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Virtual Reality Versus Desktop And AI Gaming Experience Comparison

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Abstract: The evolution of digital gaming platforms has introduced significantly different interaction experiences, particularly between traditional desktop gaming and emerging Virtual Reality (VR) environments. This study compares the visual immersion, user interaction, performance demands, and cognitive engagement associated with VR gaming and desktop gaming. Additionally, the growing role of Artificial Intelligence (AI) in enhancing gameplay, adaptive difficulty, realism, and personalized user experiences is examined across both platforms. Findings indicate that VR offers higher sensory immersion and presence due to its 3D spatial environment and natural motion controls, while desktop gaming provides greater accessibility, comfort, and precision in competitive gameplay. AI contributes to both platforms by improving game physics, character behaviors, and user-tailored responses.

Keywords: Virtual reality, VR game, 3D game, Oculus Rift, Unity.

I. INTRODUCTION

The rapid advancement of digital technology has significantly transformed the gaming industry, leading to the emergence of diverse gaming platforms and interactive environments. Among these, Virtual Reality (VR) and traditional desktop gaming represent two prominent modes through which users engage in digital play. Desktop gaming has been widely established for decades and continues to dominate the gaming market due to its accessibility, well-developed control systems, and compatibility with a vast library of games. In contrast, Virtual Reality presents a more recent technological shift that aims to provide a deeply immersive and interactive experience by placing players directly within a simulated three-dimensional environment. As VR technology becomes more affordable and sophisticated, it is increasingly being considered as a potential alternative or enhancement to conventional gaming methods.

The difference between VR and desktop gaming extends beyond hardware setups. Desktop gaming relies on screens, keyboards, mice, or controllers, which create an indirect interaction with the virtual world. Although modern displays offer high resolution and smooth frame rates, the sense of being “inside” the game world is limited. VR gaming, on the other hand, uses head-mounted displays, motion sensors, and spatial tracking to simulate presence and embodiment within a digital space. This level of immersion enables players to interact with game environments through natural body movements, resulting in a more lifelike and engaging experience. However, this increased immersion also introduces challenges such as motion sickness, physical fatigue, and the need for larger play spaces.

II. LITERATURE SURVEY

Several researchers have explored smart infant monitoring systems integrating IoT, image processing, and automation. Jabbar et al. proposed IoT-BBMS, o address this, the authors designed a carefully controlled experiment involving three groups of participants, each exposed to a height stimulus in different conditions a real-life height exposure using a fire truck’s crane (actual physical height), (2) a VR height exposure using 360° photorealistic video presented via a head-mounted display (HMD), and (3) a classic 2D laboratory condition presented on a screen. They collected behavioral measures as well as psychophysiological data, specifically electroencephalogram (EEG) oscillations and heart rate variability (HRV), to index vigilance, anxiety, and sensory processing. Their results are striking. On many key measures especially in the alpha- and theta-frequency bands of EEG, which correlate with vigilance and anxiety, and in HRV measures the VR and real-life conditions were nearly indistinguishable. In contrast, both of these immersive conditions diverged significantly from the 2D laboratory setting. This suggests that at least for certain core emotional and cognitive

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processes, photorealistic VR can engage the brain in a manner very similar to actual real-world experience. However, the authors also observed differences in the beta-band oscillations, which they interpret as reflecting aspects of sensory processing: VR did not fully match real life in terms of sensory fidelity, particularly on a haptic (touch) level. This highlights a gap in current VR technology — while visual immersion is excellent, other sensory modalities (like touch) may still lag.

III. METHODOLOGY

The system is developed by designing a VR game environment, creating 3D scenes, and integrating questions using Unity and C#. A database provides questions and user profiles. The VR mobile app delivers the experience through a headset. Users interact, answer questions, and the system records scores and performance

- **Game's Plan and Scenario Design**: The basic story, rules, and exam flow are planned.
- **Maps and 3D Graphics Design:** The virtual world (rooms, objects, scenes) is created.
- **Player's Character Control**: The user's movement and actions inside the VR world are designed.
- **Question/Answer Mechanism**: The system decides how questions appear and how users submit answers.
- **Unity 3D Engine with C# Script**: All the above elements (graphics, controls, questions) are combined and programmed to work together.
- **System Database (Question Bank & User Profiles):** Stores questions and user details. Unity retrieves questions from here.
- **VR Mobile App + VR Headset Control:** The built game is sent to the mobile VR app so the user can experience it using a VR headset.
- **User Interaction (Completing Examination):** The user plays the VR game, answers questions, and completes the exam.
- **Game/Exam Metrics (Time, Score, Grade):** The system records performance results such as score, time taken, and grade.

