Virtual Strike Project Modules and Modul Requirements

Prepared By VS Games

(Group 4)

1. Group members

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2. Introduction

Game name : Virtual Strike

Project scope: A shooting game where players shoot targets using VR glasses and a special aiming device.

The aim of the project: To offer players an interactive gaming experience with their real-life movements.

This report introduces a shooting game that is played using VR (Virtual Reality) glasses and integrates the player's real-life movements into the game.

This project aims to provide the player with real-life sensations in the game to be played through VR glasses. The game is basically based on shooting targets. This game will provide players with a real-time and interactive gaming experience, giving them the feeling of a real shooter as they take aim at targets within the game. "Virtual Strike" will be played using a specialized aiming device integrated with the Unreal Engine game engine and VR (Virtual Reality) headsets. The main goal of the project is to transfer real-life physical activity into the game world while providing players with interactive entertainment. This will make the game both fun and attractive for players who want to spend time in a healthy way. The "Virtual Strike" project represents an innovative approach that combines technology and entertainment to offer players an immersive shooter experience in a virtual reality world. With the successful completion of the project, players will experience a unique gaming experience where they will be able to control their real-world actions in the virtual world. The player needs the following devices to play the game:

- An Android phone

- A Computer

- A hand-held device as a remote control

- A VR glasses

Firstly, the game is opened on the computer, after the
connection with the phone is established, the image of
the game is reflected on the phone via the app we will write on Android. The player wearing the glasses
with the Android phone will be able to move around in the game and direct the game as he wishes. The
control in the player's hand will allow the character in the game to change the direction of movement,
walk and interact with obstacles or targets (such as targeting and shooting).

3. MODULES

Modules are separated in order to better manage the project and to better distribute the division of labour
among the group members. First of all, we divided the project into two as game making and tool making.

The game production part will be divided into two modules, the first module will be the mechanics behind
the game, in other words the backend part. The second part will be the design and user interface of the
game.

The construction of the tools will be the remote control in the hand and the reflective app on the phone to
which the android device is connected. There will also be a module for communication between the
controller and the game.

A - Game Backend and Mechanics:

- **Module Description:** This module encompasses the development of the backend systems and mechanics of the Virtual Strike game. It involves implementing the core functionality of the game, such as player movement, target interactions, scoring mechanisms, and game physics.

- **Requirements:**
- *Player Movement System:*
    - o Implement a system to capture player movements accurately using VR glasses and the handheld device.
    - o Translate real-world movements into in-game actions, allowing players to navigate the virtual environment seamlessly.
- *Target Interaction:*
    - o Develop mechanisms for spawning and managing targets within the game environment.
    - o Implement hit detection algorithms to register successful shots on targets.
- *Scoring System:*
    - o Design a scoring system based on factors such as accuracy, speed, and precision.
    - o Ensure that scores are calculated and updated in real-time during gameplay.
- *Game Physics:*
    - o Integrate realistic physics simulations to enhance the gaming experience.
    - o Implement projectile physics for bullets and other in-game objects.

- **Technologies and Tools:**
- *Unreal Engine:* Utilize Unreal Engine for game development, including blueprint scripting and C++ programming for backend functionalities.
- *VR Development Kit:* Make use of VR development kits compatible with Unreal Engine for VR integration.
- *Version Control System:* Employ a version control system (e.g., Git) to manage collaborative development and track changes effectively.
- *Integrated Development Environment (IDE):* Use appropriate IDEs such as Visual Studio for C++ development and blueprint scripting within Unreal Engine.

- **Testing and Debugging:**
- Conduct rigorous testing to ensure the reliability and stability of backend systems and mechanics.
- Perform debugging and troubleshooting to address any issues or bugs encountered during development.

- **Timeline and Milestones:**
- Break down development tasks into manageable milestones to track progress effectively.
- Allocate sufficient time for testing, iteration, and refinement of backend systems and mechanics.

B - Game Design and User Interface:

- **Module Description:** This module focuses on the design aspects and user interface development of the Virtual Strike game. It involves creating visually appealing game elements, intuitive controls, and an immersive user experience.

- **Requirements:**
- *Game Design:*
    o Develop a compelling game concept and story that engages players.
    o Increase player immersion and enjoyment by designing game levels, environments and elements.
    o Ensure consistency in art style, theme and narrative throughout the game.

- **Test and Iteration**
- Conduct usability tests to gather feedback on game design and user interface elements. Revise designs and improve usability and player engagement based on user feedback and playtesting sessions.

