 - 18	Female	Angry birds 2;	hard to control, the box was too small			Victor	
214	7/20/24 11:41:48	7/20/24 11:44:26	anonymous			Yes				children 6 - 12	Female	Volleyball;	Liked the game, scenery was nice. But not so easy to control the player, especially moving forward.				
215	7/20/24 11:44:27	7/20/24 11:47:52	anonymous			Yes				children 6 - 12	Female	Windsurfing;	Liked the superpowers such as the wind But it was a bit hard to move the player - could use hands instead of head		Royal Kingdom, Animal Crossing on iPad		
216	7/20/24 11:48:03	7/20/24 11:49:31	anonymous			Yes			family	children 6 - 12	Male	Hang Gliding;	hard to control.		fifa 24 on ps5	Victor	
217	7/20/24 11:47:53	7/20/24 11:50:39	anonymous			Yes				children 6 - 12	Female	Hang Gliding;	Couldn't really get it to move straight ahead, kept turning. But overall a fun game.				In primary school for disabled children
218	7/20/24 11:52:19	7/20/24 11:53:35	anonymous			Yes				children 6 - 12	Female	Hang Gliding;	some delay when putting hands down for the down control			Victor	
219	7/20/24 11:50:40	7/20/24 11:54:14	anonymous			Yes				children 6 - 12	Female	Windsurfing;	Easy to control since only head is needed Game could have some obstacles				Multiplayer games for all ages
220	7/20/24 11:53:45	7/20/24 12:01:03	anonymous			Yes			family	children 6 - 12	Female	Volleyball;	fun it's like in real life doing sports			Victor	
221	7/20/24 11:58:57	7/20/24 12:07:03	anonymous			Yes				teenagers 13 - 18	Male	Windsurfing;	A bit confusing for the controls - could be clearer where to move which body part. Didn't really understand the purpose of the game.				
222	7/20/24 12:05:33	7/20/24 12:07:49	anonymous			Yes			family	children 6 - 12	Female	Hang Gliding;	hard to control for going up and down, not sensitive enough left and right too sensitive			Victor	
223	7/20/24 12:07:05	7/20/24 12:11:30	anonymous			Yes						Volleyball;Boxing;	Liked the boxing - punch and dodge, has variety. Could just be more reactive and prettier. Volleyball more for older kids, trickier to control. Good that it gives multiple chances so you can get used to it.				
224	7/20/24 12:07:51	7/20/24 12:13:38	anonymous			No	mehul shah	mehul.k.shah@ohneal.org 07944107222 Based in Kingsbury London NW9	Ohneal Association of the UK	Adult 35 - 69	Male	N/A;	I would like to invite UCL to come and show us how this can work in my community. We run a sessions for the disabled meme era of the community			Mehul Shah	Entertainment for the disabled in the community
225	7/20/24 12:11:31	7/20/24 12:14:50	anonymous			Yes				children 6 - 12	Female	JetPack ;	Liked the pinching motion, didn't like the fireballs. Not so easy to use, not so sensitive / delay in sensing the movement.	Instead of dragging before clicking, could just move finger across and point, like on a touch screen.			
226	7/20/24 12:13:40	7/20/24 12:17:50	anonymous			Yes			family	children 6 - 12	Male	Hang Gliding;Volleyball;	HG: fun, it's easier to move Volleyball: really hard, it's hard to move		Nintendo sports on switch Ray man, mario	Victor	
227	7/20/24 12:14:51	7/20/24 12:20:54	anonymous			Yes				children 6 - 12	Female	Windsurfing;	Good, can move your body, no other remote needed. Visuals were good too, nothing to change about it.				
228	7/20/24 12:17:51	7/20/24 12:24:52	anonymous			Yes			family	children 6 - 12	Male	Boxing;	Instead of precise detection, maybe detect which hand punching for input	virtual reality, kick detection too	Roblox on pc + ipad	Victor	
229	7/20/24 12:20:56	7/20/24 12:28:13	anonymous			Yes				children 6 - 12	Male	Windsurfing;	Controls quite unique. But not very practical as VR has already been developed and those are much better.				
230	7/20/24 12:28:15	7/20/24 12:32:32	anonymous			Yes				teenagers 13 - 18	Female	Boxing;	Fun, instructions could be clearer. Liked the graphics, but it didn't always detect the punches.	Different difficulty levels			
231	7/20/24 12:32:36	7/20/24 12:34:01	anonymous			Yes				teenagers 13 - 18	Male	Hang Gliding;	Liked the feeling of slowly floating downwards, but movements not always detected.				
232	7/20/24 12:24:53	7/20/24 12:43:07	anonymous			Yes			family	children 6 - 12	Male	Hang Gliding;	fun, to try to control the plane laggy tho	make it faster	Roblox, minecraft on pc	Victor	
233	7/20/24 12:38:29	7/20/24 12:46:36	anonymous			Yes				Young children < 6	Female	Volleyball;	Couldn't understand the motioninput controls, especially difference between left and right hand. Confusing for young children. Moving body for direction, hands to hit would be better.				
234	7/20/24 12:46:37	7/20/24 12:51:12	anonymous			Yes				Adult 35 - 69	Male	Volleyball;	Interesting game, nice environment. But hard to control, would be good to have instructions that you can refer to and revisit.				
