

## *Retraction*

# **Retracted: Virtual Reality Action Interactive Teaching Artificial Intelligence Education System**

### **Complexity**

Received 23 January 2024; Accepted 23 January 2024; Published 24 January 2024

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Manipulated or compromised peer review

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

In addition, our investigation has also shown that one or more of the following human-subject reporting requirements has not been met in this article: ethical approval by an Institutional Review Board (IRB) committee or equivalent, patient/participant consent to participate, and/or agreement to publish patient/participant details (where relevant).

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

### **References**

- [1] L. Jiang, "Virtual Reality Action Interactive Teaching Artificial Intelligence Education System," *Complexity*, vol. 2021, Article ID 5553211, 11 pages, 2021.

## Research Article

# Virtual Reality Action Interactive Teaching Artificial Intelligence Education System

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Received 2 March 2021; Revised 6 April 2021; Accepted 13 April 2021; Published 27 April 2021

Academic Editor: Zhihan Lv

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Comprehensively improving the level of vocational education and teaching quality has become an important initiative to meet the new round of technological revolution and industrial change. The traditional teaching mode can no longer meet the needs of industries and enterprises for job competences, and all higher education institutions are actively thinking about how to carry out teaching reform. Virtual reality (VR) can effectively solve the above-mentioned drawbacks, but the hardware facilities of the existing VR systems are extremely expensive, making it impossible to popularize it in teaching. In this context, this paper is based on VR for the design of an interactive teaching platform. This paper discusses the key technologies of virtual reality, introduces the relevant theoretical foundation, and describes the current virtual reality devices with high popularity and their advantages and disadvantages for systematic analysis. From the perspective of teaching design, the design of human-computer interaction teaching process using VR technology to develop learning scenes is studied, introducing 3D modeling techniques, model construction, the production of picture and text panels, the production of video materials, and the establishment of virtual tour guide 3D scenes. The principle of this paper is to build a 3D vision for building 3D views of educational needs to design high quality images and video animation using 3DMAX and unity 3D engines. Then, we introduce the use of VR glasses (entry-level), smart phones (android/ios), and Bluetooth wireless handle to build a simple interactive teaching platform; the platform is of low cost of construction and student coverage, to solve the teaching resources shortage, equipment conditions lagging behind, the curriculum content aging, teachers and students who cannot interact in real time, and a series of problems.

## 1. Introduction

Standing on the overall situation of economic, social, and educational development, comprehensively improving the level of vocational education and teaching quality has become an important measure to meet the new round of technological revolution and industrial change [1]. The traditional teaching mode can no longer meet the demands of industries and enterprises for job competencies, and higher vocational institutions are actively thinking about how to carry out teaching reform. In order to speed up the process of teaching reform, various interactive online learning platforms using multimedia computer technology and network technology have emerged. Although these teaching platforms have overcome the problem of uneven

allocation of resources in time and space and improved the teaching effect, they still cannot meet students' demands for experiments, practical exercises, and training and cannot realize real-time interaction between teachers and students, and teachers cannot perform the function of guidance and supervision, which will weaken the students' motivation to participate in the teaching process [2]. Therefore, based on this situation, a new technology, virtual reality (VR), has entered the education field with its rapid development. The basic principle of virtual reality, also known as VR technology, is to build a corresponding three-dimensional virtual space with the help of computer graphics rendering technology and other technologies to give the user sensory perceptions, mainly visual, auditory, and tactile, so that the user can feel and interact with the information from the

virtual reality world as if he or she were in a virtual environment. The user can also feel and interact with information from the virtual reality world [3].

Virtual reality is a technology that allows people to feel like they are actually there and to perform activities and communication [4]. Virtual reality technology is actually a collective term for a number of technologies, including sensing technology, stereo display technology, network technology, voice recognition, stereo sound technology, and data communication technology. Its main feature is to achieve a perfect docking of virtual reality, bringing people a sensory experience, as shown in Figure 1. In the situation of comprehensive implementation of teaching reform in business data ( $t_n$ ), it is undoubtedly most necessary to design real data ( $y_n$ ), economically and widely applicable VR interactive teaching device to assist teaching, especially in private higher education institutions that are limited by teaching funds. Computer-assisted teaching is a discipline that applies various teaching activities conducted with the assistance of computers to discuss teaching contents, arrange teaching processes, and conduct teaching training methods with students in a dialogic manner [5]. From 1958, when the theory of computer-assisted teaching was proposed, to late 1980s, when computer-assisted teaching was developed with the help of multimedia computers, computer-assisted teaching has been developed at a high speed in education and has formed a great impact on the traditional education industry in terms of teaching methods, making it an important source of theory and knowledge for innovative education methods, and computer-assisted teaching has become an emerging teaching method, and computer-assisted instruction has become an emerging method and means of teaching [6]. However, computer-assisted instruction is not always smooth. Due to the limitations of traditional computer-assisted teaching systems on teaching approaches and answers, it is difficult to cope with students of different levels and abilities and how to use different teaching strategies and appropriate teaching methods to assist students of different levels, which puts forward higher requirements for computer-assisted teaching, hoping that computer-assisted teaching can have a better presentation form, a more intelligent assessment system to improve the teaching and learning process [7]. Therefore, people began to propose more concepts and teaching methods to improve the theory of computer-assisted teaching, and educators proposed the combination of virtual reality and computer-assisted teaching in order to make the content of computer-assisted teaching more interesting and vivid, so as to improve the quality of teaching with more interesting and intuitive presentation. The maturity of virtual reality technology in recent years has injected infinite vitality into the new concept of teaching method proposed by computer-assisted teaching, and the humanized interactive teaching method will be developed at a high speed [8]. Therefore, the application of virtual reality technology in education will become a hot topic of education reform, and the concept of “immersive teaching” is born. The concept of “immersive teaching” was born. Using the three outstanding features of VR technology, interactivity, immersion, and

