"SUBNAUTICAN ADVENTURES"

Submitted in partial fulfilment of the requirements of the

degree of Bachelor of Engineering

by

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Under the Guidance of
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New Horizon Institute of Technology and

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University of Mumbai

2023-2024

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CERTIFICATE

This is to certify that the mini-project 1A entitled ("**Subnautican Adventures**"), (Group No.7) of SE Computer Engineering.

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Mini Project-1B Approval for S.E.

This project report entitled *SUBNAUTICAN ADVENTURES* by *Sana Girish, Anish Shinde, Aradhana Shrivastav* is approved for the Degree of Bachelor's in *Computer Engineering,* 2023-24

Examiners:

   1. Name: Sign with Date:

   2. Name: Sign with Date:

Date:

Place:

Declaration

We declare that this written submission represents our ideas in our own words and where others ideas or words have been included, we have adequately cited and referenced the original sources. We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea / data / fact / source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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Date:

Abstract

"Subnautican Adventures" is an exhilarating and addictive game that takes the iconic gameplay of Flappy Bird to a whole new dimension—underwater! In this interstellar adventure, players take control of a submarine as they navigate through a challenging cosmic environment filled with sharks, octopus and other obstacles.

The objective of the game is simple: guide your submarine through the infinite expanse of underwater by tapping the screen to adjust thrust and avoid collisions. As players progress, they'll encounter increasingly difficult levels that test their reflexes and precision. The game boasts stunning, vibrant graphics that depict the breathtaking beauty of underwater, complete with twinkling stars and distant galaxies.

Key Features: The game's one-tap/key control system is easy to grasp but difficult to master, providing a seamless gaming experience for players of all ages. With procedurally generated levels, offers an endless array of obstacles and challenges, ensuring that each playthrough is unique. A captivating and immersive soundtrack sets the mood for your cosmic journey, enhancing the overall gaming experience.

"Subnautican Adventures" combines the addictive simplicity of Flappy Bird with the excitement of interstellar exploration. It promises hours of entertainment for gamers seeking a challenging and visually stunning adventure through the cosmos. Prepare for liftoff and embark on a thrilling voyage into the great unknown!

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CHAPTER 1

INTRODUCTION

SUBNAUTICAN ADVENTURES is designed as a 2D game with simplicity in mind. In this game, a "click" on the device enables the control of the movement of the submarine and helps it rise and skip the incoming obstacles. The submarine continues to gradually descend and reach the bottom of the screen unless an input from the user helps it to navigate upwards.

It is an alternative to other mini games to provide fun and excitement to the player. It offers insights into the world of gaming, demonstrating that simple mechanics and creative design can lead to a captivating gaming experience.

Key Feature: Our SUBNAUTICAN ADVENTURES game features a simple tap-to-navigate control scheme, challenging obstacle courses, and a scoring system that motivates players to achieve higher scores. Significance of the Study: Our study holds significance on various fronts. First, it pays homage to a classic game while offering an opportunity for creative expression. Second, it serves as a practical learning experience in game development, showcasing the power of Unity for aspiring developers. Third, it contributes to the broader conversation of what makes mobile games engaging and how developers can capture and sustain players' interest.

Improvement of Reflexes and Hand-Eye Coordination: The game's fast-paced nature and requirement for precise timing can help users improve their reflexes and hand-eye coordination. Constantly tapping to keep the bird afloat and navigate through obstacles challenges users to react quickly, which can have benefits beyond gaming in various real-life situations.

Persistence and Patience: It teaches users the value of persistence and patience. As the game gets progressively harder, users must learn from their mistakes, adapt their strategies, and keep trying to improve their performance. This can instill valuable life skills such as resilience and perseverance.

CHAPTER 2

LITERATURE REVIEW

The underwater domain is an alluring 'other world', inviting of human-aquatic interactivity and bodily play and yet it is also an extreme environment as it is inhospitable to support human life without external air-supply. Playful interactions are therefore matters of life and death in the underwater domain. We correlated data on human-aquatic interactions and narcosis with a range of game design principals to produce a design pallet for digital underwater play from water level to 30m depth. We also present a proof-of-concept system called Gravity Well as an exemplary research tool. Through our work, we aim to inspire other researchers and designers to consider creating digital play in and under water.

