The Design and Implementation of a Game Simulation

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ABSTRACT-In today's scenario, virtual reality which can be referred to as immersive multimedia or computer simulated life, replicates an environment that simulates physical presence in places in the real world or imagined worlds and lets the user interact in that world. Virtual reality artificially creates sensory experiences, which can include sight, hearing, touch, smell, and taste. Virtual reality gaming is where a person can experiences being in three dimensional environment and interact with that environment during a game. Based on Virtual Reality technology, a more interesting and convenient way is provided for people to play virtual reality game on cardboard VR (Virtual Reality). In this project, a virtual reality educational simulation in gaming is proposed for the android platform through cardboard VR. The game is rendered when player aims using his/her eye sight at the specific marker. The players can view the virtual scenario through the lenses of Cardboard VR. Player moves the device to control the game. The experiment results show that the proposed game system can work effectively and provide better educational result to the user.

1. INTRODUCTION

This project deals with creating and deploying a 3D (3-Dimensional) simulator, which is scripted to give users an immersive experience. It describes a proposed solution for waste of energy and cost on employee training as well as ensuring their safety. This solution was designed to improve the level of skill of the employees who belong to the fresher category, who lack experience. A person's safety plays a vital role involving the job that they are in. There are various forms of the 3D simulations. Manual training, which is tests the limits of safety, in many situations such as mechanical work. Today it is important to find methods to eliminate the risks involved in manual training.

1.1 SIMULATION GAME

A simulation video game describes a video game describes a diverse super category of video games, generally designed to closely simulate real world activities. A simulation game attempts to copy various activities from real life in the form of a game for various purposes such as training, analysis or prediction. Usually there are no strictly defined goals in the game, with players instead allowed to freely control a character. Well-known examples are war games, business games, and role play simulation. From three basic types of strategic, planning, and learning exercises: games, simulations, and case studies, a number of hybrids may be considered, including simulation games that are used as case studies. Comparisons of the merits of simulation games versus other teaching techniques have been carried out by many researchers and a number of comprehensive reviews have been published.

1.2 CLASSIFICATION OF SIMULATIONS

Historically, simulations used in different fields developed largely independently, but 20th century studies of systems theory and cybernetics combined with spreading use of computers across all those fields have led to some unification and a more systematic view of the concept. Physical simulation refers to simulation in which physical objects are substituted for the real thing some circles use the term for computer simulations modelling selected laws of physics, but this article does not. These physical objects are often chosen because they are smaller or cheaper than the actual object or system. Interactive simulation is a special kind of physical simulation, often referred to as a human in the loop simulation, in which physical simulations include human operators, such as in a flight simulator or a driving simulator. Simulation fidelity is used to describe the accuracy of a simulation and how closely it imitates the real-life counterpart. Fidelity is broadly classified as 1 of 3 categories: low, medium, and high. Specific descriptions of fidelity levels are subject to interpretation but the following generalization can be made:

Low - the minimum simulation required for a system to respond to accept inputs and provide outputs

Medium - responds automatically to stimuli, with limited accuracy

High - nearly indistinguishable or as close as possible to the real system

Human in the loop simulations can include a computer simulation as a so-called synthetic environment. Simulation in failure analysis refers to simulation in which an environment/conditions to identify the cause of equipment failure is created. This was the best and fastest method to identify the failure cause.

1.3 VIRTUAL REALITY

VR is a computer technology that uses virtual reality headsets, sometimes in combination with physical spaces or multi-projected environments, to generate realistic images, sounds and other sensations that simulate a user's physical presence in a virtual or imaginary environment. A person using virtual reality equipment is able to look around the artificial world, and with high quality VR move around in it and interact with virtual features or items. The effect is commonly created by VR headsets consisting of head-mounted goggles with a screen in front of the eyes, but can also through specially designed spaces with multiple large screens. VR systems that include transmission of vibrations and other sensations to the user through a game controller or other devices are known as haptic systems. This tactile information is generally known as force feedback in medical, video gaming and military training applications. VR also refers to remote communication environments which provide a virtual presence of users with through telepresence and tele existence or the use of a VA (Virtual Artifact). The immersive environment can be similar to the real world in order to create a lifelike experience grounded in reality or sci-fi. Augmented reality systems may also be considered a form of VR that layers virtual information over a live camera feed into a headset, or through a smartphone or tablet device.

Independent production of VR images and video has increased by the development of omnidirectional cameras, also known as 360-degree cameras or VR cameras that have the ability to record in all directions, although at low-resolutions or in highly compressed formats for online streaming. In contrast, photogrammetry is increasingly used to combine several high-resolution photographs for the creation of detailed 3D objects and environments in VR applications.