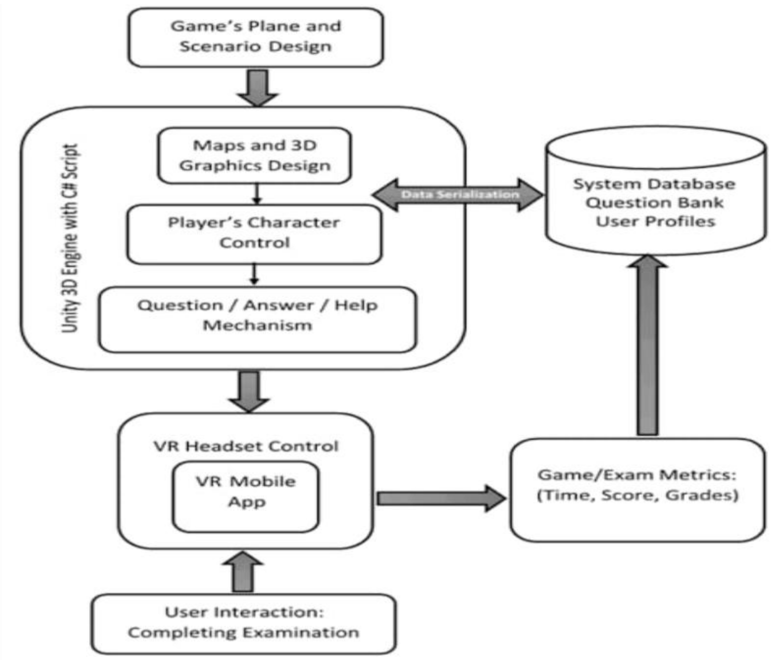

Figure 1: Block Diagram of Proposed System

IV. IMPLEMENTATION

The proposed system integrates a 3D interactive Virtual Reality (VR) game with a real-time health monitoring system using multiple sensors and a web-based interface. The methodology involves the combination of both hardware and software components to create an intelligent, health-aware gaming platform. The hardware section includes different sensors such as ultrasonic sensors, an LM35 temperature sensor, a heartbeat sensor, and a brainwave (ECG) sensor, while the software part includes Unity 3D for game development and an HTML-based interface for displaying health parameters.

Ultrasonic Sensor-1: Measures distance of objects using sound waves.

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Ultrasonic Sensor-2: Another distance-measuring sensor (maybe used for two sides or more accuracy).
Temperature Sensor: Measures the body or environmental temperature.
Heart Beat Sensor: Measures the heart rate (pulse) of a person.
Brain Sensor: Detects brain waves or mental activity (like EEG signals).
ESP-32 Board (Main Controller): All sensor data goes into the ESP-32 board.
It processes the values and prepares them for display.

