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*Research Article*

# Design of Digital Teaching Platform for Spoken English Based on Virtual Reality

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In order to improve the effect of digital teaching of spoken English, this paper combines virtual reality technology to design a digital teaching platform for spoken English and combines virtual reality technology to digitally process spoken English. The signal processed by the front-end amplifier circuit is converted into a digital signal through analog-to-digital conversion, and the digital receiving system is realized by means of software radio, which reduces the dependence on the hardware circuit and enhances the portability of the system. In addition, this paper selects filters according to the needs of digital teaching of spoken English and constructs a digital teaching platform for spoken English based on virtual reality. The experiment verifies that the digital teaching platform for spoken English based on virtual reality has a good effect of digital spoken English teaching.

## 1. Introduction

Driving education modernization through education informatization has become a hot virtual reality point of current education reform and strengthening the construction of teaching informatization has become an important virtual reality measure for colleges and universities to promote educational modernization. Furthermore, many colleges and universities basically rely on the development of digital campuses to create their own digital learning environments by building virtual reality. Many colleges and universities lack good top-level virtual design and system planning, resulting in a digital learning environment that is full of flowers. At present, the main virtual reality has a special learning website, a large-scale online teaching platform purchased, and a self-developed virtual reality learning platform. At the same time, rapid development has led to some problems. Virtual reality is mainly manifested in the disconnection between construction and actual teaching, the lack of effective integration of technology and courses, the lack of practicability and advancement, inconsistent standards, incomplete functions, and difficulty in sharing data with virtual reality.

According to the teaching concept of the college, this paper closely combines the new teaching mode to design a network-based digital education system that conforms to virtual reality and educational standards. Moreover, this paper establishes an integrated learning platform that integrates teaching resources, teaching process, and teaching effect evaluation based on virtual reality in the course and connects with the virtual reality educational administration system, which makes the educational structure and teaching virtual reality process more efficient and flexible. ① Realization of resources: through the unification of resource structure, resource format, and virtual reality technology standards, unified construction, and unified management, various teaching resources, teaching virtual reality elements, and teaching links can be integrated. ② Teaching: with the help of technology, the interactive teaching mode of inquiry-based virtual reality is highlighted, and network-assisted teaching is realized [1]. ③ Learning: it provides students with an interesting and profound personalized learning experience with virtual reality, and uses the platform as a cognitive tool to promote students' autonomous learning, an emotionally motivated virtual reality tool, and a learning environment creation tool. ④ Evaluation: it adopts a variety of methods to realize the real and virtual reality time evaluation and summative evaluation, as well as tests the teaching effect and quality. ⑤ Effectiveness: it uses the advantages of virtual reality technology to control the cost of learning and improve the learning effect. ⑥ Management: the educational administration's virtual reality management system is smoothly connected to the platform. The educational administration management system provides the platform with virtual reality basic data in real-time, and various data generated in the platform provide a decision-making basis for educational administration management [2].

The integrated platform is composed of multiple systems, and the existing data resources, virtual lines, and some existing systems should be used. Therefore, in terms of technical implementation, some technical difficulties associated with virtual lines need to be solved. First, to integrate existing data resources to form a unified data center, virtual lines will be a key point and cause technical difficulty. For teaching resources, a unified resource center is established by means of standardized virtual line processing. For basic data, the core system is determined by confirming virtual lines. For example, student and teacher data are centered on the virtual line of the educational administration system, and other systems use virtual lines as the core. The interface reads the data of the educational administration management system in real time and realizes the accuracy of the data with virtual lines [3]. Second, the integration of the original application system is also a key virtual line point, such as the existing teaching quality evaluation system. The solution adopted is to retain the application logic of the original virtual line system, extract the original user data, and unify user login management. The virtual line redirects the login and logout pages of the original system to the login and virtual line logout pages of the platform layer, and other business logic of the original system will remain unchanged, so that the real and virtual lines are now integrated, and it is not correct for the old system to injure muscles and bones [4]. The third is to integrate the purchasing system, and virtual lines are a key point. The method adopted is to establish a data synchronization update strategy, provide centralized shared data at the flat virtual line platform layer, and then establish the platform layer data to update synchronously with the virtual line data of the new purchase system. The fourth is to use a new concept to achieve better interaction and flexibility of virtual lines [5].

The question of how to combine the teaching characteristics of the school to promote the platform to be widely used has become the focus of the work after the development of the flat virtual line platform, and it is also the key to promoting the informatization of teaching. Although the virtual line school and most teachers are increasingly aware of the importance of virtual line nature of teaching informatization, the use of teaching platforms, especially in the early stages, will increase the workload of teachers, and virtual line teachers are under pressure from scientific research. In particular, due to the influence of the general environment, professional title evaluation, promotion of virtual line, salary, and bonus are directly linked to scientific research topics and scientific research papers, so that some teachers of virtual line are reluctant to devote more energy to teaching informatization work [6]. To this end, the Virtual Line Academy has taken a number of measures to promote the informatization of teaching. One is to establish institutions. The School of Learning Virtual Lines has established a leading group to promote teaching informatization with the dean as the group leader. The two virtual lines are for making policy. Based on the existing virtual line policies for teaching, scientific research, and personnel work, the college has formulated various assessment and reward policies to promote teaching informatization and issued them in the form of document-shaped virtual lines. The third is to set up projects. In the form of teaching reform project approval, the teaching virtual line drawing informatization project was established, and project-based management was implemented. Fourth, set up special funds. The virtual line combines the "project-based" investment method of realizing teaching informatization funds with the virtual line style of the maintenance investor, and the special funds are dedicated. Fifth, establish and improve the basic environment. The college has increased investment in virtual lines, built and improved the automatic recording and broadcasting system of teaching videos and multimedia classrooms [7].