1.3.1 GAMING IN VIRTUAL REALITY

Several virtual reality HMDs (Head Mounted Displays) were released for gaming. These included the Virtual Boy developed by Nintendo, the iGlasses developed by virtual I-O, the cybermaxx developed by victormaxx and the VFX1 headgear developed by forte technologies. Other modern examples of narrow VR for gaming include the wii remote, the kinect, and the playstation move/playstation eye, all of which track and send motion input of the players to the game console somewhat accurately. Commercial tethered headsets released for VR gaming include the oculus rift and the HTC vive. Systems in development include sony's playStation VR, requiring a playstation instead of a PC (Personal Computer) to run; the star VR; fove; and the magic leap. Following the widespread release of commercial VR headsets, several VR-specific and VR versions of popular videogames have been released. guild software's vendetta online was widely reported as the first MMORPG (Massively Multiplayer Online Role Playing Game) to support the oculus rift, making it potentially the first persistent online world with native support for a consumer virtual reality headset. Since 2013, there have been several virtual reality devices that seek to enter the market to complement oculus rift to enhance the game experience. One, virtuix omni, is based on the ability to move in a three dimensional environment through an omnidirectional treadmill.

1.4 GAME ENGINES FOR SIMULATION

A game engine is a software framework designed for the creation and development of video games. Developers use them to create games for consoles, mobile devices and personal computers. The core functionality typically provided by a game engine includes a rendering engine, a renderer, for 2D (2 – Dimensional) or 3D graphics, a physics engine or collision detection, collision response, sound, scripting, animation, artificial intelligence, networking, streaming, memory management, threading, localization support, scene graph, and may include video support for cinematics. The process of game development is often economized, in large part, by reusing/adapting the same game engine to create different games, or to make it easier to port games to multiple platforms. In many cases game engines provide a suite of visual development tools in addition to reusable software components. These tools are generally provided in an integrated development environment to enable simplified, rapid development of games in a data-driven manner. Game engine developers attempt to pre-invent the wheel by developing robust software suites which include many elements a game developer may need to build a game. Most game engine suites provide facilities that ease development, such as graphics, sound, physics and AI functions. These game engines are sometimes called middleware because, as with the business sense of the term, they provide a flexible and reusable software platform which provides all the core functionality needed, right out of the box, to develop game application while reducing costs, complexities, and time-to-market all critical factors in the highly competitive video game industry.

1.5 SCOPE

The objective of the project is to design and deploy a simulator game in virtual reality which can act as a training module. The equipment and concepts to be trained on are represented as interactive graphic assets in the simulator. To provide an immersive learning experience, using VR headsets which gives a near - life simulated environment.

In this case, a basketball game, providing players with simulated environments, where they can practice their aiming skills, without wasting their physical energy. The user can change the position of the virtual targets to test out different simulated cases. Users are mostly players who intend to test out different situations of playtime and at the same time, plan to, save their energy for the actual match.

2. LITERATURE REVIEW

Zhao Xiao I hong (2017), proposed that based on these the ecological environment of college physical training based on computer virtual technology was studied in this paper. The results show that the application of computer virtual reality technology in college physical training ecology can avoid the danger that may arise in the teaching of physical education and can improve the pertinence of physical education teaching.

Jiali Liu (2015), proposed that in recent years overseas set off a craze for learning chinese. Chinese idioms teaching is important but difficult for foreigners in teaching chinese as a foreign language . Comparison of textbooks or teachers explaining, VR chinese idioms educational game can enhance most of the learners understanding with intense interest. However, It costs the users at least 10 minutes or more to adapt the operation of leap motion. In the further research, the VR chinese idioms educational games can be better gradually based on this research.

Mohamed Ali Khenissi et al (2015), proposed that, recently, there has been growing interest in the use of games in education. Educational games have been found to stimulate learners by increasing their motivation and engagement. The paper also enumerates several educational games that are suitable for experimentation. This synthesis is expected to not only help the researchers and developers working in this field but also pedagogues and teachers who plan to integrate these approaches in educational context.

