Hindawi
Journal of Sensors
Volume 2021, Article ID 2887302, 12 pages
https://doi.org/10.1155/2021/2887302

Research Article

Design and Implementation of English Listening Teaching Based on a Wireless Communication Microprocessor and Virtual Environment

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Received 14 September 2021; Accepted 1 October 2021; Published 9 November 2021

Academic Editor: Guolong Shi

This paper presents an in-depth analysis and research on teaching English listening through a wireless communication microprocessor combined with a virtual environment and designs and implements an English listening teaching experiment. Based on an in-depth understanding of wireless communication algorithms, this thesis extends the instruction set based on the general-purpose compact instruction set computer architecture (RISC) for common operations in wireless communication algorithms, adding new instructions such as multiplication and addition and bit inversion. The microprocessor has an increase in the number of execution clocks for wireless algorithm processing. The processor is extended with an interrupt interface to facilitate information interaction between the processor and the external environment to achieve coordinated work between the processor and the accelerator and to further enhance the speed of digital signal processing through the introduction of the accelerator. An overview and comparison of the status of domestic and foreign research are presented in the vein of VR teaching and the overall development of English teaching. Then, the problems and hypotheses to be explored in this study are presented, and several types of research methods used to explore the solutions to the problems are introduced. The results of the two classroom formats were compared, and specific performance data were obtained. The analysis of the results showed that the students in the VR scenario teaching group made greater progress in vocabulary judgments, complementary dialogues, and Chinese to English translation, with a 43% merit rate and a 100% pass rate in English for the whole group. The real-life scenarios created through VR technology greatly increased students' interest in learning and significantly improved the effectiveness of classroom teaching. The development trend of education informatization is towards virtualization and intelligence, and the application of VR to the process of education teaching is of great significance to promote the modernization of secondary education informatization.

1. Introduction

Virtual reality technology has a long history, and with the development of the times, the connotation of virtual reality technology has been enriched in the new process. With the new generation of information and communication technologies such as network transmission, near-eye display, rendering processing, and artificial intelligence, it builds a virtual environment that combines virtual and real senses such as vision, hearing, touch, smell, and other perceptions as one. With the help of head-up display and other related equipment, the audience interacts with the objects in the virtual space in a certain way to obtain immersive perception and experience [1]. From virtual reality classrooms to virtual reality labs and from virtual reality immersive theaters to virtual reality house viewing, virtual reality technology has entered the lives of ordinary people. Everyone is inevitably in contact with the new technology, constantly learning to use it through learning and thus forming physical habits [2]. In the interaction with virtual reality technology objects, the technology objects make the body believe that it is in the real space; the immersive character of virtual reality technology, coupled with the interactive and multisensory character, makes the audience mobilize the body perception to interact with the technology objects and then create the illusion of being in the real space. The advancement of human history is inextricably linked to the development of technology [3]. The rapid development of technology makes people live in one technological field after another, affecting every aspect of their lives, and the changes in technology bring about various changes in nature, humanities, and society, making people actively or passively face and reflect on the relationship between people and technology. Technology also requires the presence of the body, and the interaction between technology and the body is essential as technology affects the body and cannot be separated from it.

The design concept of this project is to improve the current processing architecture by proposing an architecture of parallel processing of signals by many processors and data interaction between processors through data exchange modules, to build a data exchange network, thus making the whole platform have a great improvement in flexibility and upgrade speed; when the communication system needs to be upgraded, only the software code of each base station can be loaded remotely [4]. When the communication system needs to be upgraded, only the software code of each base station needs to be remotely loaded, and the hardware can be almost unchanged, thus making the upgrade cost relatively low to meet the needs of low cost, smooth upgrade, and fast industrialization and thus flexible to adapt to the development of new technologies in the future. By comparing various processor architectures, the microprocessor designed in the thesis uses RISC architecture to simplify the decoding unit of the processor and to improve the instruction density and execution efficiency of the processor [5]. The design for this processor is described in two main aspects: the design of the processor instruction set and the design of the processor hardware architecture based on the instruction set. The design of this processor is mainly for communication-specific digital signal processing, so it is necessary to carry out the extraction of common algorithms for communication, the extraction of operation operations for frequently used algorithms, and thus the design of corresponding instructions for the corresponding operation operations. Virtual reality (VR) technology is an emerging information technology, which can create a virtual environment for students to create a virtual space out of the language environment so that students in the environment implicitly demonstrate language knowledge and exercise language application skills. The application of this technology in the field of education helps to change the traditional classroom teaching model [6]. At present, there are many studies on embedding VR technology in English subjects, but there are few cases of real application in teaching English courses, and how to make VR technology into daily English teaching is a very interesting direction.

With the intensive application of information technology in the field of education, all school sections are actively carrying out teaching reforms. The English course is an important cultural foundation course for secondary vocational schools. The content of English courses in secondary vocational schools is relatively simple, grammatical knowledge is simple and easy to understand, and the courses intend to focus on exercising students' oral application skills, with the aim of better preparing students for employment and adapting to social needs. According to the guidance of the modern education concept, actively promoting a variety of modern educational technology and teaching methods to improve the quality of English teaching has an important role. Section 1 first describes the research background of the subject, introduces the relevant background of logistics systems and networks, then explains the significance of the design and realization of the study of English listening teaching, and finally introduces the organization of the article. Section 2 also introduces the current research status of the design and implementation of English listening teaching, analyzes the advantages and disadvantages of existing technologies, and then introduces the main research on the design and implementation of English listening teaching based on wireless communication microprocessors and virtual environments. Section 3 first introduces the design ideas of the English listening teaching analysis of the wireless communication microprocessor combined with the virtual environment, then introduces the overall architecture of the system, and finally analyzes the business process of English listening teaching. And it realizes the key technology of English listening teaching with a wireless communication microprocessor combined with a virtual environment. Section 4 analyzes the results of the research and at the same time analyzes the wireless communication microprocessor combined with the virtual environment algorithm and analyzes these results. Section 5 summarizes the research content and research results of this paper and introduces the focus of future system improvement.