Instructional Design: it is for the teaching system. A special design activity for solving teaching problems and optimizing learning for the purpose of virtual lines. It not only has the general nature of design but also must follow the basic laws of teaching. The main purpose of instructional design is to promote learners' learning of virtual lines [8]. Use a systems approach. The process of transforming the original virtual line theory of learning and teaching theory into specific plans for teaching ear tags, teaching content, teaching methods, teaching strategies, and teaching virtual line evaluation, and creating an effective teaching and learning system. The virtual line teaching design is based on teaching objects and teaching objectives. Determine the appropriate virtual line and end point of the teaching starting point, order the teaching elements, optimize their arrangement, and form the virtual line process of the teaching plan. Encourage students to develop effectively according to their own characteristics [9]. Therefore, all aspects of the virtual lines that are conducive to the teaching process are kept in the best state, and the effect of teaching difficult materials can be truly achieved. The virtual line digital platform is a course management system. It is also a course designed to help virtual line teachers build a course on the Internet that can provide rich learning materials, various virtual line learning activities, a complete communication environment, powerful learning management, and easy-to-operate virtual line experience. It provides strong support for teachers to design, organize, and implement network teaching [10].

Learning activity refers to the sum of virtual line operations performed by learners in order to accomplish specific learning objectives and is the foundation for learners to understand and master knowledge. Therefore, the design of virtual lines for learning activities is the core content of instructional design. According to the needs of teaching, virtual lines use the "digital environment" to demonstrate various virtual lines teaching information to students [11]. It can be CAI courseware or multimedia teaching information such as videos, animations, and graphics, downloaded from network resources or developed by virtual lines [12]. For example, when the virtual line is teaching the use of verification controls, use the network to log in to Tencent's main interface, enter the virtual line, and enter the account registration page. Through this kind of demonstration, students can feel the use method and function of the verification control in a vivid, and straight virtual line view [13].

Taking advantage of the opportunity for daily teaching inspection and special evaluation, relying on teaching supervision, student virtual line teaching information staff and employers, increase feedback and control efforts, continuously improve teaching work, and promote the improvement of education and teaching quality. Routine teaching check virtual line check feedback regulation, timely find and correct problems in teaching work, carry out summary research on virtual line questions, and promote the continuous improvement of teaching work [14]. Special evaluation needs to adhere to the policy of "promoting reform with evaluation, promoting construction with evaluation, promoting management with evaluation, combining evaluation with construction, and focusing on construction with virtual lines," and give full play to the guiding role of various special evaluations, promote the construction of virtual lines, strengthen supervision and rectification, effectively standardize teaching management, and improve teaching quality. The third virtual line is the feedback regulation of the performance management system [15].

This paper combines the virtual reality technology to design a digital teaching platform for spoken English, to change the shortcomings of the existing spoken English teaching, and to improve the students' spoken expression effect.

## 2. Intelligent Digital Signal Processing of Spoken English

*2.1. The Structure of Down-Converter in the Receiver System of the English Spoken Wave Instrument.* Figure 1 shows the down-conversion structure diagram. The signal processed by the front-end amplifying circuit is converted into a digital signal through analog-to-digital conversion. At this time, the sampling rate of the signal is too high, so it is necessary to reduce the sampling rate of the signal. This function is the digital down-conversion function, which involves the techniques of signal quadrature detection, sampling rate conversion, and low-pass filter.

In the process of down-conversion, the signal that has undergone quadrature detection must undergo sampling rate conversion in order to reduce the sampling rate and meet the design requirements. The filtering function in Figure 1 actually implements the decimation and anti-aliasing functions.

It is a widely used way to realize the digital receiving system of the English spoken voice wave instrument by means of software radio. This solution reduces the dependence on the hardware circuit, enhances the portability of the system, facilitates the upgrading and updating of the system, and has wider expansion performance. This paper mainly explains the realization of a 5-stage integral filter and a half-band filter. The implementation of FIR filter banks has been covered in many papers, so this paper will not repeat them. Figure 2 shows the structure diagram of the digital oscillator.

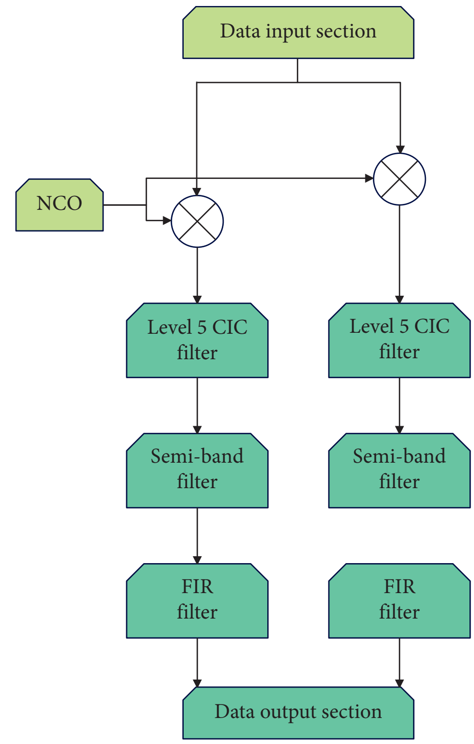


Figure 1: Down-conversion structure diagram.