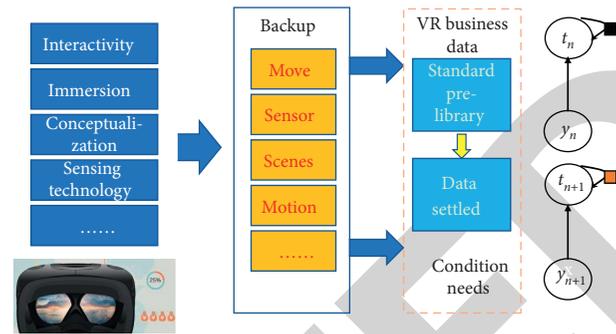


FIGURE 1: Virtual reality technology scene display.

conceptualization, and the key technologies, sensing technology, computer graphics technology, voice recognition and processing technology, network technology, etc., the information accessed by the computer can be rapidly transformed into a technology that can be recognized by the human body, and things in the virtual environment can accurately give corresponding feedback after receiving the user’s input [9]: real-time interactive online and offline hybrid education, an online learning platform, and an organic combination of real-time point reading, and the construction of a low-cost, widely used teaching platform, in order to achieve the purpose of improving the teaching effect, increasing interest in learning, and teaching and learning without time and space limitations [10].

Although the current application field of VR is wide, the application in the field of education still has some limitations, not popular enough, mostly in the national key undergraduate institutions to develop, apply, and promote few vocational institutions, and fully immersive VR system hardware equipment is expensive, bulky, and complex, and difficult to meet the use at any time, and the coverage of students is small, not widespread in teaching, and it cannot meet the online learning requirements. In this paper, we explain the history and development of the VR technology. And then, we analyze and organize the current state of applying VR technology to domestic and foreign education, clarify the advantages and disadvantages, and analyze the requirements of hardware and software, performance requirements, and, therefore, rational design platform. Using VR technology, such as real-time 3D computer graphics technology, stereoscopic display technology, network transmission, and the like, using the VR technology to develop a learning scenario for interactive educational process design from the viewpoint of educational design Using 3D Dmax and unidirectional 3D engine, we build a 3D visual construction of a 3D view of preschool education needs and design high quality photos and video animation. Using VR glasses (entry-level), smart phones (android/ios), online learning APP, and Bluetooth wireless handle to build a simple interactive teaching platform, the platform is a low-cost construction and has wide student coverage, to solve the shortage of teaching resources, equipment conditions lagging behind, course content aging, teachers and students who cannot interact in real time, and a series of problems. Finally, the application test of the platform was conducted

with the example of “explanation of a scenic spot” in the course of tour guide practice, and the questionnaire survey was conducted to verify the advantages and shortcomings of the teaching platform.

## 2. Related Work

The development of VR technology has gone through three main periods, when virtual reality technology first appeared, but there was no complete concept of virtual reality [11]. It was Morton Heilig, an American, who created a simulator called Sensorama to facilitate his work, which integrated several technologies, mainly 3D stereoscopic vision, hearing, and smell, and it was an extremely advanced multisensory simulation system. Buttussi published a paper about virtual reality technology, suggesting that the computer screen we use can actually serve as a window to the virtual reality world. It was this idea that sparked a surge of research into virtual reality. The following year, researchers at MIT first began researching helmet-based displays [12–16].

After several years of hard work, Ivan finally developed the ultimate display and named it Sword of Damocles, which contained two CRT monitors that could display more images, as well as mechanical linkages and ultrasonic detectors that could be controlled by a handheld terminal. The user can interact with the virtual reality world by controlling it with a handheld terminal [17]. In general, the Sword of Damocles is the most important result of the nascent period of virtual reality technology, and it is also called the prototype of virtual reality devices. Virtual reality technology also began to gradually penetrate into the application field [18].

The first application of VR in education has been developed around 22 years ago, beginning in several major developed countries in Europe and the United States. The pioneer of VR education is the Department of Electrical Engineering of the MIT. VR technology was introduced into the classroom immediately after the appearance. The Institute of Space Physics at NASA and Houston University established the virtual physics laboratory through technology sharing and teamwork. A major scholar at Carolina State University has built a web-based exploratory virtual physics lab using Java technology. It contains two major research directions. First, research on virtual experimental equipment and equipment. Second, collaborative learning research.

In this period, some extremely classic virtual reality integrated systems were produced. The following year, the Virtual Interactive Environment Workstation (VIEW) was created, which was the first complete VR system in the history of VR technology [19]. VPL developed the first civilian virtual reality product, Eye Phone. The founder of VPL formally proposed the concept of “Virtual Reality.” The founder of VPL officially introduced the concept of “Virtual Reality,” which was officially recognized and used. In this stage, the input and output devices of virtual reality technology have more comprehensive development, so that users can have more convenient, intuitive, and realistic experience of the virtual environment, and the user experience is greatly

improved and is an important sign of maturity of virtual reality technology [20].