2. Current Status of Research

Lin et al. attempt to integrate VR digital games with language teaching and work on how to popularize them in classrooms of all school grades and summarize the five characteristics of language teaching games: goal orientation, game interaction, timely feedback, background narrative, and motivation [7]. Bryant proposes the idea of language learning community construction, and Nasr builds on it by proposing that language community learning should be strengthened in learners' social cognitive processes and the development of language socialization [8]. Kraus et al. used an online 3D virtual reality English learning platform based on Bloom's level of cognitive complexity to evaluate students' learning effects in an experiment [9]. The results showed that students' verbal and cognitive skills gained some degree of improvement and learning in the virtual world helped to develop complex or higher-order thinking [10]. Anukool and Petsangsri found that bilingualism using native language retention effectively promoted the development of children's core intellectual mechanisms [11]. Compared to monolingual children, bilingual children were more efficient in invoking the neural mechanisms of language. The establishment of a virtual campus system allows users to observe the campus in all aspects and feel the overall design and atmosphere of the campus; on the other hand, the virtual campus system can also provide some reference for the project planning of the campus [12]. The distance education institute affiliated with the Central Radio and Television University used an online game graphics engine when VR technology was emerging, breaking through the underlying software limitations of most VR technology at the time, and the experience was more pronounced than that of other primary engines. The science and engineering disciplines are better able to demonstrate the advantages of VR technology, especially in subjects such as physics and architecture. The VR lab at Tongji University's School of Architecture uses the latest analysis and restoration equipment to recreate as much of the building's reality and details as possible in a virtual environment, thus allowing teachers and students to freely observe and study the various details of the building and its interior in a multiangle, up-close manner. Southwest Jiaotong University has used VR technology for simulated urban planning and simulated driver training and has achieved excellent results [13].

Research development has evolved from hypermedia-based adaptive learning systems to mobile learning and ubiquitous learning environments, and researchers have focused on learning environments that mainly provide the right content for the right learners at the right time and place, but this is only a small part of the learning experience for learners to personalize their learning, ignoring the interactions and scenarios in the learning environment. Current adaptive learning technologies mainly focus on personalized recommendation of learning resources, learning path referral, and precise positioning of learning content as the main research hotspots, such as adaptive learning environments [14]. Researchers gradually found that learners' learning styles dominate the adaptive learning environment [15]. Computer-based adaptive learning systems can effectively track multiple information entries of learners, including their learning goals, learning environments, and learners' interaction behaviors. Individual students with different styles use different learning styles to acquire knowledge from the adaptive learning system to gain different benefits, and only then can personalized learning be achieved. New challenges and demands are placed on e-learning and distance education. Network learning and education need suitable educational resources, of which educational resources are mainly network teaching resources. Because network education information resources pay too much attention to network construction, which leads to the lack of network educational resources, with the continuous expansion of network educational resources, although network resources can be enriched, due to various reasons, educational resources are not effectively used, resulting in the utilization rate of educational resources. The utilization rate of educational resources is very low [16].

Adaptive learning systems and personalized learning approaches are a trend in the development of distance education. This trend is for distance education and training institutions to provide teaching for individual student needs on a broader scale and for distance education systems to be transformed into adaptive learning systems that are guided by teaching objectives and adapted to student learning needs. With the continuous development of information technology and the popular application of mobile learning, learners can use mobile terminals to learn anytime and anywhere according to their learning needs, realizing the goal of independent and personalized learning. Although online education has now achieved milestones, it still has many shortcomings, such as imperfect hardware facilities, a teaching system that still needs improvement, and the vigorous promotion of mobile learning. This requires the continuous combination of new teaching and learning concepts and ideas, the design of optimal learning products, and seizing the opportunity of online education to enable learners to improve their learning efficiency and achieve the goal of personalized learning.

3. Analysis of a Wireless Communication Microprocessor Combined with the Virtual Environment for Teaching English Listening

3.1. Wireless Communication Microprocessor Combined with Virtual Environment Algorithm Analysis. In the wireless communication microprocessing process, combined with virtual environment-related technologies, the instruction state machine is added to optimize the operating complexity of related algorithms. The research of this paper improves the existing algorithms, and the focus is on the interruption processing and response improvement in the wireless communication microprocessing. The pipeline technology is not only used in the field of processor design but also in the industrial field, and the introduction of pipelines has greatly improved the productivity of production lines [17]. The main idea of pipeline technology is that the entire production/processing process is divided into several subprocesses with equal working time, and these subprocesses are arranged in a certain order to form a pipeline. In the production/processing process, the production materials/items to be processed are placed on the line one after another and allowed to flow through each subprocess in turn to complete the production, thus increasing the production efficiency. Figure 1 depicts in detail the processing modes of the non-flow line and the four-stage flow line, from which the production/processing efficiency of the four-stage flow line is four times higher than the processing efficiency of the non-flow line in the ideal case, when the tasks arrive in real time when the production times of each process are approximately equal and there are no dependencies between processes. In processing platforms applicable to digital signal processing for wireless communications, to meet the need for real time, the microprocessor usually needs to respond to and interact with the information collected from the outside world and process it promptly. Interrupt-based processing and response are some of the more important aspects of the microprocessor design and handling approach in this thesis in the scenario of the use of the microprocessor designed in this thesis. English listening teaching uses a virtual environment, and the adaptive device and the control device are linked by a wireless communication processor. The two complement each other and are indispensable.