- **Timeline and Stages:** Set milestones to ensure the design and implementation of game elements, user interfaces and audio-visual components. Allocate time for iterative design cycles, testing phases and feedback based on feedback.

C – Mobile Application and Data Transfer:

- **Module Description:** This module includes the development of a mobile application that transfers the screenshot of the computer game to the mobile device and the creation of a data transfer mechanism that transmits the movements of the mobile device to the computer.

- **Requirements:**
- *Mobile App Development:*
    o Develop a mobile application to capture the computer game's screen.
    o Regularly capture the screen of the computer game and mirror it to the mobile device through the mobile app.
- *Data Transfer Mechanism:*
    o Develop a data transfer mechanism to capture the mobile device's motion data (e.g., accelerometer and gyroscope data).
    o Transmit motion data to the computer at regular intervals to reflect the player's real-time movements in the game.

- **Technologies and Tools:**
- *Mobile App Development:* Use development environments like Android Studio, (with Java, Flutter or Kotlin).
- *Data Transfer:* Implement technologies like socket communication or WebSocket to transmit mobile device motion data to the computer.

- **Testing and Debugging:**
- Test the accuracy and performance of the mobile app and data transfer mechanism.
- Address any issues encountered during the debugging process and resolve errors within the system.

- **Timeline and Milestones:**
- Define specific stages and a timeline for the development of the mobile app and data transfer mechanism.
- Allocate sufficient time for testing and debugging, and monitor the progress of the development process regularly.

D - Guidance - Motion Control Circuit Module:

- **Module Description:** This module focuses on developing a motion control circuit that enables users to change the direction of their in-game character based on real-life hand movements. Additionally, users can aim and shoot at the target location using a button that interacts with position data from a mobile device. The circuit will include a button, a motion sensor, and a Raspberry Pi.

- **Requirements:**
- *Hardware Components:*
    o *Motion Sensor:* Integrate a motion sensor (e.g., accelerometer or gyroscope) capable of detecting hand movements accurately.
    o *Button:* Include a tactile button for triggering actions such as shooting or initiating specific commands.
    o *Raspberry Pi:* Utilize a Raspberry Pi microcontroller to process input data from the motion sensor and button and generate corresponding output signals.

- **Communication Protocol:**
- Use protocols like Bluetooth or Wi-Fi for wireless communication between the Raspberry Pi and the mobile device.

- **Test and Calibration:**
- Conduct extensive testing to calibrate the motion sensor and button interface for optimal performance.

- Ensure compatibility and stability across different hand gestures and button inputs.

- **Timeline and Milestones:**
- Define milestones for the development of the motion control circuit module, including hardware integration, algorithm implementation, and testing phases.
- Allocate sufficient time for testing, debugging, and refinement to ensure the reliability and effectiveness of the circuit module.

E - Communication Between Controller Hardware and Computer:

- **Module Description:** This module involves the creation of a communication protocol that facilitates communication between the controller hardware and the computer. The controller hardware will transmit real-time motion and button information to the computer, enabling in-game controls.

- **Requirements:**
- *Communication Protocol:*
    - o *Define a communication protocol to be used between the controller hardware and the computer.*
    - o Ensure the protocol supports reliable, fast, and real-time data transmission.
- *Data Transmission:*
    - o *Develop a data transmission mechanism to transfer motion and button information from the controller hardware to the computer.*
    - o Ensure the data transmission mechanism provides low latency and high data accuracy.

- **Technologies and Tools:**
- Hardware Interfaces: Select and integrate hardware interfaces compatible with the chosen communication protocol.
- Data Transmission Software: Develop or select software on the computer side to receive data or establish communication.

- **Testing and Debugging:**
- Create a comprehensive test plan to verify the accuracy and reliability of the communication protocol.
- Verify that data transmission operates correctly at each step and address any errors encountered during testing.

- **Timeline and Milestones:**
- Establish specific stages and a timeline for the design, implementation, and testing of the communication protocol.

- Allocate sufficient time for each stage to ensure the successful implementation of the communication protocol.

4. Modules and their Distribution among Developers:

Virtual Strike	Game Backend and Mechanics	Game Design and User Interface	Mobile Application and Data Transfer	Guidance - Motion Control Circuit Module	Communication Between Controller Hardware and Computer
Ahmet Özdemir			+	+	+
Akif Safa Angi	+	+			+
Aykut Sert	+	+			+
Burak Kurt	+	+			+
Doğukan Baş		+	+	+	+
İlkay Bolat	+		+	+	
M. Yasir Güneş			+	+	+

| Murat Erbilici | + | + | + | | |