CAVE, a virtual reality system based on a multidirectional projection display model, emerged, containing mainly more than three screens to provide users with a comprehensive virtual presentation environment, in which they can fully immerse themselves and interact with the virtual environment with great precision. In recent years, the development of virtual reality technology has progressed rapidly, and the reason why there is such a great progress is due to, firstly, the rapid progress of computer technology and computer graphics processing technology and, secondly, virtual reality technology that has been applied to many industries and has achieved extremely high achievements, and people are more and more favoring virtual reality technology. At this stage, virtual reality technology has started to be applied in many fields such as education, entertainment, medical care, military, and cultural heritage conservation [21].

## 3. Design and Implementation of VR-Based Interactive Teaching Platform for In-Class Applications

*3.1. Design of Interactive Teaching Platform.* In hardware including VR glasses, Bluetooth scanning handle, smartphone hardware devices, high-performance servers, and high-capacity storage devices, the selection follows the principle of technologically advanced, economically reasonable, applicability in the course, as well as feasibility, maintenance, operability, and energy supply requirements, analysis, and comparison to determine the optimal solution for the equipment [22].

- (1) The choice of VR glasses. When wearing a good VR headset, the cell phone into the box being a display and computing equipment, the user can see the left and right parts of the image with the help of the left and right eyes, respectively, and the brain can realize the processing of two images and produce stereo vision. With the help of cell phone gas pedal, gyroscope, etc., to determine the human head posture, the user is able to shift their perspective through head movement, and you can initially experience the charm of virtual reality technology, bringing students the feeling of immersion. This study chose VR glasses as the basic equipment for the study.
- (2) The choice of Bluetooth scanning handle. Bluetooth scanning handle can be selected from the ordinary handle, instead of the cell phone as an interconnected operating device, with the help of which to connect and complete the corresponding interactive transmission operation, the development of the function of the button, in the Bluetooth handle, and the assembly of vibration and acceleration sensors. Bluetooth supports version 4.0 or more, through the five batteries for life, and the Bluetooth handle can achieve a seamless connection with the Bluetooth-enabled cell phone.

When students need to explain the textbook graphic description of the attractions, you can hold the scanning handle in a laterally horizontal position with the text of the extension in the direction of movement or continuously draw circles in the outer contour of the image, the optical element camera, the graphic light information into the sensor, the sensor built-in converter, and the light signal into a digital signal and send it to the digital processor, the digital processor for digital information binarization. The digital processor performs binarization, tilt correction, image stitching, and OCR recognition on the digital information, and the Bluetooth scanning handle graphic processing process, as shown in Figure 2, converts the information into editable graphic information stored in the storage and transmits it to the computer or cell phone through the wireless transmission element, matching the values with the 3D view prepared before the class in the computer or cell phone learning platform and controlling the virtual software through the Bluetooth operating handle to make it play the view prepared before the class. The constructed view can be viewed in real time in the field through VR glasses as a 3D view or panoramic video. For the virtual reality system, in order to better meet the demand for roaming functions, the camera must be used reasonably well, because the camera is an important bridge to achieve human-computer interaction. Through the camera, the virtual world can be more intuitive to present. Therefore, for roaming experience, the camera is a crucial component, and in this system, the first and third viewpoints are used to help the experiencer feel the virtual reality world, which is presented in the first-person perspective. For large scene roaming application, roaming map is an extremely important part of the content, which can be extremely intuitive to present the rover's direction, location, and other information and can also help complete the jump operation. By changing the rover's direction information, zooming the map, and presenting the location, the corresponding interactive map can be completed.

In the teaching process, the platform is divided into mobile and PC terminal, and the main functions are course learning, discussion questions, homework practice, 3D cloud video viewing, course work layout submission, question bank use, message management, course syllabus upload access, etc. In order to achieve the above functions, the functional modules are designed as shown in Figure 3.

- (1) Login statistics module: it is used to count the login status of users, mainly based on the concurrency, area, time period, and current number of online users for the current and historical login data. The data file blockchain can be obtained in the interactive record, which was easily realized based on the app.
- (2) Database storage module: it is used to store account information data, user login statistics, and other data uploaded to the platform when registering on the teacher side or student side, so as to facilitate the subsequent search and verification of data information.
- (3) Interface management module: it is used to distinguish the user interface for rendering different roles, to facilitate the display of the corresponding role interface once different role users log in, with the said student-side display interface being different from the teacher-side display interface.
- (4) Resource management module: it is used to manage the resources stored in the cloud server in the software on the teacher side and the student side, including uploading, downloading, deleting, updating, and finding operations of 3D video resources, 3D model package resources, and audio resources on the teacher side and the student side, so that it is convenient for the teacher and the student to request resources from this module in a timely manner.
- (5) Information relay processing module: it is used for relaying and parsing the received control information sent from the teacher side to the student side, and the feedback information sent back from the student side to the teacher side, so that the teacher side and the student side can interact with the data stream. The interface representation layer is where users interact directly with various android pages and client interface software; the logical interface layer establishes an abstraction for the functions.
- (6) Data push module: it is used to push relevant data information to the student side or the teacher side according to the request sent by the student side or the teacher side.
- (7) Log management module: it is used to record some log information of the system itself to facilitate operation.