## 3. Sampling Rate Conversion

In digital signal processing applications, it is hoped that digital operations can be directly used to realize the conversion of sampling rate, that is to say, it is hoped that a linear digital system can be used. In this way, a linear system $g_m(n)$ is required to be derived, so that $y(m)$ can be directly obtained after $x(n)$ is processed by $g_m(n)$. In order to achieve this purpose, it is necessary to design a unit sampling response ht digital filter.

$g_m(t)$ is a time-varying system. That is, each output sample $y(m)$ can be represented as a linear combination of input samples $x(n)$. The general form of this expression is shown in the following formula:

$$y(m) = \sum_{n=-\infty}^{\infty} g_m(n) x\left(\frac{mM}{L} - n\right). \quad (1)$$

Among them, $g_m(n)$ can be expressed as [16]

$$g_m(n) = \hat{h}[(n + \delta_m)T]. \quad (2)$$

Because $g_m(n)$ can represent $L$ different sets of values, it is periodic with respect to $m$, that is,

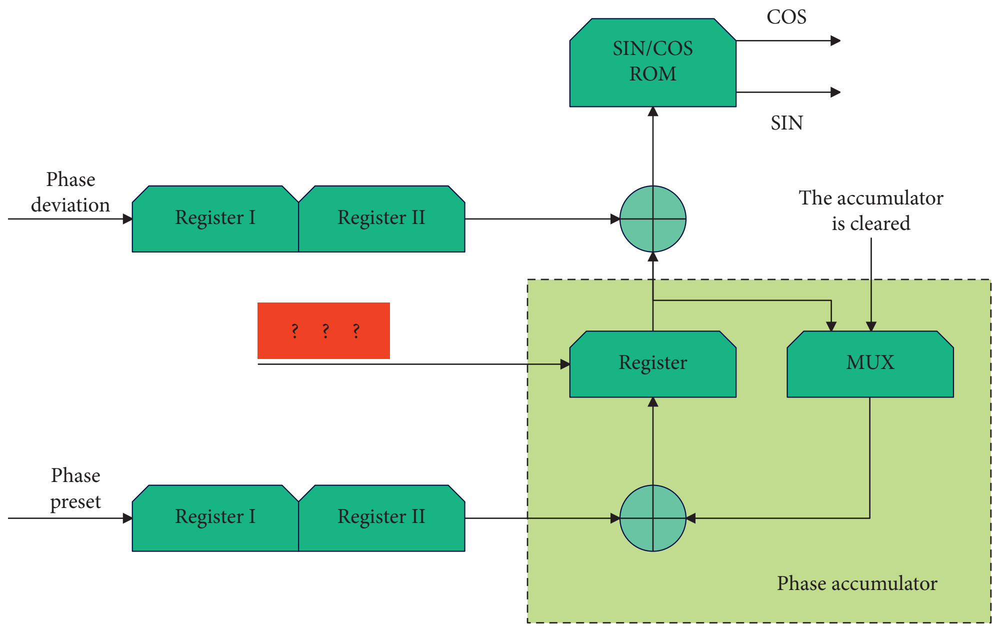


Figure 2: Numerically controlled oscillator.

$$g_m(n) = g_{m+L}(n), \quad r = 0, \pm 1, \pm 2, \ldots. \tag{3}$$

Therefore, the system $g_m(n)$ is a linear, digital, periodic time-varying system and has a wide range of applications. When $L = M = 1$, since the period of $g_m(n)$ is 1, formula (3) can be simplified as

$$y(m) = \sum_{n=-\infty}^{\infty} k(n)x(m-n). \tag{4}$$

Another representation of a linear time-varying system is as follows: If the input is represented as $x$ $(n)$ and the output is represented as $y$ $(m)$, then

$$y(m) = \sum_{n=-\infty}^{\infty} k(mn)x(n). \tag{5}$$

In formula (5), $k$ $(m,n)$ is the system function. Among them, the sampling rates corresponding to $m$ and $n$ are different. The system function of a time-varying system is defined as the response of the system at $m$ time to $n$ samples by adding one unit sample. Here it is necessary to define the general corresponding time-domain and frequency-domain correspondence, the corresponding signals are $x$ $(n)$ and $y$ $(m)$, respectively, where $\omega$ and $\omega'$ represent the signal sampling rates of $x$ $(n)$ and $y$ $(m)$, respectively. Therefore,

$$Y(\omega') = \int_{-\pi}^{\pi} K(\omega', \omega)X(\omega)\mathrm{d}\omega. \tag{6}$$

In formula (6), the function $K(\omega', \omega)$ becomes a system function represented by $k$ $(m,n)$, or a dual-frequency system function.

From the aforementioned conclusions, the frequency domain mapping from the signal space $X(\omega)$ to the signal space $Y(\omega')$ can be obtained, as shown in Figure 3. For a linear time-invariant system, there is the following relationship:

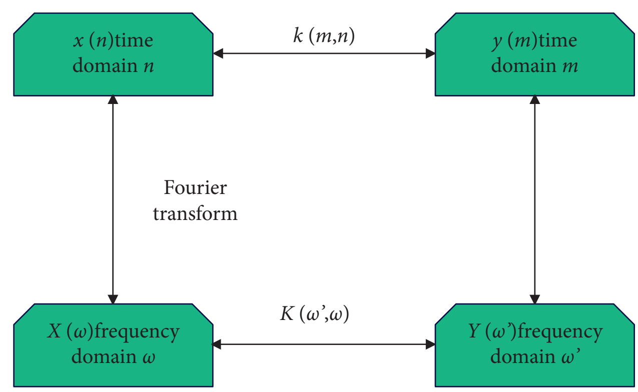


Figure 3: Frequency domain mapping in a multisampling system.

$$Y(\omega') = H(\omega)X(\omega'). \tag{7}$$

For time-varying systems, the mapping defined by $K(\omega', \omega)$ is more complicated, and these two states always appear. When many frequency components in $X(\omega)$ are mapped to a certain frequency point in $Y(\omega')$, this is a many-to-one mapping, and this state is called aliasing. On the contrary, when a certain frequency component in $X(\omega)$ is mapped to multiple frequency points of $Y(\omega')$, this is a one-to-many mapping, and this state is called a mirror image. In multisampling rate systems, both in the time domain and in the frequency domain, aliasing and mirroring are possible.