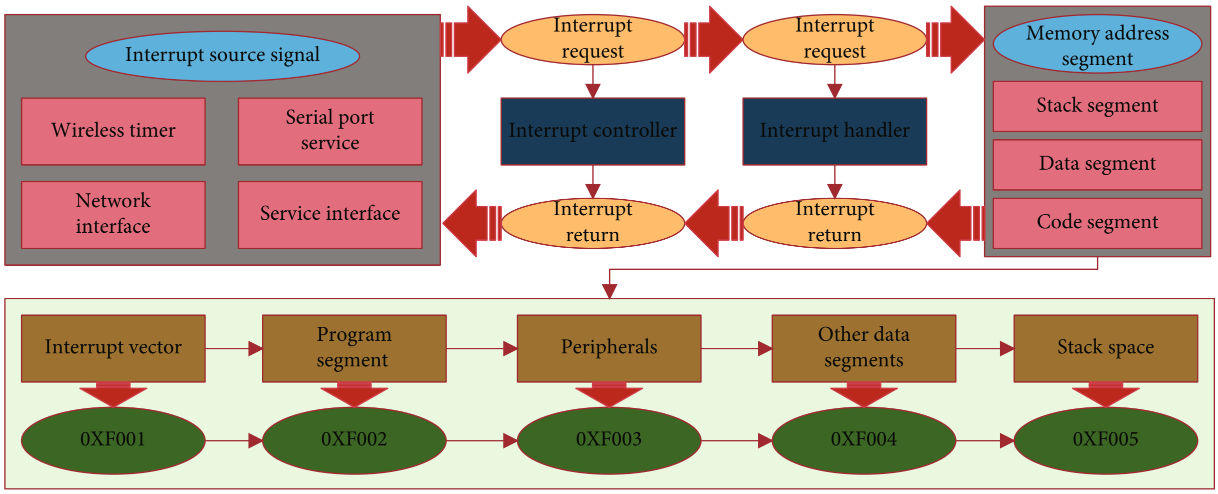

Figure 1: Address map space with interrupts.

Everything in the world is in a state of vibration all the time, so there is vibrational energy in the vibrating objects. Vibrations caused by wind, earthquakes, tsunamis, and other properties have a huge amount of energy that we still cannot control and use effectively. But the vibrations of industrial motors, the vibrations of vehicles on the road, and some other small vibrations contain microenergies that we can use. The biggest flaw of traditional junior high school English teaching is precisely the pressure of exam-oriented education, where teachers focus on teaching declarative knowledge such as vocabulary and grammar, and teaching is limited only to the proficiency in reading and writing knowledge, ignoring the practical application of knowledge. Students lack knowledge and practice in the real-world context of using this knowledge. For this reason, the VR educational game designed in this study attempts to create scenario scaffolding to motivate students and meet the scenario creation needed for English learning [18]. A questionnaire survey was conducted to find out how much the public knows about VR educational games, and an attempt was made to apply VR educational games to junior high school English teaching to explore whether the application of VR educational games to junior high school English teaching can enhance secondary school students' interest in learning English and whether it can contribute to the improvement of secondary school students' English performance, as shown in formula (1). Then, the attitudes of both teachers and students towards the use of VR educational games are explored, as shown in formula (2). Among them are the V -type virtual education environment, t which represents the education time, and M which is a constant.

$$V_t = V_0 - (V_{\text{rect}} + V_0) * \left[1 + e^{t/\text{RC}}\right], \tag{1}$$

$$\text{tab}_R(i) = r((G_{\text{mean}} - 1 - M + G_{\text{mean}-2}) \times cdf_R(i)). \tag{2}$$

Requirement analysis is the premise of software design and implementation, through which we can find out where the problems are, clarify the causes, and seek solutions. First, in the user need analysis, VR educational games need to provide users with a friendlier interface, more convenient game operation, and more fresh interactive experience, to enrich the learning experience of learners and improve the motivation of students. At the same time, it should also reduce the hazards of the learners' mobile phone screen and screen radiation and moderately transfer the learners from mobile phone addiction to achieve the healthy growth and overall development of the learners. Secondly, in terms of device performance, not only should the basic functions of teaching be realized but also the integrity and compatibility of the game functions and the smoothness of the game operation should be ensured. The design optimization in the later development is also an indispensable task if we want users to get a better experience. Formulas (3), (4), and (5) are shown as follows. where W represents the microprocessing method.

$$\rho = \frac{f(x - \Delta x) + f(x)}{M^2(x)\Delta x}, \tag{3}$$

$$M^* = \arg\min \left\{ \sup_{x \in \Omega_x} \left| b^2(x) + W^T S(x) \right| \right\}, \tag{4}$$

$$\partial_1 \|c\|^2 \ge \int_{t_0}^{t_0+T_0} \left| S^T(\tau) c \right|^2 dv(\tau) \ge \partial_2 \|c\|^2, \quad \forall_{t_0} \le 0, c \in R^n. \tag{5}$$

It is clear from the flow that the design of the processor instruction set is the key to a processor design, and the iterative design, coding, simulation, and verification of the instruction set are important factors in achieving a high-performance processor; in addition, it is clear from the flow that the design of the software suite is also an important part; the software suite mainly includes the compiler, assembler, and linker, as the development of applications nowadays uses a high-level language. Since applications nowadays are mainly designed in high-level languages, the design of the software suite fundamentally determines the ease of use of a processor. The conventional design approach, which uses a hardware description language for the architectural description of the processor, uses the hardware description language to describe the behavior of the processor and then generates the corresponding cores, as shown in formulas (6) and (7). P represents the probability, m_i represents the processing flow of the i-th processor, and m_j represents the processing flow of the j-th processor. This design approach is better able to optimize the performance of the processor, but the design complexity is higher, the cycle time is longer, and the human resource investment required for the design of the software suite is higher.

$$J = M(x, \{w_i\}) + x, \tag{6}$$

$$Q_N(w) = \frac{1}{2}\sum_{i,j}\left(1 - P_{ij}\right)^2\left(m_i - m_j\right). \tag{7}$$

The coding of the processor instruction set is a crucial part of the processor, and the difference between different instructions directly affects the high- and low-level switching generated during instruction switching, which directly affects the power consumption of the processor; also, the difference in coding between instructions directly affects the logic complexity of the processor decoding process, which directly affects the length of the critical path and thus affects the operating frequency of the processor, so in the RISC processor design process, the issue of encoding the instruction set is crucial. In this processor design, we have classified all instructions in terms of the number of operands and instruction relevance, and the coding of various instruction classifications is shown in Figure 2.