Jeremy Reimer (2014), states that tennis for two was developed by willy higinbotham as a fun demonstration to liven up a rather dull tour of the brookhaven national laboratory. The custom-made analog computer was hooked up to an oscilloscope, and two paddles consisting of a potentiometer and a single button were connected to it. It was a two-player game only: there was no logic for a computer player. As primitive as it was, however, it represented the first time an action game with an electronic display had been demonstrated to the public. There had been earlier electronic games such as a version of tic-tac-toe and ralph baer had come up with the concept of a games machine hooked to a television as early as 1951, but tennis for two was nevertheless a landmark in video game history. Higinbotham never thought to patent his ideas, and the unit itself was disassembled a couple of years later.

Meller G. (2013), stated that the growth of simulation technology has brought about rapid innovation in medical education systems. The analysis identifies the patients, the procedure, the physician, and the professor as essential elements in any medical education simulator. The level of interactivity of these elements determines the realism of the simulator. The development of a fully interactive simulator for ultrasound education will be presented.

Lina Liu (2011), proposed that computer-based simulation is one of the most valuable aids for manufacturing systems design, yet its use remains limited. The paper evaluates the viability to use the interface as a basis for a general purpose simulation modelling tool capable of coping with any complex manufacturing systems, analyses its potential values, and proposes developments that can support the uptake of simulation techniques within the manufacturing industry**.**

3.1 EXISTING SYSTEM

The existing system makes use of three dimensional graphic technology in computer simulation to attain a certain level of realism, which is not that completely an immersive experience. A computer simulation is an attempt to model a real-life or hypothetical situation on a computer so that it can be studied to see how the system works. By changing variables in the simulation, predictions may be made about the behavior of the system. It is a tool to virtually investigate the behavior of the system under study. Computer simulation has become a useful part of modeling many natural systems in physics, chemistry and biology, and human systems in economics and social science as well as in engineering to gain insight into the operation of those systems. A good example of the usefulness of using computers to simulate can be found in the field of network traffic simulation. In such simulations, the model behavior will change each simulation according to the set of initial parameters assumed for the environment.

3.2 METHODOLOGY

The field of simulation modeling has grown greatly with recent advances in computer hardware and software. Much of this work has involved large scientific and industrial applications for which substantial financial resources are available. However, advances in object-oriented programming and simulation methodology, concurrent with dramatic increases in computer capabilities and reductions in computer hardware costs, have meant that the benefits of simulation can be extended to areas that previously have been impractical. This includes recreation management. The challenge of simulation modeling is to capture the essential behavior of the system being modeled. In outdoor recreation, this means capturing and representing the characteristics of the physical environment, for example, a system of trails, roads, waterways, and/or facilities and modeling the behavior of visitors as they interact with the environment and with each other. In the most basic sense, models have three components: input variables that describe the system being modeled, software and associated modeling approaches designed to process these input variables, and output variables that are useful to planners, managers, and scientists. This outlines these components for recent modeling efforts in park and wilderness management.

3.2.1GENERAL FRAMEWORK

In the framework, the working space is separated into a general level and a native level. Users perform the experimental design and analysis on the general level through the uniform interfaces provided. Then the system transforms the simulation workflow and the configuration specification into a model-specific manner on the native level by using a script or program wrapped with the model. The data management and model execution issues inherent in experimental design for complex workflows are handled transparently from the user such that they can focus on the design itself.

The classification of the physical components used in the general asset creation framework is shown in Figure 3.1. The physics components of the system component consist of two main features called the rigid body and the character controller. The rigid body feature commonly refers to assigning gravitation properties to the graphical assets that are created. The character controller feature refers to assigning player control of the protagonist in the game. The rigid body feature is further subdivided into three major categories of colliders, joints and constant force. The collider is the property of graphic asset creation which enables physics options to the graphical assets that are created. The various types of colliders are sphere, box, capsule, mesh and wheel. The joints are the points of connection between two or more parts of a single graphical assets in any scene. The different types of joints available are hinge, spring, fixed, configurable and character joints. The final classification is that of constant force. This option enables force properties on the graphic objects created.