235	7/20/24 12:51:13	7/20/24 12:59:29	anonymous			Yes				children 6 - 12	Female	Windsurfing;	Didn't understand the forward movement, seemed to stay still sometimes. The turning was a bit fast, sometimes you don't stop in time. Liked the animals				
236	7/20/24 12:59:31	7/20/24 13:07:21	anonymous			Yes				children 6 - 12	Male	Volleyball;	Liked that you don't need a controller and use your actual hands. But one time it detected someone else's had and I lost a point that way. Environment was nice, characters could look more realistic.		Minecraft		
237	7/20/24 12:43:09	7/20/24 13:08:48	anonymous			Yes			family	Young children < 6	Male	Boxing;	Like the hitting action a bit slow			Victor	
238	7/20/24 13:08:50	7/20/24 13:12:35	anonymous			Yes			family	children 6 - 12	Male	Hang Gliding;	Really like it, especially using hands to control. Less glitchy.	Sailing	Roblox, one piece: bounty rush on chromebook	Victor	

239	7/20/24 13:12:37	7/20/24 13:16:35	anonymous			Yes			family	children 6 - 12	Male	Hang Gliding;	Timing for the arms fun but glitchy	Using different parts of the body		Victor	
240	7/20/24 13:07:22	7/20/24 13:17:56	anonymous			Yes				children 6 - 12	Female	Windsurfing;	Fun, liked that moving the head would move the whole thing. quite hard to get the dolphins and it detected other peoples head				
241	7/20/24 13:17:57	7/20/24 13:26:58	anonymous			Yes				children 6 - 12	Female	Volleyball;	Quite hard to control, learning curve. Need instructions. Can provide indication of where the ball will land. Could have some spectators.				
242	7/20/24 13:27:00	7/20/24 13:36:49	anonymous			Yes				teenagers 13 - 18	Male	Volleyball;	Fun game, but not that easy to control player movement. Would be good to be able to choose the direction of the ball too.				
243	7/20/24 13:36:50	7/20/24 13:40:17	anonymous			Yes				children 6 - 12	Male	Volleyball;	Really fun - the way you can move your arms. Quite easy to control.	More players, eg doubles	FIFA		Computing and PE class
244	7/20/24 13:40:19	7/20/24 13:46:52	anonymous			Yes				children 6 - 12	Male	Volleyball;	Quite hard to keep track of where you move your hand, but liked the use of hands and the different shot types Environment was nice and pretty		Zelda, Mario, FIFA		
245	7/20/24 13:16:37	7/20/24 13:52:44	anonymous			Yes			family	children 6 - 12	Female	Boxing;	UI is easy to understand and easy to use. Accessible. Poor movement detection sometimes	For people with disabilities		Victor	
246	7/20/24 13:46:54	7/20/24 13:55:33	anonymous			Yes				teenagers 13 - 18	Female	Volleyball;	Interesting how you can use your own movements without an actual joystick. Screen for player movement could be wider, not that easy to control. Good detail and nice environment, Point scoring system was good too.				
247	7/20/24 13:55:34	7/20/24 13:57:46	anonymous			Yes				children 6 - 12	Male	Volleyball;	Player moved too fast, but game was fun. One character doesn't have hair but should!				
248	7/20/24 13:52:45	7/20/24 13:58:24	anonymous			Yes			family	children 6 - 12	Female	Hang Gliding;	Less reactive than normal games. Some delay there.	Education.	War and Order on mobile	Victor	
249	7/20/24 13:57:48	7/20/24 14:00:06	anonymous			Yes				children 6 - 12	Male	Volleyball;	A bit confusing, need time to learn how to control. Graphics were good.				
250	7/20/24 13:58:25	7/20/24 14:07:48	anonymous			Yes			family	children 6 - 12	Male	Hang Gliding;	Like the flying.			Victor	
251	7/20/24 14:00:07	7/20/24 14:09:35	anonymous			Yes				children 6 - 12	Female	Windsurfing;	Using hands to control is easier than head. Could also use hand movements to make it more realistic. Creative.				
252	7/20/24 14:07:49	7/20/24 14:11:21	anonymous			Yes			family	children 6 - 12	Male	Bubble shooter ;	Slight movement goes off too much, sensitivity	control for VR	Minecraft, Roblox on pc	Victor	
253	7/20/24 10:41:50	7/20/24 14:15:12	anonymous			Yes				children 6 - 12	Male	Bubble Blast;	Great experience, no comments			HB	
254	7/20/24 14:25:29	7/20/24 14:29:53	anonymous			Yes		poongong@gmail.com		Adult 35 - 69	Male	bubble shooter;	Wonderful experience, fast tracking and accurate response	practice use in daily life, use in school and at home			
255	7/20/24 14:09:36	7/20/24 14:31:18	anonymous			Yes				children 6 - 12	Male	Volleyball;	Very fun Sometimes didn't respond to the arm movements - could be more sensitive. Detection of left wrist wasn't central enough Could also have jumping, ability to move faster	Multiplayer games	Fortnite, Minecraft, Mario, shooting games		
256	7/20/24 14:31:20	7/20/24 14:38:40	anonymous			Yes				Young children < 6	Male	Volleyball;	Too difficult for young children, can't grasp the controls				
257	7/20/24 14:38:42	7/20/24 14:56:01	anonymous			Yes				children 6 - 12	Female	Volleyball;	Confusing, not so easy to control				
258	7/20/24 14:56:02	7/20/24 14:57:12	anonymous			Yes				children 6 - 12	Male	Volleyball;	Game was a bit fast-paced, not very easy to move to the right position to hit the ball, camera could be more sensitive				