In the design of a microprocessor, the compiler is the bridge between the high-level language and the underlying hardware. The compiler parses the high-level language and generates the corresponding assembly code, and the quantity and quality of the generated assembly code determine the execution time of the high-level language, as well as the efficiency of the processor usage. Therefore, the design of the compiler seriously affects the ease of use and performance of the microprocessor.

In this design session, using VR technology for key vocabulary and core phrase voice recording design, the original audio files are recorded in advance by professional English speaking teachers, and the voice is imported into the virtual scene as a unit; through VR technology for secondary English vocabulary design, the technology provides a three-dimensional voice function, the voice is directly embedded in the virtual scene, and the scenery that appears in the virtual scene, the pronunciation, Chinese translation, and example sentences related to the vocabulary are explained. The students repeat and imitate the pronunciation according to their actual proficiency until they master it. The phonetic follow-through explanation gives students more freedom and space than traditional ELT classroom materials, and with the example sentence explanation, students' proficiency is more appreciable [19, 20]. Through specific classroom implementation, students' proficiency in vocabulary is greatly improved and not easily forgotten, and most importantly, they can be comfortable in facing the vocabulary judgment questions in the college entrance examination. The design of the vocabulary explanation not only helps students' English performance to improve but also cultivates students' autonomy and self-confidence in learning English.

Everyday communication is a good starting point for learning spoken English. Through the practice of daily communication, students gradually develop their English habits and English speaking skills, reflecting the value of English as a language for daily communication. Through predesigned VR conversation scenarios with audio files of everyday communicative phrases, students can personally experience and immerse themselves in the VR scenarios to get a more realistic feel of everyday spoken expression situations and gain a deeper understanding and more proficient use of everyday spoken conversation content. The spoken dialogues are designed not only to improve spoken English but also to develop students' understanding and integration of foreign cultures. The VR technology provides learners with rich speaking learning resources, so that learners can experience different teaching styles more and can experience a foreign culture in a real and intuitive way, expand their horizons and international connection, and achieve understanding and practical application of speaking learning.

3.2. Experimental Design for Teaching English Listening in a Virtual Environment. In each lesson, teachers should make students understand the learning objectives, design the learning objectives as reflection questions, and present them to students, so that they can bring the questions to independent learning and cooperative inquiry. The reflection questions designed by the teacher must reflect the important and difficult points of the textbook; the main knowledge has a certain depth and hierarchy, can trigger students' interest in the inquiry, can enhance students' learning ability, and can meet the learning needs of students at different levels. This session needs to take place in the classroom and requires the teacher to set a time limit, as well as roving and counting students' problems and problem students. This is an important part of teaching and learning; in the inquiry, the teacher's roving participation can not only see the students' problems, knowledge unique learning, and innovative ways of solving but also see different levels of students express their opinions to each other, deepen their understanding and thinking about the problems, and prepare for the next session on the problems to guide the thinking and doubts to answer [21]. This session is the key to the success of the teacher's teaching in this course, which requires the instructor to inspect more and participate in group discussions to grasp the extent of the students' understanding of the problem. This session should be crossed with the critique of the students' presentations, and the instructor should draw a sharp point of view. The teacher should comment on the students' presentations, affirming the correctness and pointing out the problems, giving accurate answers to the students' ambiguous questions, and explaining the problems that exist by summarizing the ideas and methods and techniques and rules and precautions. After the lecture,

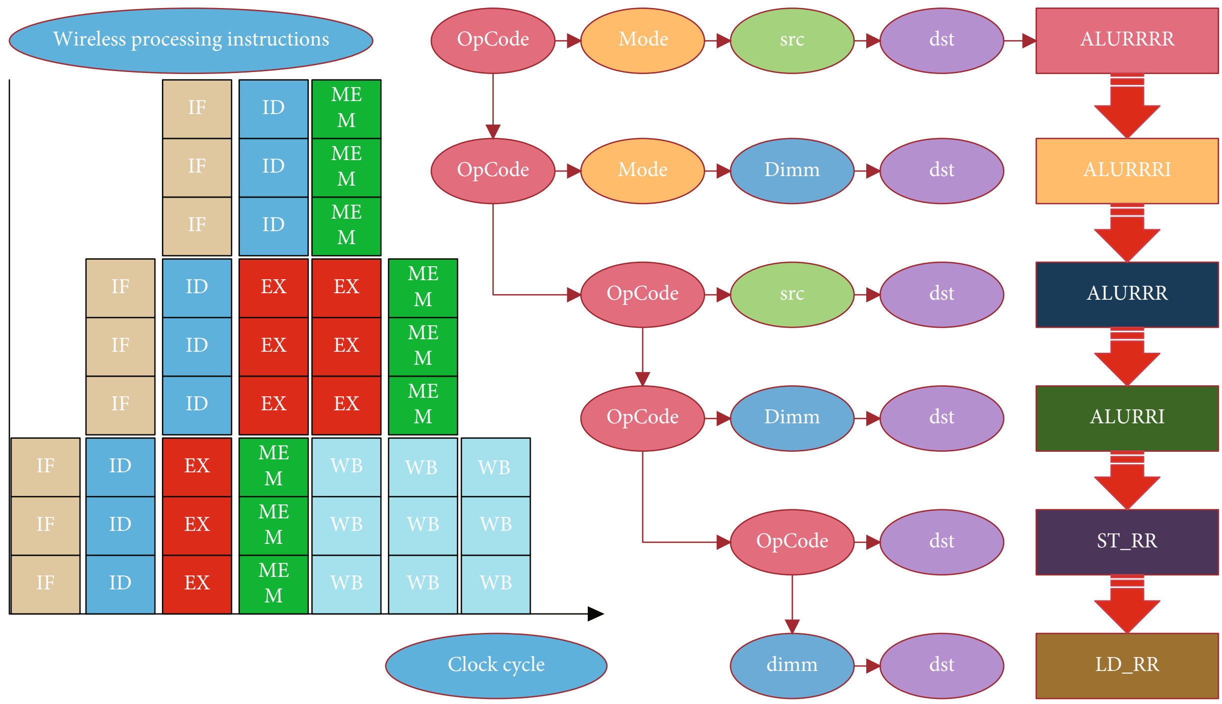

Figure 2: Instruction coding format for classification.

teachers must ask students to write the analysis of the causes of errors and correction of perceptions, so that students in the reflection of growth and in the correction of errors improve. Teachers should carefully design test questions, which should be accurate and typical to ensure the validity of the test. After the student practice, the teacher should give timely feedback and comments based on the criticism and then explain the existing problems, which can achieve a good teaching effect.