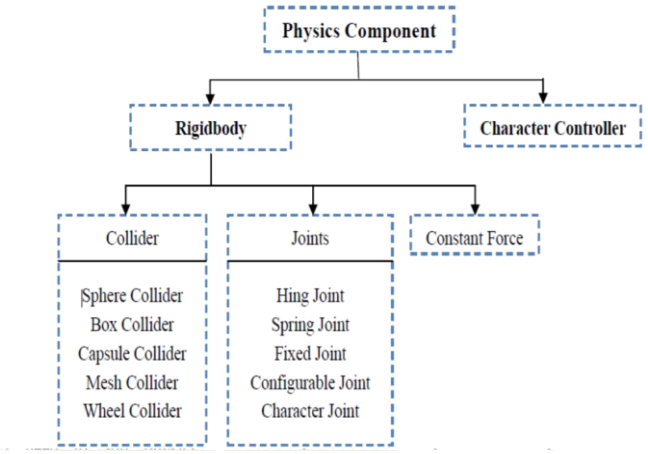

Figure 3.1 Physics components

A game engine is to a game what a car engine to a car. It directly controls all the things in the game, such as the plot, the scene, the music and etc. The game engine binds together all the elements in the game and directs them to work in harmony in the background. Nowadays, the game engine has developed into a complex system which involves all the important parts of the game developing such as modeling, animation making, physical system, collision detection, particle system, and file management system. Scripts are usually compiled at run time, while the host language will be compiled at compile time. This means that recompilation is not needed if the script changes. Recompiling a full game can take minutes to hours, which implies a big productivity hit. Usually, the critical code or backend code will not be scripted. This code should run fast and often memory management is crucial. In games, game logic and configuration are typically contained in script files. These scripts can easily be updated by non-programmers like the designer to tweak the gameplay. Script languages are easy and act in a forgiving manner for that purpose. Often, a script language is also used to do scripting at real time. This comes in handy for tweaking some gameplay elements or even for debugging. Many games provide a console for this, mostly in-house purpose. It is very well possible that one create a game using an existing game engine, just by scripting. The game engine layer is thus fully de-couple from the game logic layer.

3.2 PROPOSED SYSTEM

The proposed project implements the real immersive experience expected out of computer simulations. Virtual reality makes wide use of the degrees of freedom to take the users right into the simulation. This system presents the training module as graphic assets, with which the users can interact with directly, rather than accessing it with stationary mice or controllers.

The most important piece of a virtual reality kit is the headset, a device like a thick pair of goggles that goes over one's eyes. The more expensive, higher quality headsets need to be connected to a computer to run apps and games, while some cheaper ones use a cellphone clipped to the front of the headset. All headsets need to be used alongside a good quality pair of headphones, and there are other optional accessories from hand controllers to treadmills that are all designed to enhance the simulated experience of being in another world. Hand controllers translate the player's real-world gestures into whatever game or application being used, although standard gaming joypads can also be used. VR devices have their own app stores, similar to smartphone app stores, where one can browse and download games and apps. Some of these stores are accessed using the device itself, while others – the VR section of the Steam digital games store, for example – can be browsed on one's computer.

New simulation tools imply new opportunities to teach skills and train health care professionals. The aim of this study was to investigate the learning gained from computer simulation skills training. The study was designed for optimal educational settings, which benefit student-centred learning. Twenty-four second year undergraduate nursing students practiced intravenous catheterization with the computer simulation program cathsim. Questionnaires were answered before and after the skills training, and after the skills examination. When using cathsim, the students appreciated the variation in patient cases, the immediate feedback, and a better understanding of anatomy, but they missed having an arm model to hold. It was concluded that cathsim was useful in the students' learning process and skills training when appropriately integrated into the curriculum. Learning features to be aware of when organizing curricula with simulators are motivation, realism, variation, meaningfulness and feedback.

4. RESULTS AND DISCUSSIONS

The simulator which is constructed using a game engine represents the actual atmosphere of a sports training center. Certain attributes of the in-game objects such as the speed of prefab projection and the timer can be modified. The virtual reality part of this simulator is enhanced by google cardboard or the oculus rift. The google virtual reality software development

kit that has been imported provides automatically for the settings such as the cardboard viewer camera.

This system also makes use of the android software development kit to package the build to be pushed onto android devices also. The google cardboard viewer camera provides not only provides the feature of virtual reality lens on the phone but also emulates the same setting for testing in the computer. This can help technically to validate the visuals, and provide an immediate feedback and correction on the quality and performance of the simulations generated by the target system.

5. CONCLUSION

In this paper, a method has been proposed to implement the technology of simulations for the purpose of educational welfare using virtual reality. The normal constricted first person camera used by the player in the normal simulations has been taken and modified by adding sensors to provide for degrees of freedom. Using the well - known environment of unity, the maximum reality in a simulation can be achieved when combining different features. Although three dimensional simulations have unique characteristics compared to other corpuses like two dimensional, two and a half dimensional etc., virtual reality helps to bring about that specific level of immersion, which no other technology have achieved before. However, researches can also be done by trying to develop much better game engines which almost try to replicate real life. The availability of the system capability adds an advantage. The system is designed in a user friendly manner making it pleasant to use. It also provides faster results as efficiency is maintained.

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