After analyzing the functional and technical basis of the platform, the platform is logically divided into three layers of architecture: the interface representation layer, the logical interface layer, and the data storage layer. The interface representation layer is where users interact directly with various web pages and client interface software, the logical interface layer establishes an abstraction for the functions provided by the system to separate services and data, and the data storage layer is responsible for the permanent storage of data from the logical interface layer. The main function of the server computer is to help implement user queries, logins, and other operations. Inside this platform, user scenarios need to be consistent. In order to meet the consistency of the server scenes, it is necessary to complete the corresponding interaction behavior after the user logs in to the scenes; with the help of such interaction, it is possible to modify the content and properties of the scenes, and it will update the various scenes corresponding to the platform; however, the server and client interaction presentation has a lag, so a client must submit the relevant information to the server. After receiving the user information, the server first makes a simple judgment on the information, such as the attributes of the entity, user rights, and priority and then assigns it to the processing priority queue according to the

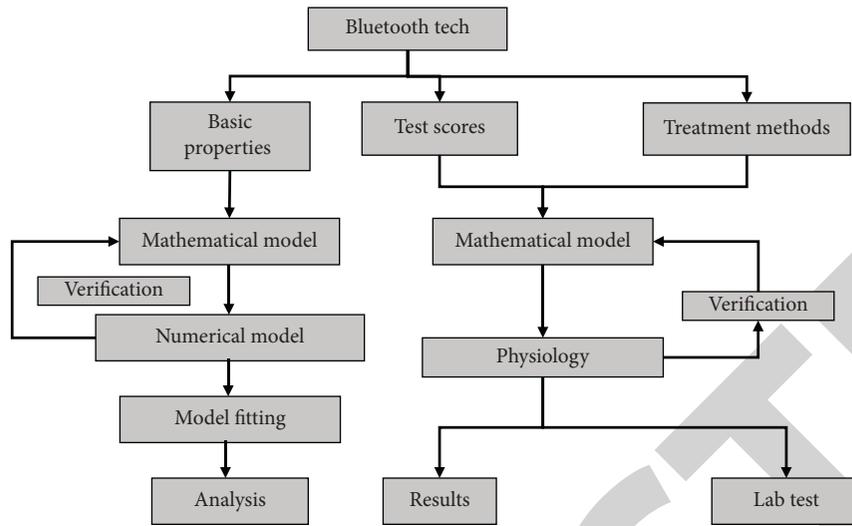


FIGURE 2: Bluetooth scanning handle graphic processing flow.

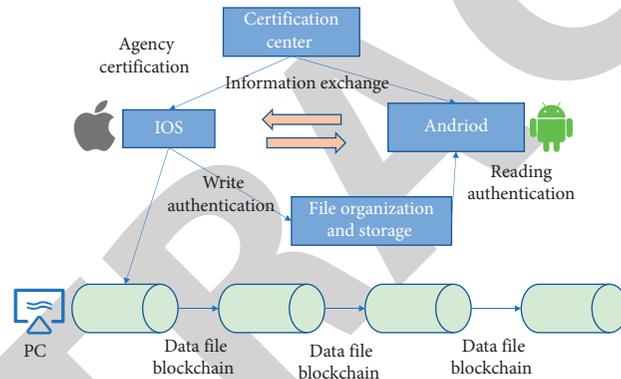


FIGURE 3: Functional module design.

situation. The server will process the events according to the queue order, and after the processing is completed, it will modify the scenario database; moreover, it will pass the modified data to the client and update some of the data. If the event execution fails, then the server sends feedback to the corresponding client and prompts the user.

**3.2. Platform Functional Module Design.** The content of user management mainly includes user information management, user operation record query, query on user operation behavior, and query on operation user. The timing diagram of user addition is shown in Figure 4. Actually, the timing diagram depended on the cycle stages. For example, in the initial stage, the time line is located on the  $\pi/4$ , where the artificial extraction is about  $-1.0$ . When the system administrator initiates the request for user addition, the front-end controller receives the request for user addition initiated by the system administrator, finds the corresponding controller, and then forwards it to the corresponding business logic to process the request for user addition, saves the new user information to the database when the business logic is

processed, and returns the result information of user addition. When the system administrator initiates a course information deletion request, the front-end controller receives the course information deletion request initiated by the system administrator, finds the corresponding controller, and then forwards it to the corresponding business logic to process the course information deletion request, and, in the business logic processing, deletes the course information from the database, and returns the course information deletion result information. In the course information addition, synchronous interaction technology is used. After the client publishes the course information, through synchronous interaction technology, other clients can see the course information added by this client after refreshing again.

Teachers can view and reply to students' messages and delete illegal messages, while students can fill in messages and submit messages. When a teacher initiates a request for a message, the front-end controller receives the message request from the teacher, finds the corresponding controller, and forwards it to the corresponding business logic to process the message request, and, in the business logic

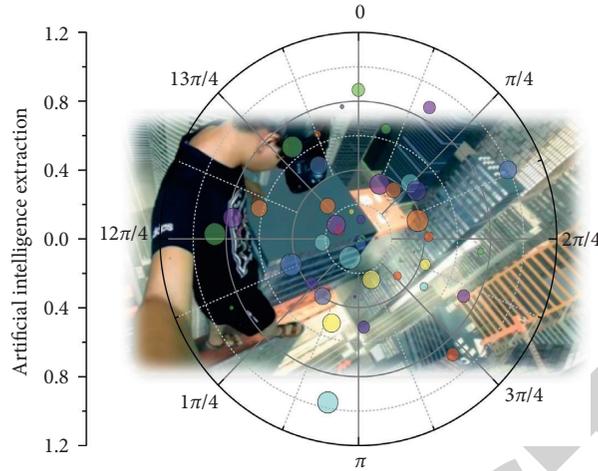


FIGURE 4: User addition timeline.

processing, queries the user's message information from the database, and returns the result information of the message query. In the message addition, the synchronous interaction technology is utilized. After the client publishes the message information, other clients can see the message information added by this client after refreshing again through the synchronous interaction technology. Message information lists will be described by trapezoidal fuzzy numbers. Before introducing trapezoidal fuzzy numbers, we briefly understand the definition and operation of LR-type fuzzy numbers.