For example, virtual tourism is based on real tourism scenes, visiting museums or classic attractions, these scenes are real-world reproduction, and the audience is immersed in them as if they have crossed the distance and come to the tourist place personally. It needs to consider other virtual reality natural scene experience and virtual reality house viewing. Beyond reality, type refers to virtual reality technology to build scenes based on reality but with content beyond reality, such as virtual reality laboratory; there are some dangerous experiments, dangerous gas, blasting, etc., which can be completed in the virtual reality laboratory; in others such as virtual reality space capsule experience, the audience can feel the space world, visit the space capsule, grow plants in space, etc. These contents are based on real life but not easily available or impossible to achieve in real life; this part of the content presented virtual reality technology ride beyond reality type. The fictional fantasy type is completely beyond reality, fully reflecting the conceptual nature of virtual reality technology. For example, “Water Droplet Travel” and “A Day in the Life of a Cell” are science education contents presented in science museums and museums, which are both means of science popularization and at the same time presenting content beyond reality. Other common forms, such as virtual reality science fiction films, are also based on conceptual content and are fictional fantasy virtual reality technologies, as shown in Figure 3.

The state machine design pattern is the final step orchestration model. Any process system can be recognized as a migration following a specific state-guided sequence triggered by an event. This design pattern uses logic states and event mapping tables to define each process sequence. The relationship between a specific state and an event determines the microservice process to run. Both mapping tables become part of the state control data. State machine orchestration solves the problems related to synchronous and asynchronous request processing. In synchronization processing, a request for a microservice is blocked until the requested service is completed. For very simple microservice applications, this is manageable, but it is always difficult to handle parallelism and elasticity. The main role of the microprocessor is to perform several tasks such as wireless data reception and transmission and data acquisition from temperature sensors and angular velocity sensors. Since this system must meet certain conditions to achieve energy state autonomy, the energy consumption needs to be minimized in the active state, and the microprocessor also needs to complete the switch between the active and sleep states when necessary. The previous hardware designs have been designed to reduce the power consumption of the entire system as much as possible, and the software has a significant impact on the power consumption of the system [19, 20].

Virtual reality technology is a functional reflection of the fact that the purpose of virtual reality is to understand and transform objective reality. Technology is invented to benefit people’s lives and to better understand and transform the world, and virtual reality technology first achieves the simulation and reproduction of the real world. In the real world,

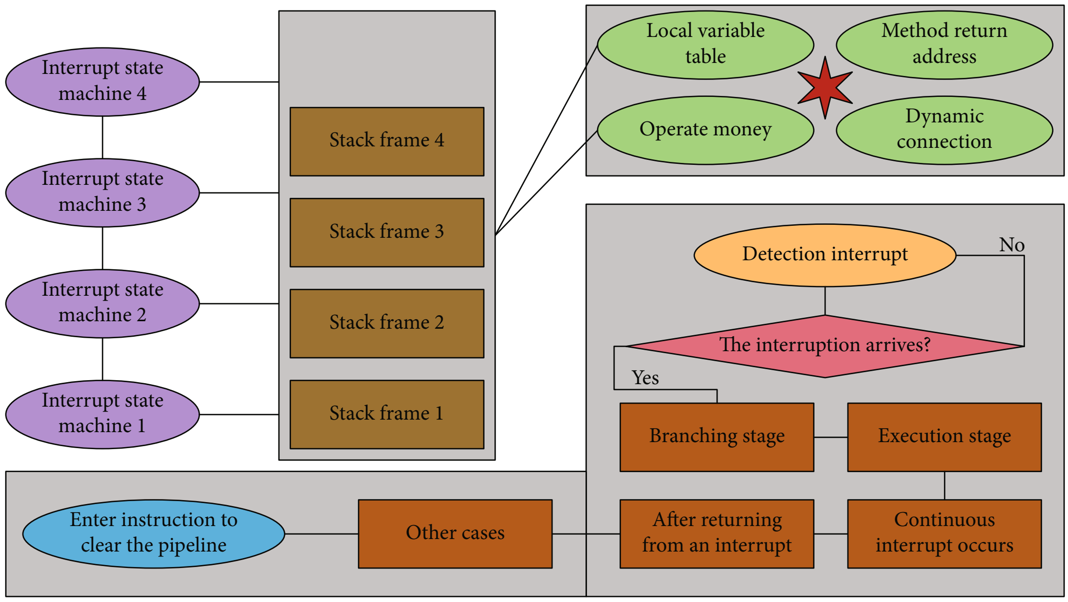

Figure 3: Prefetching after the introduction of interrupts refers to the new partial state machine.

some things cannot be observed by the naked eye and cannot be experienced by people, while virtual reality sublimates the part of the reality that exists, which is reflected in the content that can provide the audience beyond the reality so that the audience can better understand the world and transform the world. The part of virtual reality that transcends the objective reality may be in the objective reality that people cannot reach and realize, may be presented only across the boundaries of time and space, may be the figurative presentation of abstract things, or may be the realization of imagination and creativity based on the real world, all to enable the audience to better recognize the real content that cannot be recognized in the objective reality, in a digital presentation to know the world and thus transform it. This interactive process also reflects the transformation of virtual reality for the objective reality, in both form and content; virtual reality is aimed at knowing and transforming the objective reality and at the same time realizing knowing and transforming the objective world in the process, as shown in Figure 4.