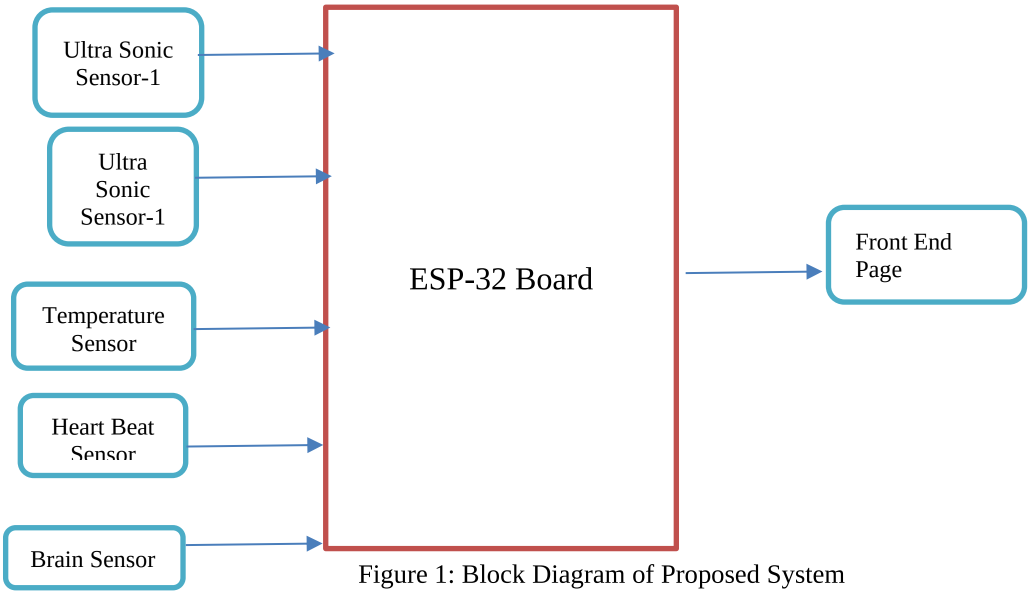

Figure 1: Block Diagram of Proposed System

V. RESULTS

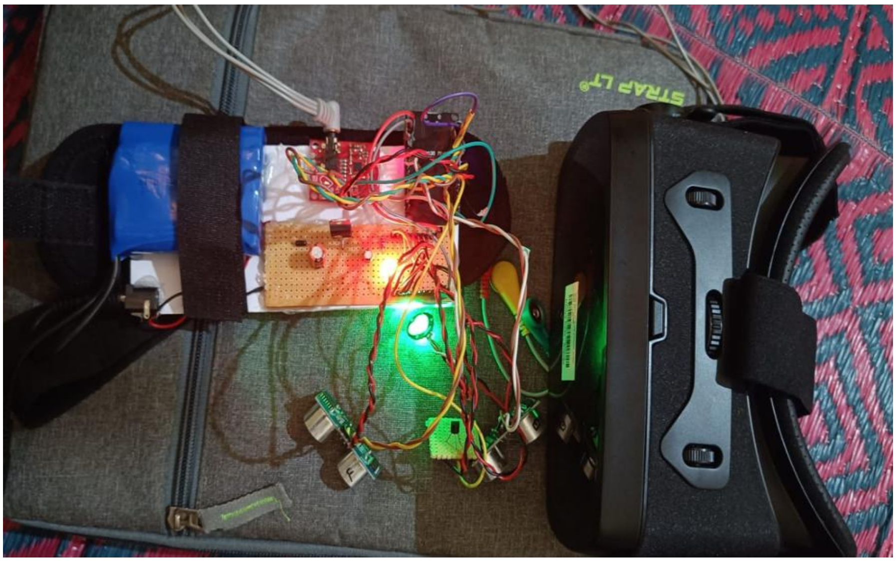

Fig 5.1: Prototype of Proposed System

This prototype is designed to monitor the health of the person.The DHT11 sensor with an external probe measures body temperature, while the heartbeat sensor checks the pulse and sends alerts if irregularities occur.

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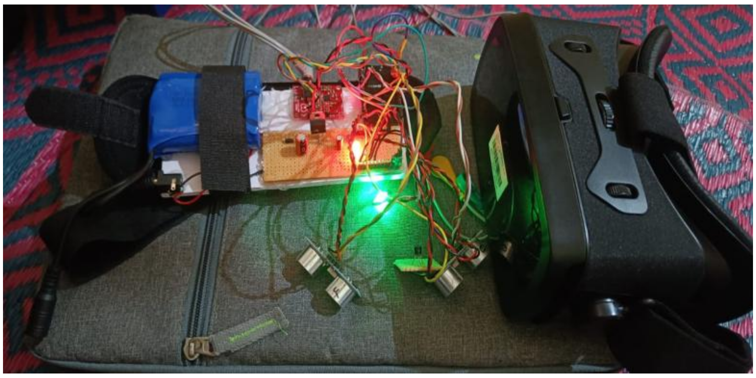

Fig 5.4: Working of model

Microcontroller used to control specific tasks in a wide range of device from simple appliances to complex system.