Assume that a fuzzy number  $A$  is a regular fuzzy set with fuzzy convexity and continuous affiliation function in the set of real numbers  $R$ , where the family of fuzzy numbers is denoted as  $F$ . Assume that  $A$  is a fuzzy set with  $\gamma$ -level intercept.

$$[A]^\alpha = [x(\beta), y(\beta)], \quad (\beta \in [0, 1]). \quad (1)$$

Then, the exact form of the mean value of the probability of  $A$  is

$$Q(A) = \int_{i=0}^n (x(\beta) + y(\beta)). \quad (2)$$

Assume that the platform parameters and personalization parameters of the product family are  $x_1, x_2$ , and the mapping of platform and personalization functions are  $1, 2, f, f$ , respectively, and the expressions of the mapping are linear and contain fuzzy coefficients; the optimization directions of platform and personalization functions are minimal and maximal, respectively, and the constraints are also linear and contain fuzzy coefficients. The platform function is optimized, and then a fuzzy two-layer linear programming model for the product family parameter design can be established as shown in

$$\begin{cases} \min f_i(x_1, x_2) = C_{ij}x_1 + C_{ij}x_2 \\ Bx_1 \leq d \\ x \neq 2 \\ \text{Poss}(f_i(x, y)) \leq \beta_i \\ x_2 \leq 1 \end{cases}, \quad (3)$$

where  $C_{ij} = (1, 2)$  denotes the fuzzy coefficients in the platform and personalization function mapping, respectively,  $B$  and  $d$  denote the fuzzy coefficients in the platform function optimization constraint, and  $A_j$  ( $i = 1, 2$ ) and  $b$  denote the fuzzy coefficients in the personalization function optimization constraint, both of which are fuzzy numbers obeying a certain likelihood distribution. When a student initiates a request to submit a message, the front-end controller receives the student's request to submit a message, finds the corresponding controller, and forwards it to the corresponding business logic to process the request to submit a message, saves the message submitted by the student to the database during the business logic processing, and returns the result information of the submitted message. When a teacher initiates a file upload request, the front-end controller receives the teacher-initiated file upload request, finds the corresponding controller, and then forwards it to the corresponding business logic to process the file upload request, saves the uploaded file information to the database when the business logic is processed, and returns the result information of the file upload. Users can publish information after logging into the system, edit the information, and click publish, and the information can be published on the system after passing the system administrator's verification. When the system user initiates a request for information release, the front-end controller receives the information release request initiated by the system user,

finds the corresponding controller, and forwards it to the corresponding business logic to process the information release request, saves the released information to the database when the business logic processes it, and returns the result information of the released information. In information publishing, synchronous interaction technology is utilized. After the client publishes information, other clients can see the information published by this client after refreshing again through synchronous interaction technology.

In the platform, the content of the lectures can be recorded and archived for later reuse, and the content can also be recorded with the help of video equipment for flexible recall. In the case of specific teaching, it is possible to record the content of different tour routes. Once recorded, these files are stored in a separate file for easy recall. At the same time, these files are handed over to the students for evaluation in order to improve the efficiency and effectiveness of the simulated tour guide. The biggest advantage of this approach is that it avoids the drawbacks of teacher evaluation and identifies problems in the process from the student's point of view, which can be optimized and improved. At the same time, the platform uses advanced technology, and users can access the system with the help of a variety of networks such as local area networks and complete the interaction with the system to enhance the flexibility of teaching. An important technology for virtual scene roaming is collision detection, and virtual-tools can help the system achieve the presentation of elasticity, friction, gravity, and dynamic properties of vehicles. The collision detection of characters and buildings is done through grid. With the grid, a two-dimensional area is constructed in the virtual world and mapped to the three-dimensional space. At the same time, it is necessary to create a grid in the virtual world and present the location information of the building and add the Layer Slider module to the script file.

#### 4. System Implementation

For virtual reality applications, virtual artificial environments must be constructed through hardware and software facilities, and dynamic virtual environment information must be continuously provided to the user to create a sense of immersion. In the human vision system, binocular inspection is the key to generate 3D stereo images, so this paper uses this principle to help users achieve stereo vision through the Unity-3D engine. In this engine, the Scene view presents the virtual environment, in which there are many virtual objects built in the virtual environment, the Main Camera is the virtual camera, and the Game view presents the picture corresponding to the camera, so the virtual camera should be regarded as the "eyes" of the human body in the virtual environment.

Figure 5 shows the corresponding Scene view, and it is easy to find that the Game view shows the images within the field of view of the Main Camera, and in fact, the Main Camera can be regarded as the eyes of the human body in the virtual environment. As the position of the Main Camera changes, the Game view will be dynamically adjusted accordingly, and the display screen will be updated in real time.