The embodied character of virtual reality technology, which requires the participation of the real body, shows that virtual reality relies on the construction of real perceptions. Without the involvement of perception or the solidification of perception as a known conclusion, there is a clear separation of the body from the technology [22]. Some scholars have suggested that virtual reality technology is not embodied because there is no real involvement of the physical body and because the objective real body is not present in the virtual space, and the contents of the virtual space are fictional, but there is no denying the real perceptual nature of virtual reality technology. Although there is no physical presence in the virtual space created by virtual reality technology, the interactive activity in the virtual space is a projection of intentional activity, and embodiment is based on the level of perceptual impact of the technology, not on the superficial materialization of the objective reality of the body. It is

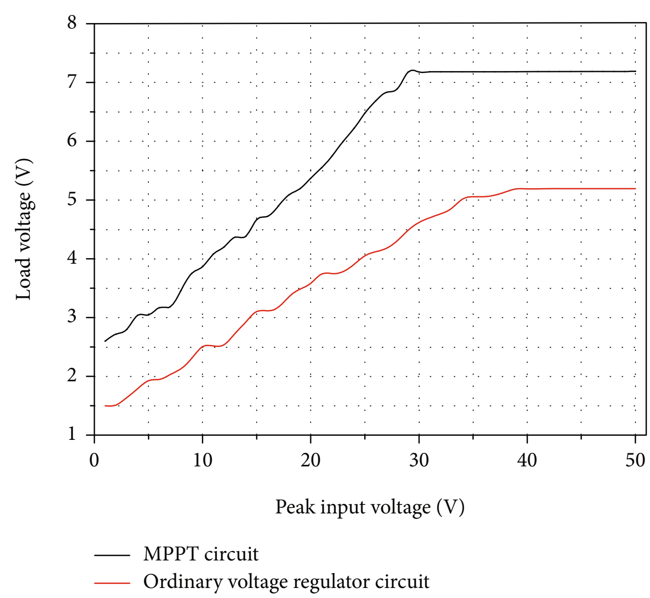

Figure 4: Circuit and normal regulator circuit load voltage waveform.

emphasized how the technology changes the perceptual content of the body, that the body participates in the acquisition of interaction with the virtual reality technology, and that the presentation of the content in the virtual space is also the manifestation of the body's will so that the virtual reality technology is based on the essence of real perception.

4. Analysis of Results

4.1. Wireless Communication Microprocessor Combined with Virtual Environment Algorithm Results. The test environment is an open campus with two wireless sensing nodes, one for the transmitter and one for the receiver, at a height of 1 m from the ground. Since too many obstacles can affect the communication performance of the wireless module, a playground with less traffic and obstacles in the school is chosen. Many factors in the environment affect the communication performance between the nodes of the wireless communication module, the surrounding obstacles can cause signal attenuation, and path loss effect during signal transmission, transmission distance, and transmission baud rate can affect the output transmission. In this design due to energy constraints, the subnodes can only collect sensor data and transmit it when they are well supplied, which results in a limited number of data transmissions, which requires good enough transmission performance to reduce packet loss. So the main concern in this design is the packet loss rate during transmission. So the main test in this section is the communication distance and the effect of the baud rate of the transmitted data on the packet loss rate. The test is carried out in an open building area. The expert node is responsible for receiving the communication data from each subnode and transmitting it to the host computer for displaying it through the serial port. The subnodes do not communicate with each other and can only interact with the expert node for information. The whole wireless sensing network forms a dispersive star network. The transmitting power of the wireless communication module is set to 20 dBm, the baud rate for sending data is fixed at 12000 bps, and 10000 packets are sent for each test. The effect of transmission distance on packet loss rate is shown in Figure 5. After testing, it is found that the highest packet loss rate is achieved when the transmission distance is greater than 200 m, and communication is not possible at this time.

From the graph, it is observed that as the baud rate increases, the number of packet losses also increases. This is because when the baud rate increases, it leads to a decrease in the average power of the corresponding signal. This will eventually lead to distortion of the transmitted data content, and the receiver will not be able to demodulate the packets accurately thus making the number of packet losses increase. From the above tests, it is found that the increase in transmission distance and the increase in baud rate will lead to an increase in the packet loss rate, so these two factors must be limited in practice. The MPPT circuit performance test and the energy-aware switching circuit performance test were conducted. From the test results, it is found that the MPPT circuit reaches the required stable voltage value faster than the normal voltage regulator as the load and input voltage increase. The wireless sensor nodes are tested for transmission performance by the first suitable operating environment to test the relationship between transmission distance, transmission baud rate, and packet loss rate. The results show that the greater the transmission distance between nodes, the faster the baud rate of data transmission and the greater the packet loss rate of data.

The test model is the executive part of the learning system that makes detection judgments, it is the key component that connects the student model with the knowledge model and the adaptation model, and it is the main thread that runs through the entire structural model. The test model initially

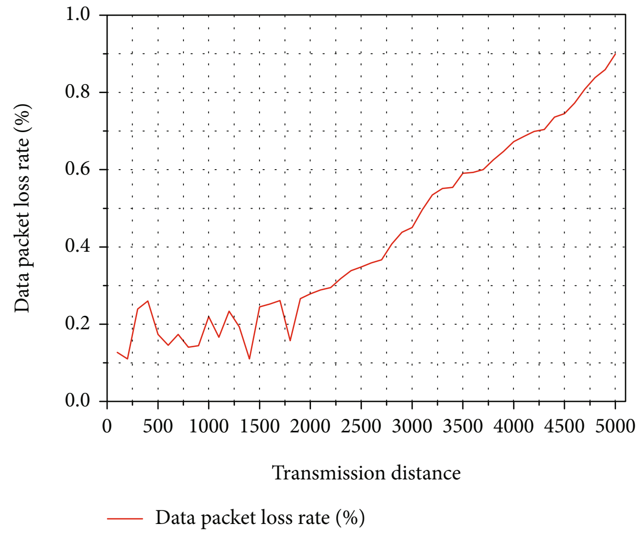

FIGURE 5: Transmission distance versus data packet loss rate.