In the last decades, the popularity of video games has been increasing thanks to their unique ability to engage their audience and create empathy. Among them, serious games have additional purposes besides entertainment, such as learning and behaviour change. Serious games, in fact, have been successfully applied to different fields, including education, health, tourism, and cultural heritage. In this context, the paper describes a novel serious game developed for increasing awareness and promoting the Underwater Cultural Heritage (UCH). In particular, the paper focuses on the Dive in the Past Serious Game which allows users to simulate a virtual dive into the Mediterranean Sea to explore accurate and life-sized 3D reconstructions of underwater archaeological sites. The purpose of the game is twofold: to engage diver and non-diver tourists into a virtual interactive exploration of underwater sites through digital storytelling and challenges; to increase awareness and knowledge on Mediterranean UCH. This work has been carried out in the context of the MeDryDive project, an EU co-funded under the COSME Programme, which aims to create personalized dry dive experiences for the promotion of Mediterranean UCH sites as distinctive tourism destinations

In the Golden Age of arcades, video games were more than pop culture- they were portals to the future. Shooting galleries and claw machines seemed archaic next to the video arcade's sizzling colors and animated attract mode screens. Subdued room ambience accentuated bright, back- lit marquees, displays, and coin boxes. Buttons with flashing red LEDs looked like rocket ship controls. The sharp, neon lines of vector graphics drafted a perfect, minimalist design language. More distinct than the visuals were the sounds. Video game coin- ops together formed this dissonant mashup of explosions, laser blasts, computer music, and synthesized speech. The ominous, walking bass lines of Asteroids and Space Invaders stood out the most. You could feel the pulsing in your gut as you scanned the floor.

to see which games were in the room, and which of those were unoccupied, waiting for the next quarter. Play a game and the feel of the vibrating cabinets and custom controls-different from game to game-made for a new kind of amuse- ment park ride.

Simulation system is charged with the strategy validation and dual team meets, and as the 2-dimensional simulation platform for underwater robotic fish game, URWPGSim2D is the assigned platform for Chinese underwater robot contest and Robot cup underwater program. By now on URWPGSim2D, there is only static obstacles, thus short of changeableness. In order to improve the changeableness and innovation of robotic fish contest, to extend the space for the programming of contest strategy, and to increase the interest, this paper study the design of dynamic obstacles on URWPGSim2D, and design and implement two kinds of dynamic obstacles, which are the evadible dynamic obstacle and the forcing dribbling obstacle.