*3.1. The Integer M times Extraction of the Digital Receiving System of the Spoken English Voice Wave Instrument.* In the digital receiving system of the English spoken voice wave instrument, the sampling rate is reduced from 32 MHz to 2 MHz according to the requirements of the system, that is to say, only the process of reducing the sampling rate by an integer multiple of $M$ needs to be considered, that is, the sampling rate at this time. According to formula (8), the sampling factor $M = 16$ is obtained.

$$F\prime = \frac{1}{T\prime} = \frac{1}{MT} = \frac{F}{M}. \tag{8}$$

We assume that when the xnt signal is input, its spectrum is not all zero within $-F/2 \leq f \leq F/2$. It can also be represented by $\omega$, and $\omega = 2\pi f$.

$$|X(\omega) \neq 0|. \tag{9}$$

In order to reduce the sampling rate and avoid aliasing, an ideal filter must be used, which can only be approximated in practice. The characteristics of the filter are

$$\widetilde{H}(\omega) = \begin{cases} 1, & |\omega| \leq \dfrac{2\pi F\prime T}{2} = \dfrac{\pi}{M}, \\ 0, & \text{other.} \end{cases} \tag{10}$$

For the data, one data is reserved for every $M$ points and the reserved data are at the same interval, so that the purpose of reducing the sampling rate can be achieved. First, the system function of the actual low-pass filter is set to $h$ $(n)$, then we can get

$$w(n) = \sum_{k=-\infty}^{\infty} h(k)x(n-k). \tag{11}$$

Among them, $w(n)$ is the o-wave output data, and the final output is $y$ $(m)$.

$$y(m) = w(Mm). \tag{12}$$

The digital equivalent of the sampling system is shown below. Among them, $w\prime$ and $w$ are normalized to the sampling frequencies $F'$ and $F$, respectively.

*3.2. Theoretical Basis of Digital Filter Design.* The key problem to realize the conversion of the sampling rate is how to realize the filters at all levels because the filters at each level ensure that the signals do not overlap, as shown in Figure 4. For the conversion of the baseband signal sampling rate, it is necessary to design the filter $h$ $(n)$ as a digital low-pass filter. The quality of the filter design will directly affect the processing capability of the system.

Digital filters can be divided into two types: one is finite impulse response (FIR), and the other is infinite impulse response (IIR). FIR means that the filter system function $h$ $(n)$ is a digital filter with a finite number of values, that is to say, $h$ $(n)$ is zero outside the finite sampling interval. However, the impulse response time of the IIR is infinite. For digital filter design, it is simply to calculate the system function $h$ $(k)$ according to the required $H$ $(t)$.

Choosing FIR or IIR to complete the design is actually to determine which filter can complete the design better. As far as the current technology is concerned, FIR has better applications, and FIR has greater advantages in terms of linear phase, stability, etc. Therefore, FIR will be used to complete this design.

It is also very meaningful to estimate the amount of calculation and storage of the filter because the appropriate device is selected according to the amount of calculation. For example, the FPGAXC2S200 chip has only one hardware multiplication circuit and cannot undertake a large number of multiplication operations. Moreover, it is judged whether the system uses FPGA on-chip resources or off-chip resources according to the amount of memory. The method of valuation is given in this section.

The input is $x$ $(n)$, the output is $y$ $(n)$, and the system function of the filter is $h$ $(n)$, so that a simple digital filter model can be constructed.

$$\begin{aligned} &y(n) = \sum_{k=-\infty}^{\infty} h(k)x(n-k) \text{ In time domain of definition,} \\ &y(n) = x(n) * h(n) \text{ In the frequency domain of definition.} \end{aligned} \tag{13}$$

The FIR digital model can be expressed as

$$y(n) = \sum_{k=0}^{N-1} h(k)x(n-k). \tag{14}$$

The system function of FIR can be expressed as

$$H(\omega) = \sum_{k=-\infty}^{\infty} h(k)e^{-j\omega k}. \tag{15}$$

The parameters involved in the design of an equiripple digital filter include passband ripple $\delta_p$, stopband ripple $\delta_s$, cutoff frequency or passband edge frequency $F_p, \omega_p$, stopband start frequency or stopband edge frequency F, and transition band bandwidth $\Delta F$, as shown in Figure 5. In order to explain the functional relationship between the parameters of the filter, other functions are also defined. The functional relationship between the filter lengths $N$, $D$, $D_\infty(\delta_p, \delta_s)$, and $f(\delta_p, \delta_s)$ is expressed as follows:

$$\begin{aligned} D &= (N-1)\Delta F = \frac{(N-1)\left(\omega_s - \omega_p\right)}{2\pi} \\ &= (N-1)\left(F_p - F_s\right), \\ D_\infty\left(\delta_p, \delta_s\right) &= \lg\delta_s \lfloor a_1\left(\lg\delta_p\right)^2 + a_2 \lg\delta_p + a_3 \rfloor \\ &\quad + \lfloor a_4\left(\lg\delta_p\right)^2 + a_5 \lg\delta_p + a_6 \rfloor, \\ f\left(\delta_p, \delta_s\right) &= 11.012 + 0.512\left(\lg\delta_p - \lg\delta_s\right), \quad \left|\delta_p\right| \geq \left|\delta_s\right|. \end{aligned} \tag{16}$$