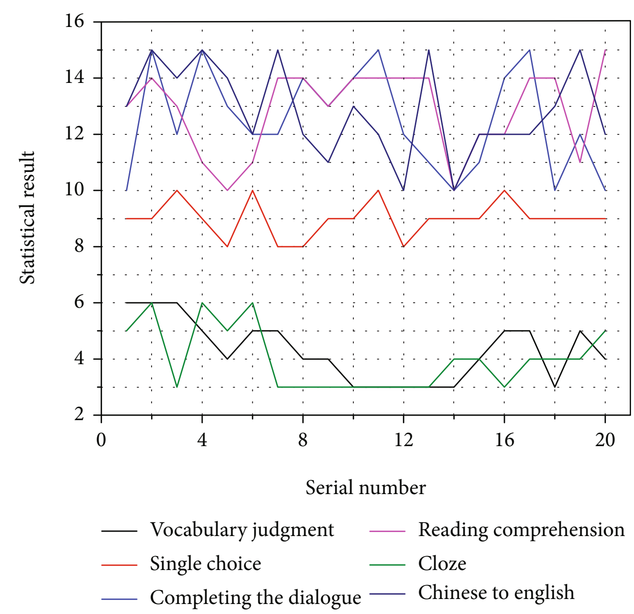

FIGURE 6: Student base statistics.

divides the learning path according to the cognitive level of the learner in the system and then provides specific retests in conjunction with the learning of the knowledge model, while it records the learning outcomes of the learner at different stages and updates and modifies the student model and the adaptation model according to this, as shown in Figure 6.

To clarify the public's understanding of virtual reality educational games, the author used a questionnaire survey to conduct online sample research. A total of 250 questionnaires were distributed, and 212 valid questionnaires were collected, with a valid return rate of 84.8%. The questionnaires covered basic personal information, knowledge of educational games, knowledge of virtual reality (VR) technology, and willingness to let children use virtual reality

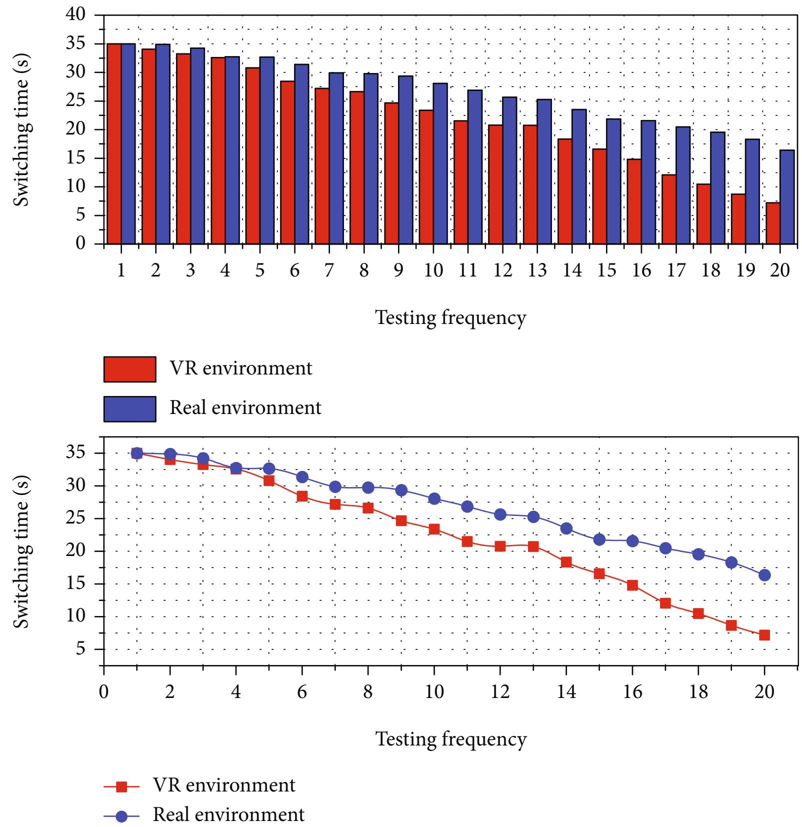

Figure 7: Graph of students' switching time between VR and realistic environments.

educational games for learning at school. First, the public is not as knowledgeable about educational games as they are about VR technology. 19.34% of people have never even heard of educational games, while 27.83% of people have experienced VR devices first-hand. This shows that the mass base of educational games is weak, and not more than half of the individuals have reached the level of general understanding, which on the one hand reveals that the market application of educational games in the early stage of development to the present is not high; on the other hand, from the viewpoint of the audience of educational games, its audience is school students; if not engaged in the industry, it is difficult to hear.

4.2. Experimental Results of Teaching English Listening in a Virtual Environment. Students were influenced by negative reinforcement from the teacher, who used disciplinary power to interfere with students' behavior due to the length of time they took to switch out from the end of the first level of the game, resulting in a sudden decrease in the switching time of the second level. Furthermore, curiosity about new things drove students to stay away from the game for a long time in the first level, and then, the curiosity gradually diminished, which was also reflected in the gradual reduction of the switching time. In response, some scholars have tried to suppress this phenomenon by reducing visual stimuli and switching back and forth between virtual and real frequently, reducing background music and interrupting learners' unconscious mental processes in the auditory sense. However, as the curve of students' switching time between virtual environment and reality in the experimental group's classroom shows, the teacher's negative reinforcement guidance and the students' weakened curiosity are gradually eroding the game's lifespan and its teaching effectiveness. The author argues that the VR educational game at this stage has not yet reached the ideal state of immersion, and it is necessary to increase the immersion in the game to prolong students' curiosity and drive the extension of learning motivation, as shown in Figure 7. It can be seen from Figure 7 that as time increases, the switching time of the VR environment decreases more.