CHAPTER 3

DESIGN & IMPLEMENTATION

1.1 Block diagram and description of each block of the system.

1.1.1 Block diagram

```
                    ┌──────────────────┐
                    │   GAME DISPLAY   │
                    └──────────────────┘
                             │
                             ▼
                    ┌──────────────────┐
                    │   GAME ENGINE    │
                    └──────────────────┘
                             │
        ┌────────────────────┼────────────────────┐
        ▼                    ▼                    ▼
┌──────────────┐    ┌──────────────┐    ┌──────────────┐
│    PLAYER    │    │  OBSTACLES   │    │   SCORING    │
│  CONTROLLER  │    │  GENERATOR   │    │  MECHANISM   │
└──────────────┘    └──────────────┘    └──────────────┘
        │                    │                    │
        ▼                    ▼                    ▼
┌──────────────┐    ┌──────────────┐    ┌──────────────┐
│ PLAYER INPUT │    │  OBSTACLES   │    │ SCORING LOGIC│
│  PROCESSING  │    │   MOVEMENT   │    │  AND DISPLAY │
└──────────────┘    └──────────────┘    └──────────────┘
```
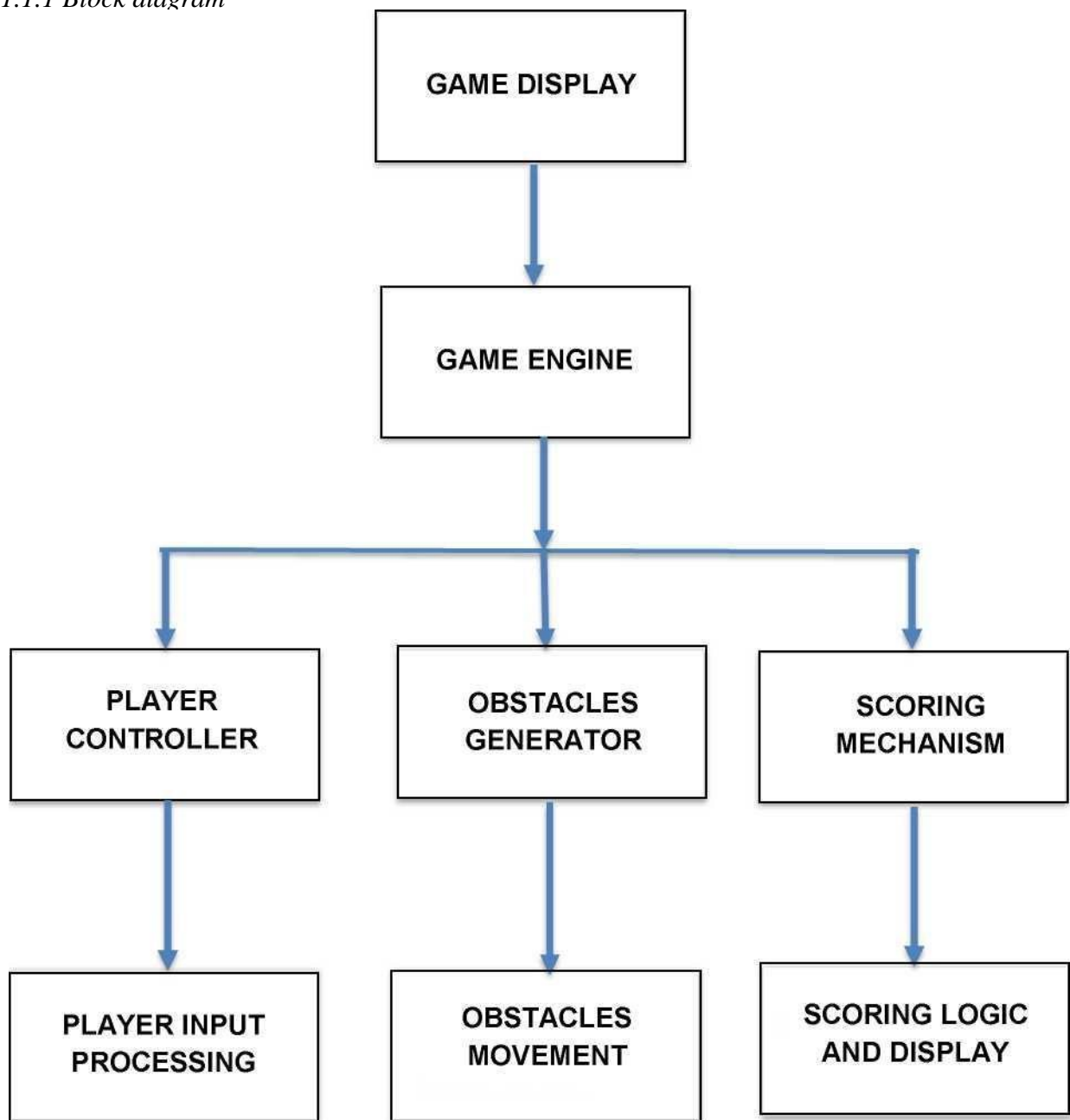
1.1.2 Description of Each Block:

1.Game Display:

The Game Display block represents the user interface (UI) and visual rendering of the game. It includes graphics, animations, and elements such as the player character (the submarine), obstacles (sharks, octopus, etc.), and score displays.

2.Game Engine:

The Game Engine is responsible for managing the game's core functionality, including physics, game mechanics, and scene management. It orchestrates the interactions between different game components.

3.Player Controller:

The Player Controller block includes the input controls for the player. It processes player actions, such as tapping the screen to make the submarine navigate.

4.Obstacles Generator:

The Obstacles Generator generates and manages the appearance and movement of obstacles (in this case, sharks,octopus,bomb) in the game. It controls the spacing and timing of the obstacles.

5.Scoring Mechanism:

The Scoring Mechanism block manages the game's scoring system. It keeps track of the player's score based on actions like successfully navigating through obstacles.