Among them, $a_1 = 0.005309$, $a_2 = 0.07114$, $a_3 = -0.4761$, $a_4 = -0.00266$, $a_5 = -0.5941$, and $a_6 = -0.4278$. The functions $D$, $D\infty$, and $f$ are related as follows:

$$D_\infty\left(\delta_p, \delta_s\right) = D + f\left(\delta_p, \delta_s\right)(\Delta F)^2. \tag{17}$$

From this, the order $N$ of the filter can be deduced.

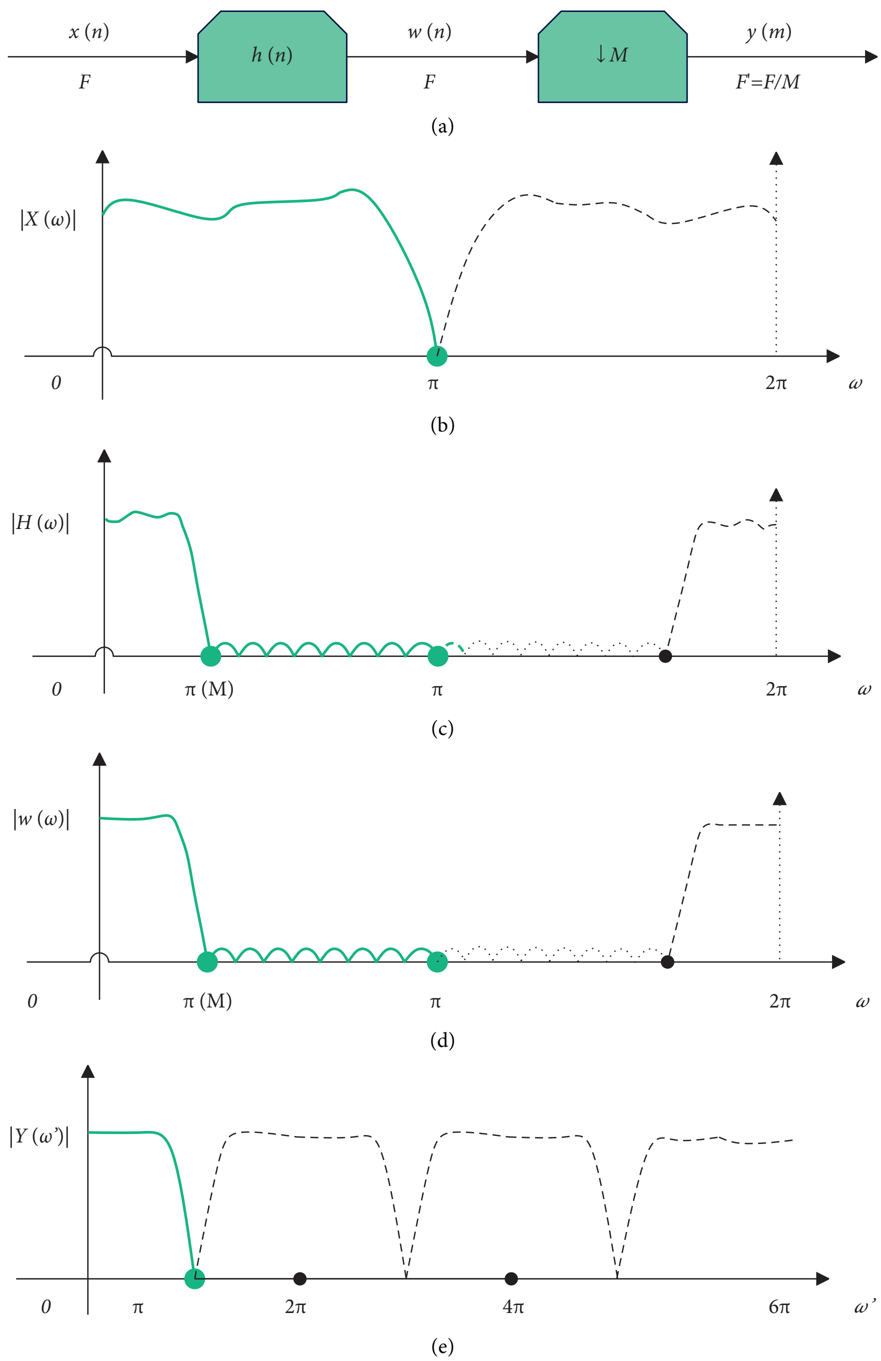


Figure 4: Extracted spectrogram.

$$N = \frac{D_\infty\left(\delta_p, \delta_s\right)}{\Delta F} - f\left(\delta_p, \delta_s\right)\Delta F + 1. \tag{18}$$

When designing a filter, the computational complexity and storage capacity of the filter should also be considered. In fact, it is impossible to estimate the exact value very accurately, only the approximate value can be calculated quantitatively. The results of these calculations are important in practical applications.