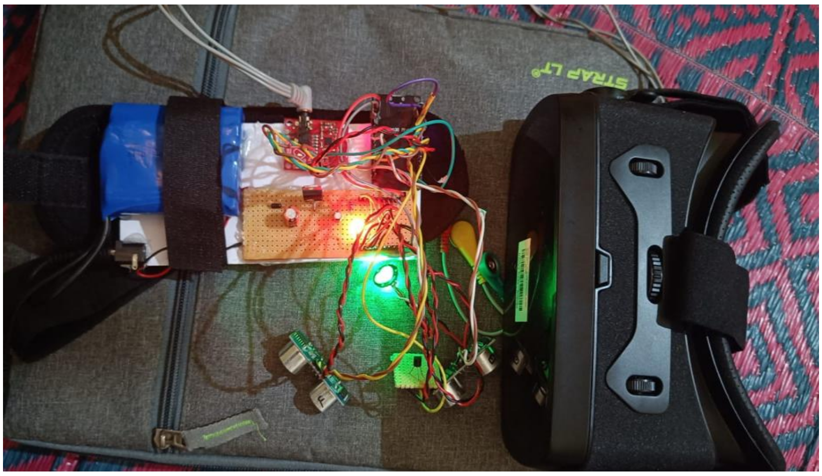

Fig 5.3: Working ultrasonic sensor

An ultrasonic sensor works by emitting high frequency sound waves and measureing the time it takes for the echo to return after bouncing off an object

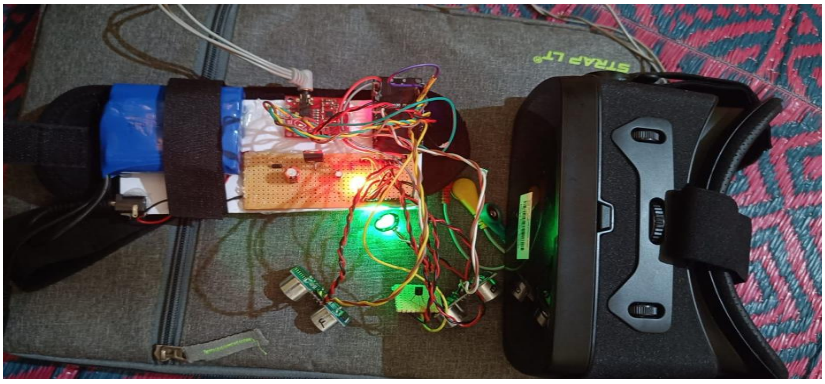

Fig 5.4: Working heart beat and ECG sensor

It works by shining light into the skin and detecting how much light is reflected back.
The ECG sensor works by de-tecting the electrical signals produced by the heart as it beats

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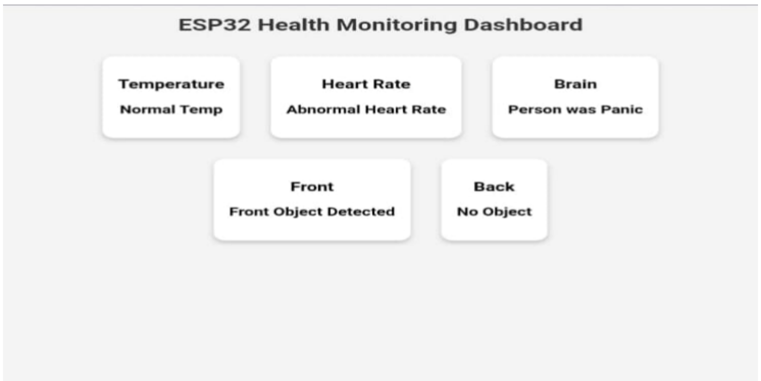

Fig 5.5: Chrome website

All readings and alerts like readings of heart beat, temperature, ECG, wet are sent to parents in real time through a chrome web site.They can remotely control the cradle, fan, and light using a mobile app.

Fig 5.6: playing the games

The photo shows a person wearing a VR headset and interacting with an electronic setup attached to their arm. They appear to be testing or monitoring a system related to baby live-streaming or remote supervision.

VI. CONCLUSION AND FUTURE SCOPE

The proposed project successfully demonstrates the integration of Virtual Reality (VR) technology with sensor-based health monitoring, creating an intelligent and interactive 3D gaming environment that promotes both entertainment and well-being.
proposed project opens several possibilities for future enhancement and real-world applications in both the gaming and healthcare domains. As technology continues to evolve, this integrated system of Virtual Reality (VR) and sensor-based health monitoring can be expanded and refined in various ways to improve accuracy, user experience, and functionality. In the (muscle activity) sensors can be incorporated to provide a more comprehensive health assessment during gameplay.

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