6.Player Input Processing:

The Player Input Processing block interprets player inputs, such as screen taps, and translates them into actions within the game, such as making the submarine navigate.

7. Obstacle Movement:

The Obstacle Movement block controls the physics and animation of obstacle movement. It ensures that the obstacles scroll horizontally across the screen to create a sense of movement.

8. Scoring Logic and Display:

The Scoring Logic and Display block calculates and displays the player's score in real-time. It updates the score on the screen when the player successfully navigates the submarine through obstacles.

These blocks represent the major components of the submarine navigate game system. The interactions between these components are essential for creating a functional and engaging game. The player's input and interactions with the game engine, obstacles, and scoring mechanism result in the dynamic gameplay experienced by the player.

1.2 Description and justification of the method chosen for the study

1.2.1 Method Chosen for the Study:

Game Development Using Unity and C#: The primary method chosen for this study was hands-on game development using the Unity game engine and the C# programming language. This method was selected for several reasons:

•Practical Application: Game development requires a high degree of practical skills, and creating this game was an excellent way to apply theoretical knowledge to a real-world project.

•Engagement and Creativity: Developing a game like Subnautican Adventures allowed for creative expression through animation, and gameplay mechanics, making it engaging and fulfilling for the developers.

•Relevance to the Research Topic: Given that the study aimed to create a game, using game development methods was not only appropriate but essential for achieving the research objectives.

1.2.2 Justification for the Chosen Method:

1.Practical Relevance: The chosen methods were practical and directly relevant to the research topic. Game development using Unity and C# was the most appropriate way to achieve the project's goal of creating a Subnautican Adventures game.

2.Learning and Skill Development: These methods served a dual purpose of learning and skill development. They allowed the developers to gain practical experience in game development, an essential skill for aspiring game developers.

3.User-Centered Approach: Incorporating user feedback into the study ensured that the game was designed with the player's experience in mind. This approach aligns with the best practices in game design, where player feedback is crucial for success.

4.Quality Assurance: An iterative approach, along with user testing, helped identify and rectify issues and provided a mechanism for quality assurance, ensuring a more polished final product.

The chosen methods for the study, which involved hands-on game development, an iterative approach, were well-suited to the goal of creating a Subnautican Adventures game. They combined practicality, learning, user-centered design, and quality assurance to ensure the successful development of an engaging and enjoyable game.

CHAPTER 4

RESULTS

4.1 WORKING:

Here's how the game works:

- Game Mechanics:

  The game is controlled by tapping the screen, clicking spacebar or left button of mouse.

  Submarine falls due to gravity and each tap makes the submarine rise slightly

- Obstacles:

  The obstacles in the game are Sharks,octopus,bombs,etc that appear on the screen.

  The submarine must navigate through the gaps in these to avoid crashing into them.

- Scoring:

  The player earns one point for every shark,octopus,bombs,etc that the submarine successfully

  passes through.

  The score is displayed at the top of the screen.

- Endless Gameplay:

  The game is endless i.e., keep appearing at regular intervals.

- Collision and Game Over:

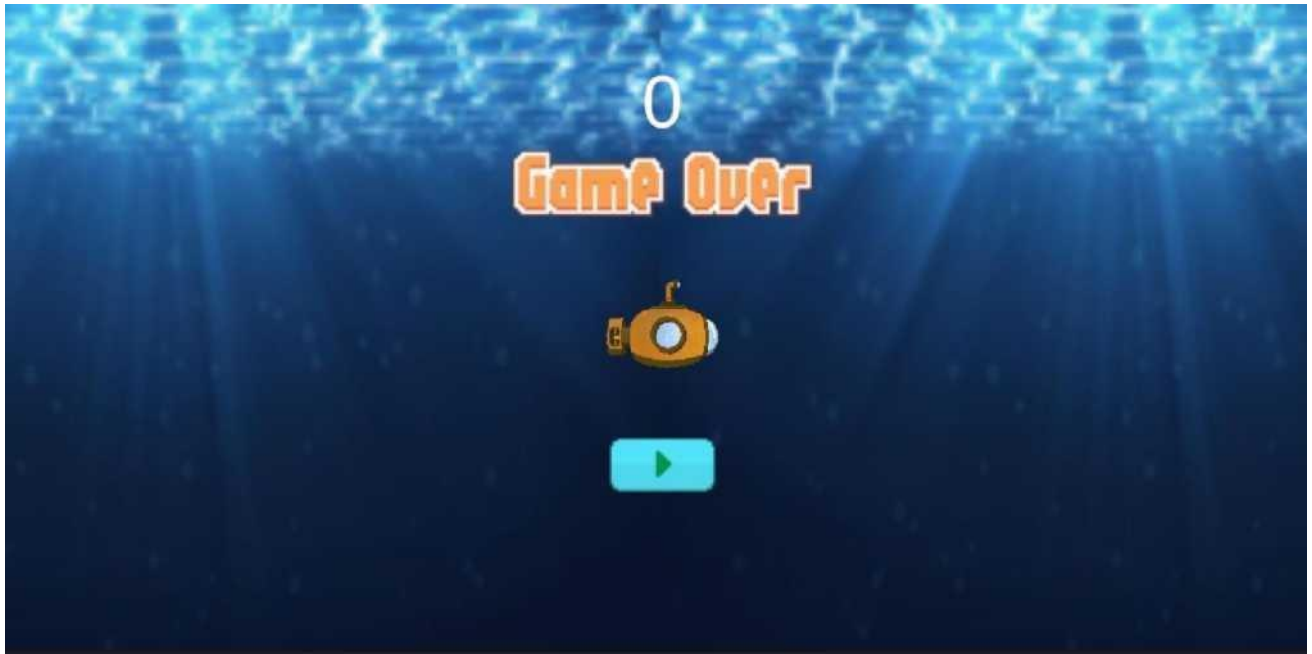 If the submarine collides with an obstacle, the game is over.
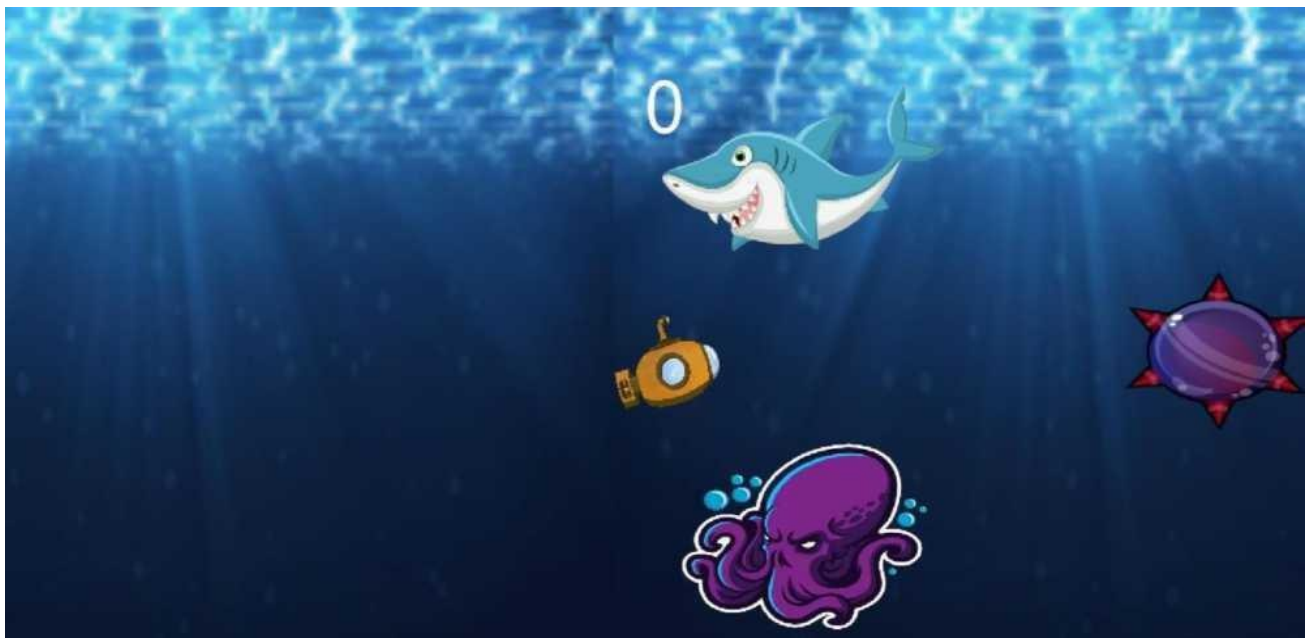
4.2 EXECUTION:

Fig4.2.1: Game Initialization

Fig 4.2.2: Submarine passing through sharks,octopus,bombs,etc

Fig 4.2.3: Submarine collides with obstacle and game over

KEY	ACTION
Spacebar (in game), left click, tap on screen	Jump
Spacebar on game over	Restart

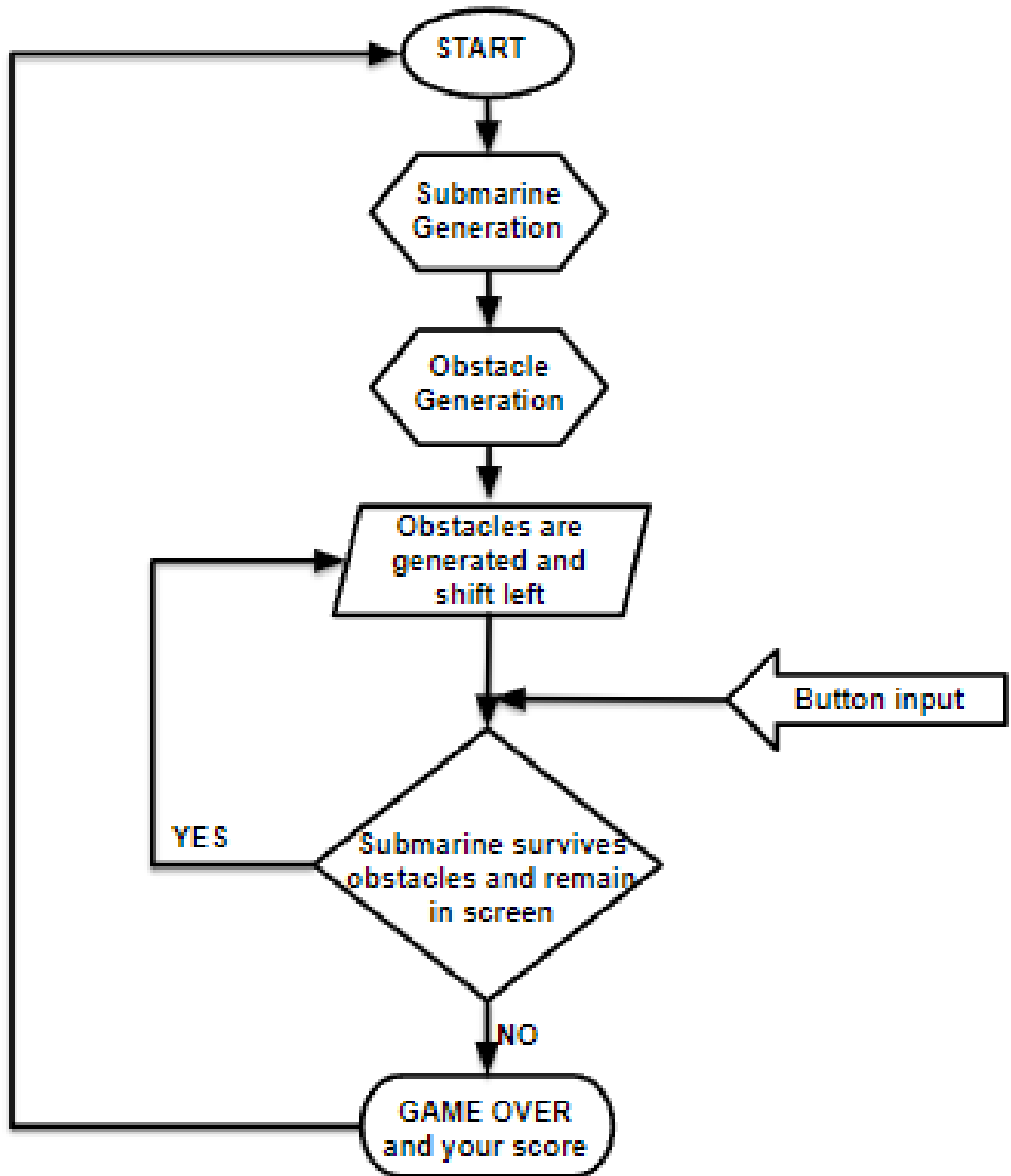**Table 4.2.1: User Actions**

PARAMETER	VALUE
Frames per second	60
Resolution	1920x1080
Framework	Unity2D
Pipe Gap	Varying
Gravity	9.8