We first define a metric, that is, the total number of multiplications per second (MPS) required to be $R_T^*$. Its expression is

$$R_T^* = NF. \tag{19}$$

$N$ is the order of the filter and $F$ is the sampling frequency.

Then, we define another metric, the amount of storage $N_T$. The amount of storage required is nearly proportional to the sum of the filter lengths of each stage, so $N_T$ is defined as

$$N_T = \sum_{i=1}^{\ell} N_i. \tag{20}$$

Among them, $N_i$ is the length of the $i$-th filter.

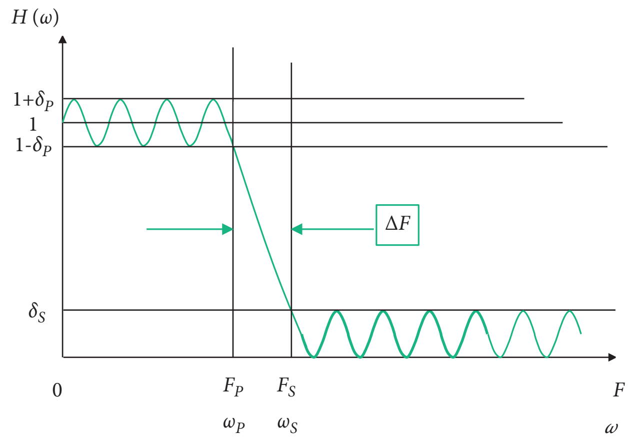


Figure 5: Spectrogram of the filter.

In general, the transition bandwidth is much smaller than the sampling rate of the filter, the second term on the right side of formula (20) can be omitted, and formula (18) can be rewritten as

$$N \approx \frac{D_{\infty}\left(\delta_p, \delta_s\right)}{(\Delta F/F)}. \quad (21)$$

In a multi-stage system, the filter order of each stage must be calculated, and then the filter order formula of each stage and the first-stage filter order formula can be derived.

$$N_i \approx \frac{D_{\infty}\left(\left(\delta_p/I, \delta_s\right)\right) F_{i-1}}{F_i - F_S - F_P}, \quad i = 1, 2, \ldots I. \quad (22)$$

## 4. Digital Teaching Platform for Spoken English Based on Virtual Reality

As one of the specific applications of computer-assisted language learning, the overall performance of the spoken English scoring system largely depends on speech recognition technology. The key steps in the specific process of speech collection, continuous speech recognition, evaluation results, and correction information feedback lie in the process of speech recognition. The results generated by this process not only show the specific content of the speaker's pronunciation but also determine whether the speech evaluation results given by the scoring system are accurate and reliable relative to the expert evaluation. Therefore, speech recognition technology is a crucial technical guarantee for this kind of computer-assisted language learning system. The digital teaching platform for spoken English based on virtual reality technology designed in this paper is shown in Figure 6.

The continuous speech recognition method is shown in Figure 7. The operation of the state grid is also performed sequentially from left to right with time synchronization, and the next state is entered only after the calculation of the current state is completed.

In a spoken language grading system, systematic grading has naturally become one of the most basic functions of the

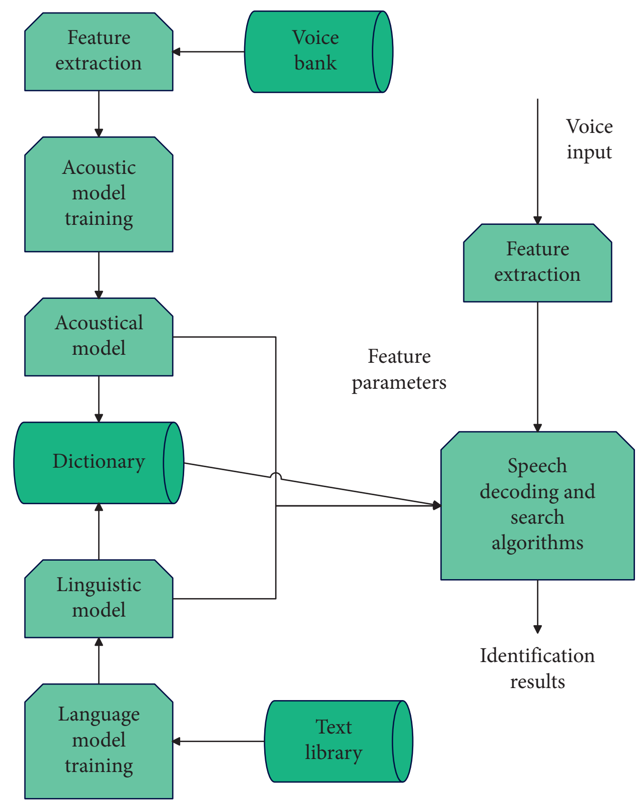


Figure 6: The digital teaching platform for spoken English based on virtual reality.