However, in a single virtual camera, the stereo vision of the virtual world is difficult to render, because no less than two cameras are needed to build the stereo vision. Therefore, through the Unity-3D engine, two virtual cameras are selected to simulate the human eye and thus build 3D stereo vision. To achieve this goal, we need to build a simple virtual environment first and then build 2 cubes by Scene, and the corresponding coordinates are  $(-1, 0, 2)$ ,  $(1, 0, 2)$ . We need to add different textures to the two cubes to do the difference, and the left and right cube are set to "left-" and "Right+" textures for the left and right cubes, respectively. And we set two cameras in the Scene, namely, Camera 1 and Camera 2, which mainly simulate the human eye to observe things in the virtual world. In order to better simulate the effect of the human eye to observe things, you need to ensure that the two cameras maintain a similar distance with the human eye; usually, the distance between the eyes of adults is 6 cm. And the basic unit in Unity-3D engine is  $m$ , so the distance between Camera 1 and Camera 2 should be adjusted to 0.06, and the coordinates of the two cameras are  $(-0.03, 0, 0)$  and  $(0.03, 0, 0)$ . In order to better present the differences between the things observed by the two cameras, the plane surface is added in this design, and the green and blue materials are added to the left and right of the surface, respectively. If there is no light source in the virtual environment, the light in the scene will be extremely dim, so it is necessary to increase the brightness by adding a light source.

At this time, the user can only observe the blue color on the right side of the plane, but not the green color on the left side of the plane, which is closer to the right side of the cube. It is not difficult to find that there is a difference between the two virtual cameras, but the difference is not large enough to meet the needs of human visual observation. If the images of Camera 1 and Camera 2 are transmitted to the left and right eyes, respectively, the human eye can observe the 3D images. In the VR glasses used in this study, the internal box has a vertical baffle, and the box is divided into two areas, so the screen presented by the phone is also divided into two areas, and the left and right show the corresponding screen of Camera 1 and Camera 2, respectively, and then, after the phone is placed in the VR glasses box, you can see the corresponding screen, respectively. For Unity-3D, the view point property of Camera contains four parameters:  $X$ ,  $Y$ ,  $W$ ,  $H$ .  $X$  and  $Y$  refer to the lower left corner of the coordinate axis, while  $W$  and  $H$  refer to the width and height. By setting these parameters, we can achieve the purpose of split-screen display.

#### 5. System Test

In the specific scenario design, you can design one explanation point or multiple explanation points, and also the total tour time can be preset, and then the system automatically, according to the content and time points, explains. In the specific tour, you can flexibly retrieve the video, pictures, and other information from the scene library and also record the student's explanation, so that you can play it back when needed. During the tour, you can stop at any time if you encounter unexpected events, and you can also jump

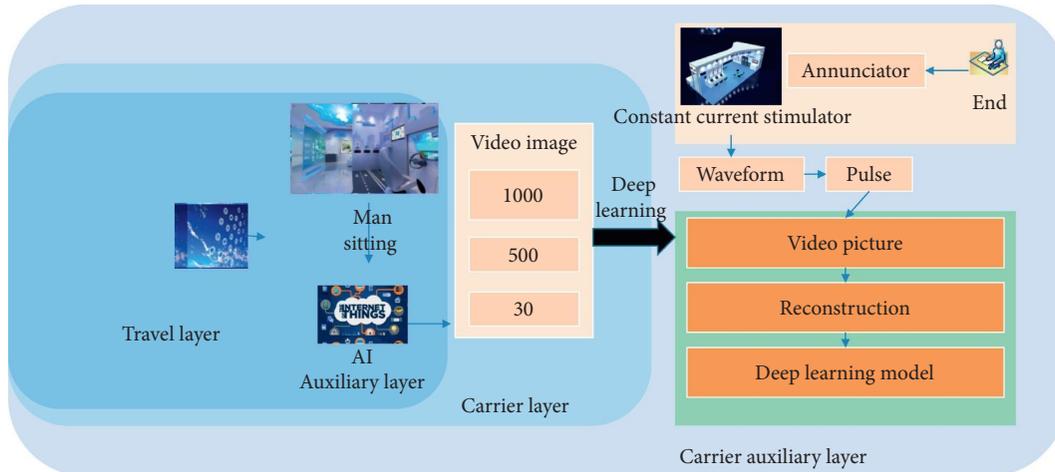


FIGURE 5: Scene view.

directly to the location you need to visit as needed. In the scene, the operator can see their own area and, thus, control the overall pace of the tour. In this platform, there are many kinds of character decision models to choose from, so teachers can role-play with the actual needs of the explanation and also feel extremely convenient to change the role during the tour and control the corresponding actions of the character, such as jumping and walking. In the course of the tour, there may also be some unexpected situations, and this material is also designed in the platform; teachers can call according to the actual needs, and through this way, they train students' resilience.

If the phone is placed horizontally, the virtual camera renders the cube "Y-Down" directly below the phone; if the phone is placed vertically, the virtual camera renders the cube "Z+Forward" directly in front of the phone, "Z+Forward" cube. Through the scheme used in this study, the gyroscope of the cell phone is needed to effectively control the virtual camera pose, which in turn links the human head pose to the virtual world, and the above method is mounted on the virtual camera through the preparation of code to complete the pose monitoring. In order to use a dual virtual camera, note that gyroscope needs to track and control the rotation of two virtual cameras simultaneously, and you need to check the left eye and right eye positions of camera simulation. This paper describes the unity 3D relationship. If the position of the object is not changed, the child is changed, and the positional relationship between them is the same. If the parent position is  $(0,0,0)$ , and the child object is at  $(0,0,1)$ , once the parent object rotates around its own axis, then the child object will also rotate accordingly. Specifically, we need to first innovate the empty object and classify the two virtual cameras as subobjects. If the coordinate of the empty object is  $(0,0,0)$ , the virtual camera coordinates are  $(0.03,0,0)$ ,  $(-0.03,0,0)$ , with the gyroscope being able to achieve the empty object rotation attitude control and, at the same time, ensure that the two virtual cameras have been simulating the left and right eyes, as shown in Figure 6.