Table 4.2.2: Technical Game Details

4.3 WORKFLOW:

```
                          START
                            │
                            ▼
                       Submarine
                       Generation
                            │
                            ▼
                        Obstacle
                       Generation
                            │
                            ▼
                     Obstacles are
                     generated and          Button input
                       shift left
                            │
                            ▼
          YES       Submarine survives
                    obstacles and remain
                        in screen
                            │
                            NO
                            ▼
                       GAME OVER
                      and your score
```

CHAPTER 5

CONCLUSION

5.1 SUMMARY:

In conclusion, the engineering mini-project that involved creating a underwater-themed game SUBNAUTICAN ADVENTURES using Unity and Visual Studio has been a stimulating and educational journey.

Throughout the development process, we delved into the intricacies of game design, programming, and graphical rendering to craft a captivating and endlessly enjoyable gaming experience. The substitution of submarines for birds and asteroids for pipes provided a fresh and engaging twist to the classic concept. Players found themselves navigating through the vastness of underwater, encountering challenges in the form of treacherous underwater fields. The introduction of a points system that rewards players as they progress added an element of competitiveness, making the game not only entertaining but also motivating to improve one's skills. The project emphasized the importance of efficient coding, teamwork, and problem-solving, essential skills in the field of engineering.

5.2 APPLICATIONS:

Flappy Bird is a simple yet addictive mobile game that involves guiding a bird through a series of pipes by tapping on the screen to make the bird flap its wings. While it may not seem like a highly complex or sophisticated game, it has inspired various applications and uses beyond just entertainment. Here are some potential applications of Flappy Bird game mechanics and concepts:

1. Gamification:

Companies can use the gameplay mechanics of Flappy Bird to create gamified applications that encourage user engagement. For example, a fitness app could incorporate similar mechanics to motivate users to exercise regularly.

2. Education:

Educational games for children can use the concept of Flappy Bird to teach basic principles, such as physics, mathematics, or even language skills. By replacing the bird with educational content or questions, children can learn while playing.

3. Stress Relief:

Some applications incorporate similar gameplay to Flappy Bird to help users relax and relieve stress. These games can serve as a fun distraction and a way to unwind.

4. Hand-Eye Coordination:

Games like Flappy Bird can be used in rehabilitation and therapy programs to improve hand-eye coordination and fine motor skills in patients recovering from injuries or surgeries.

5.3 FUTURE SCOPE:

As we look to the future, there is potential for further expansion and refinement of this underwater-themed game, as well as the application of the knowledge and experience gained to tackle more complex engineering projects. This mini-project underscores the exciting synergy between engineering and game development and sets the stage for continued innovation and exploration in this ever-evolving field

CHAPTER 6

REFERENCES

1) Hocking, J. (2022). Unity in action: multiplatform game development in C. Simon and Schuster.

2) Cozza, M., Isabella, S., Di Cuia, P., Cozza, A., Peluso, R., Cosentino, V., ... & Bruno, F. (2021). Dive in the past: A serious game to promote the underwater cultural heritage of the Mediterranean Sea. Heritage, 4(4), 4001-4016.

3) Lendino, J. (2020). Attract mode: The rise and fall of coin-op arcade games. Steel Gear Press.

4) Li, S., Yuan, X., & Chen, X. (2014). Design and realization of dynamic obstacle on URWPSSim2D. TELKOMNIKA Indonesian Journal of Electrical Engineering, 12(1), 304-313.

5) Pell, S. J., & Mueller, F. F. (2013, September). Designing for depth: underwater play. In Proceedings of The 9th Australasian Conference on Interactive Entertainment: Matters of Life and Death (pp. 1-6).