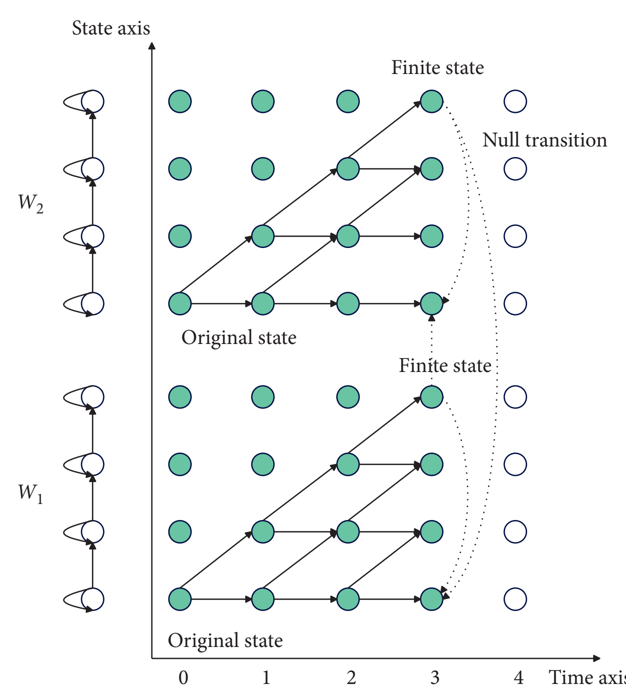


Figure 7: Continuous speech recognition.

system. Judging from the existing applications, it can be seen that the scoring methods are mainly divided into two categories: subjective and objective. Most of the subjective scoring is completed by a scoring group composed of

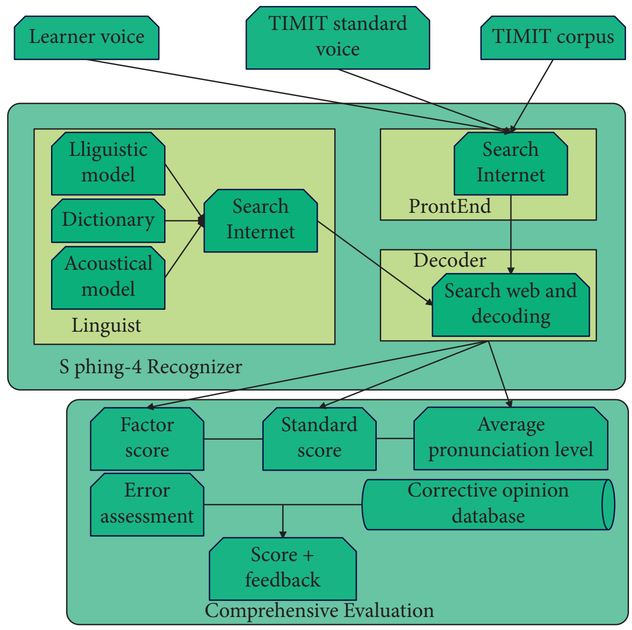


FIGURE 8: The automatic scoring system for spoken English.

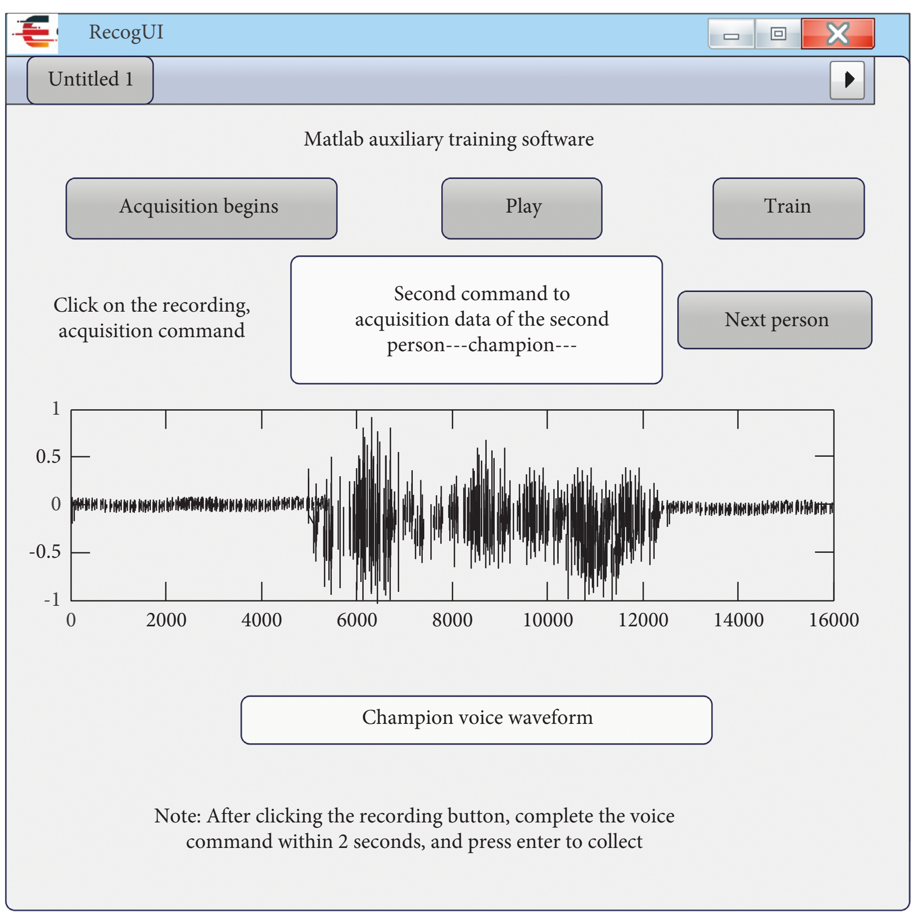


FIGURE 9: MATLAB GUI interface.