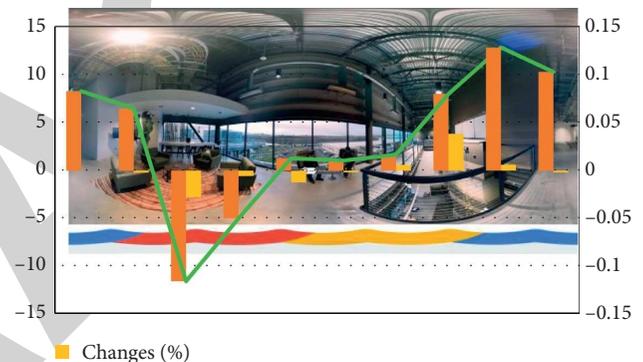


FIGURE 6: Real-time detection based on VR eye distance.

Ensure that the virtual scene will move in real time during the movement of the human head.

In the virtual reality system, the addition of stereo binocular vision and head posture detection can meet the user's immersive experience needs to a certain extent. According to the actual application scenario, "virtual tour guide" application software can be developed. However, from the actual situation, people need to be immersed in the virtual environment on one hand and hope that the viewpoint does not simply stay in a certain place but can zoom in and out by moving back and forth to realize the scene, thus having a more realistic experience. To meet this demand, this paper proposes a virtual reality roaming method based on handheld device sensing. In the previous model, it mainly relies on the tracking of human body to achieve and update the human body position information. This method can maximize people's immersive experience, but its shortcomings are extremely obvious, that is, the high technical requirements and high cost, so it cannot be used in the virtual reality system built on cell phones and VR glasses. After the user wears VR glasses, they can only see things in the virtual world, and if you want to increase the interaction with the real world, handheld devices to complete the interaction are an extremely direct

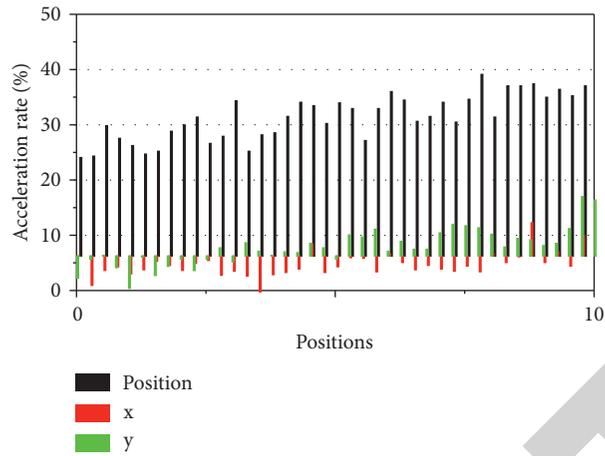


FIGURE 7: Modular acceleration display.

and fast way, and the advantage of handheld devices is that they can sense human movement commands. To meet this function, there must be built-in sensors, in line with the relevant requirements of the device, as smart bracelet, cell phones, etc.

Currently, the major bracelets on the market do not process and analyze the underlying sensors, so this paper mainly uses cell phones to act as handheld sensors. In the virtual reality system designed in this paper, a cell phone is selected to be placed in the glasses case as a display device, which can be used to determine the posture angle of the human head with the help of gyroscopes, etc. In addition, another cell phone should be added to complete the interaction with the cell phone in the VR glasses. To achieve this function, on one hand, communication guidelines need to be designed, and on the other hand, cell phones need to be interconnected. In fact, the virtual scene roaming is mainly done by the movement of the camera, and the displacement of the virtual camera mainly contains four kinds, such as front, back, left, and right. In order to realize the cell phone to master the virtual camera position information, it is necessary to build the correspondence between the cell phone and the camera displacement in four directions, that is, front, back, left, and right. In this paper, combined with the actual situation, the mapping relationship between cell phone acceleration sensor and virtual camera displacement is selected to complete the camera position judgment. In the different positions to  $x$  or  $y$ , the acceleration display would be different. The three-week acceleration sensor in the phone can calculate the acceleration component of the phone in the three-dimensional structure. In Unity-3D, a module has been nested to obtain the accelerometer data of the phone, which represents the three dimensions of the values of these metrics that are between 1 and  $-1$ , as shown in Figure 7.

$X$ -axis: place the phone horizontally, the home key is on the left, the screen is facing up, then rotate 90 degrees to the right or left, and then the corresponding gravity component is  $+1.0$ ,  $-1.0$ , respectively.

$Y$ -axis: place the phone horizontally, the home key is on the left, the screen is facing up, at this time rotate 90 degrees outward or inward, the back of the phone is facing itself, and then the corresponding gravity components are  $+1.0$ ,  $-1.0$ .

$Z$ -axis: the phone screen faces down, then the corresponding gravity component is  $+1.0$ , the screen faces up, and then the corresponding gravity component is  $-1.0$ .

It is easy to find that the axis components refer to the use of the two phones in different directions. In the  $x$ -axis component, if there is  $-1 < \text{Input.acceleration.x} < 0$ , it means that the phone is tilted to the left; if there is  $0 < \text{Input.acceleration.x} < 1$ , it means that the phone is tilted to the right. Then, the corresponding relationship of camera movement direction can be constructed by the coordinate components. The  $x$ - and  $y$ -axis components are used as the control signals to meet the actual requirements of this design. In the state of the phone screen vertical up, if the user tilts the phone to the right, then the phone will sense the change in position and send a right displacement signal to the VR glasses to ensure that the virtual camera moves to the right; similarly, if the user tilts the phone to the left, then the phone will sense the change in position and send a left displacement signal to the VR glasses to ensure that the virtual camera moves to the left as shown in Figure 8.