Traditional English teaching in junior high schools often presents teaching content in programmed languages, such as fixed phrases, idiomatic phrases, or structural phrases. And in terms of communication, it often steals students' stored information memory in exchange for a smooth communication process. The teacher's repeated stimulation of knowledge points initially brings about a short period of student response, and the teacher's monologue and the students' responses are typical of the institutionalized mechanical process of "stimulus-response," which later leads to a diminishing degree of student response to knowledge.

Comparison of the distribution of students' English performance in the experimental and control classes is shown in Figure 8. To verify the effectiveness of the case study, the author discussed with the teachers of the English subject

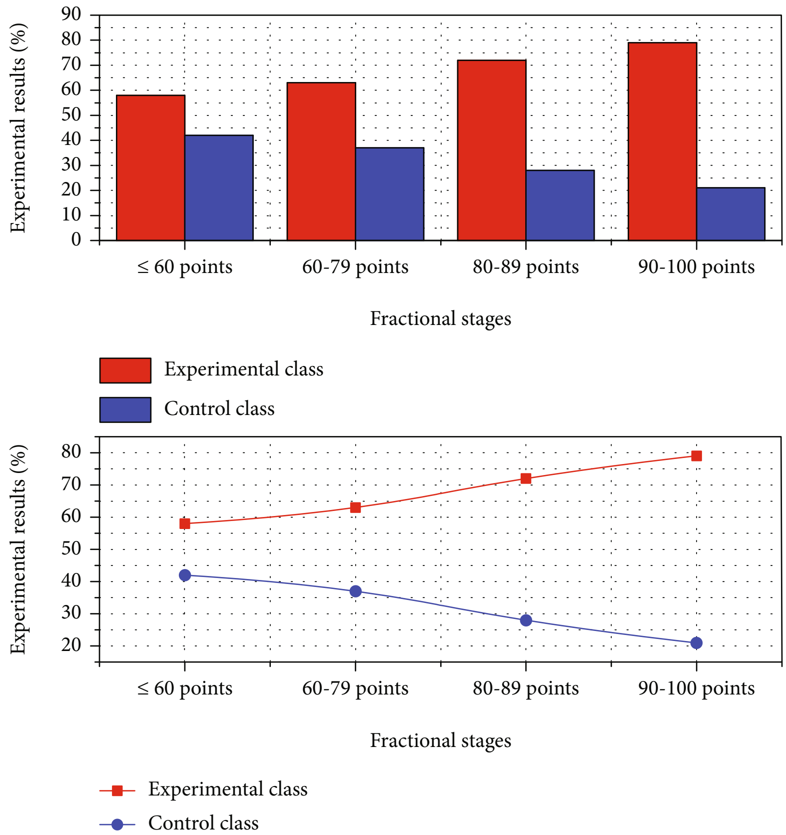

Figure 8: Comparison of the distribution of students' English performance in the experimental and control classes.

research group and arranged a 45-minute quiz for the experimental class and the control class after the teaching, which included listening, multiple-choice exam, completion, reading comprehension, written expression, and other questions to test the research hypothesis that VR educational games can promote the English performance of middle school students. In the experimental class, 54.28% of the students scored above 80 in their class, and 31.43% of the students scored above 80 in the comparison class, which shows that VR educational games applied to junior high school English teaching are conducive to cultivating high scores. Among the students with scores below 60, there were 7 students in the experimental class and 10 students in the comparison class, which shows that the positive effect of VR English educational games on the learning performance of the late-stage students is less obvious.

This expectation not only urged the researcher to reform the English curriculum and teaching but also reflected the academic pressure of junior high school students. In any case, the overall level of learners' attitude towards the learning environment in the VR educational game is high, and most of the learners have a positive attitude towards this learning method, which provides a better learning environment for the junior high school English classroom and enables learners to maintain a high level of interest and initiative. Traditional English classes are mostly teacher-led and textbook-based, with students receiving knowledge and participating in activities mechanically and passively. The virtual English classroom, on the other hand, emphasizes student centeredness and is activity-based, with the teacher controlling the technology to guide and assist students in their learning activities, to help students improve their English. Although the virtual classroom is highly contextualized, engaging, and rich in content, it is not possible to completely replace the traditional classroom currently. First, the ideal way is to use innovative technologies such as educational games and virtual reality technology in the virtual classroom as a useful extension of the traditional classroom to supplement traditional English teaching, with teachers controlling the time and space of virtual teaching in a timely and flexible manner. At the same time, traditional English classroom teaching methods, such as the task-based driving method and group inquiry method, are used to enrich the content of the lesson.

5. Conclusion

The microprocessor module, sensor module, and wireless communication module are completed from both hardware design and software design perspectives. The main consideration when performing the hardware design is the power consumption size as well as the size of the device. The microprocessor is the executor of all the tasks, which configures the sensors to work and read the collected data, drives the sending and receiving of data from the wireless communication module and ensures that the entire node operates according to the prescribed algorithm. Most of the traditional English classrooms are teacher-led and textbook-based, where students mechanically and passively receive knowledge and participate in activities. The virtual English classroom, on the other hand, emphasizes student centeredness and is activity-based, with the teacher controlling the technology to guide and assist students in their learning activities, to help students improve their English. Although the virtual classroom is highly contextualized, engaging, and rich in content, it is not possible to completely replace the traditional classroom currently. First, the ideal way is to use innovative technologies such as educational games and virtual reality technology in the virtual classroom as a useful extension of the traditional classroom, to supplement traditional English teaching, with teachers controlling the time and space of virtual teaching in a timely and flexible manner. At the same time, traditional English classroom teaching methods, such as the task-based driving method and group inquiry method, are used to enrich the content of the lesson.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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