The threshold value is set to 0.35, and the determination of the value needs to be combined with the actual situation and experience. If the value is too small, the user's extremely small changes will trigger the signal transmission, and the response will be too sensitive; conversely, if the value is too large, then the user needs an extremely large tilt to trigger the signal transmission, and the response will be too sluggish. If the user tilts the phone to the outside, then the phone will sense the change in position and send a forward displacement signal to the VR glasses to ensure that the virtual camera moves to the front; similarly, if the user tilts the phone to the inside, then the phone will sense the change in position and send an inward displacement

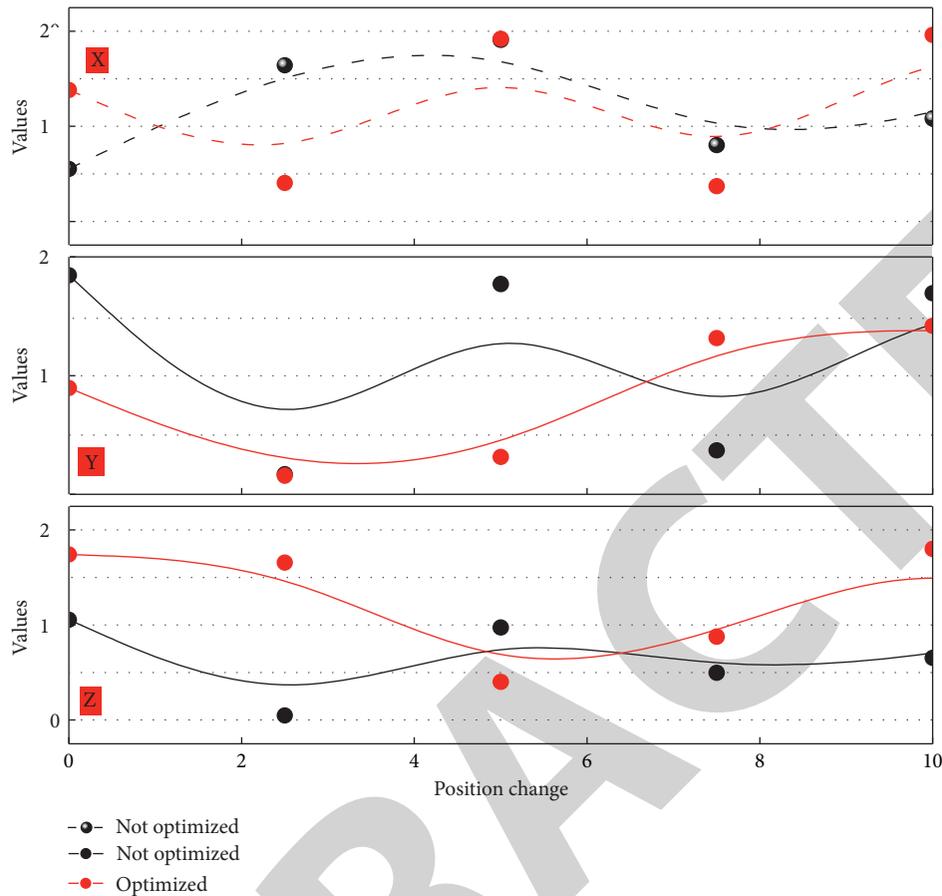


FIGURE 8: VR-based cell phone sensing position change.

signal to the VR glasses to ensure that the virtual camera moves to the back.

## 6. Conclusion

In this paper, we present an interactive educational platform based on VR and first summarize the development of the educational mode, summarize the use of VR in the field of education in Japan and abroad, and introduce the contents and significance of the paper, functional requirements, and performance requirements. We analyze the strengths and weaknesses of VR's main technology and mainstream devices and determine the main technology and display devices applicable to the platform. Second, the overall design of the virtual platform is focused on platform development, development concepts, and operational characteristics. In addition, the organization structure of the platform system and the establishment of the scene model are introduced, and the requirements related to the development and operation of the education platform system are pointed out. Again, this paper clarifies the preparation of an educational platform, including preparation, preparation, and editing of teaching materials. It also introduces the creation and export of scene 3D models and platforms. Next, it introduced platform hardware selection, Unity-3D-based software development of virtual reality system, interaction between

Bluetooth handle and virtual environment, and essentially a complete educational platform for experiencing the actual functions of this education, as well as platform with visual and auditory all-round autonomy.

## Data Availability

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

## Consent

Informed consent was obtained from all individual participants included in the study references.

## Conflicts of Interest

The author declares that there are no conflicts of interest.

## Acknowledgments

This study was supported by the Educational Reform Project of Hunan Province "Under the background of rural revitalization strategy, local colleges and universities are paid for by public orienteers Research on the cultivation model of Fan students" (Hunan Education

Department Notice No. [2019]291 no. 699); Educational Reform Project of Hunan Province “Research on the Curriculum Construction of Preschool Education Specialty Based on OBE Concept” (Hunan Education Department Notice No. [2019]291 no. 174); and Hunan Province Education Planning Base Platform Project “Research on the Transformation PATH of Normal Education in Local Universities under Modern Governance Theory” (XJK19GD002).

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