English major teachers or experts. Since t the standards for this kind of scoring have been summarized and listed one by one in advance, the scoring members can score the spoken pronunciation according to the scoring rules and personal subjective phonemes. As a result, the scoring process is time-consuming and labor-intensive, and the scoring results are

Table 1: Effect verification of the digital teaching platform for spoken English based on virtual reality.

| Number | Oral teaching | Number | Oral teaching |
|---|---|---|---|
| 1 | 83.783 | 18 | 84.022 |
| 2 | 85.447 | 19 | 86.676 |
| 3 | 87.131 | 20 | 89.679 |
| 4 | 83.948 | 21 | 89.436 |
| 5 | 85.116 | 22 | 87.473 |
| 6 | 86.514 | 23 | 84.564 |
| 7 | 89.718 | 24 | 83.462 |
| 8 | 86.466 | 25 | 83.511 |
| 9 | 86.785 | 26 | 89.926 |
| 10 | 86.774 | 27 | 88.233 |
| 11 | 86.563 | 28 | 84.585 |
| 12 | 87.873 | 29 | 87.237 |
| 13 | 85.879 | 30 | 85.281 |
| 14 | 88.656 | 31 | 84.447 |
| 15 | 87.455 | 32 | 88.035 |
| 16 | 85.841 | 33 | 83.291 |
| 17 | 88.894 | 34 | 83.699 |

somewhat subjective and lack fairness. Therefore, this type of scoring method is only used in some English-speaking tests.

However, in the computer-assisted language learning system, the scoring of spoken English is completely dependent on the more objective automatic scoring of the computer. As mentioned above, many scholars are now conducting in-depth research on scoring algorithms. The commonly used scoring algorithms include scoring based on DTW dynamic time warping, logarithmic posterior probability, or maximum likelihood score based on HMM. These algorithms can evaluate learners' pronunciation quality more objectively. However, in the scoring algorithm based on DTW, the calculation of the minimum distance between the speech feature vector and the standard template vector is too large. Moreover, the process of obtaining the optimal state sequence is too complicated. At the same time, this type of system only needs the learner to imitate the standard pronunciation to obtain a higher score, and the level of spoken English has not been substantially improved, so it cannot meet the performance requirements of today's users for this type of system. However, the log-posterior probability scoring method based on HMM can not only better reflect the similarity between the learner's pronunciation and the standard pronunciation. Moreover, it can also reflect the learner's pronunciation characteristics from phonemes, syllables, and other pronunciation units and has quite high stability, so this scoring method is widely used in related recognition systems or learning systems. The automatic scoring system for spoken English designed in this paper is shown in Figure 8.

The interface of this module is based on MATLAB for GUI design. Initially, use the mouse to drag and drop the control onto the interface for layout, and then edit the callback code of the control. The interface design of this module includes the start and end of voice captures, voice playback, the number of voice capture, voice waveform, and voice sampling rate. As shown in Figure 9, the MATLAB GUI interface is collecting the voice data "champion."

This paper verifies the effect of the digital teaching platform for spoken English based on virtual reality constructed in this paper, and the statistical simulation verification results are shown in Table 1.

The experiment verifies that the digital teaching platform for spoken English based on virtual reality has a good digital spoken English teaching.

## 5. Conclusion

Spoken English speech recognition technology is a kind of pattern recognition, and the basic principle is that the machine converts the spoken English speech signal into text by processing, analyzing, recognizing, and understanding it. Moreover, spoken English speech recognition technology involves many fields. In addition to basic applications, it can be combined with other natural language processing technologies such as spoken language recognition technology, spoken English speech synthesis technology, and machine translation technology to build more complex and intelligent applications. This paper combines the virtual reality technology to design a digital teaching platform for spoken English in order to change the shortcomings of the existing spoken English teaching, and to improve the students' spoken expression effect. The experiment verifies that the digital teaching platform for spoken English based on virtual reality has a good digital spoken teaching effect.

## Data Availability

The labeled dataset used to support the findings of this study is available from the corresponding author upon request.

## Conflicts of Interest

The authors declare that they have no conflicts of interest.

## Acknowledgments

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## References

[1] J. C. Richards, "Teaching english through English: proficiency, pedagogy and performance," *RELC Journal*, vol. 48, no. 1, pp. 7–30, 2017.

[2] L. Susanty, Z. Hartati, R. Sholihin, A. Syahid, and F. Y. Liriwati, "Why english teaching truth on digital trends as an effort for effective learning and evaluation: opportunities and challenges: analysis of teaching English," *Linguistics and Culture Review*, vol. 5, no. S1, pp. 303–316, 2021.

[3] A. S. Fatimah, S. Santiana, and Y. Saputra, "Digital comic: an innovation of using toondoo as media technology for teaching English short story," *English Review: Journal of English Education*, vol. 7, no. 2, pp. 101–108, 2019.

[4] B. Ayçiçek and T. Yanpar Yelken, "The effect of flipped classroom model on students' classroom engagement in teaching English," *International Journal of Instruction*, vol. 11, no. 2, pp. 385–398, 2018.

[5] N. Guzachchova, “Zoom technology as an effective tool for distance learning in teaching English to medical students,” *Bulletin of Science and Practice*, vol. 6, no. 5, pp. 457–460, 2020.

[6] M. S. Hadi, “The use of song in teaching English for junior high school student,” *English Language in Focus (ELIF)*, vol. 1, no. 2, pp. 107–112, 2019.

[7] A. Mahboob, “Beyond global Englishes: teaching English as a dynamic language,” *RELC Journal*, vol. 49, no. 1, pp. 36–57, 2018.

[8] H. Sundari, “Classroom interaction in teaching English as foreign language at lower secondary schools in Indonesia,” *Advances in Language and Literary Studies*, vol. 8, no. 6, pp. 147–154, 2017.

[9] A. Gupta, “Principles and practices of teaching English language learners,” *International Education Studies*, vol. 12, no. 7, pp. 49–57, 2019.

[10] B. S. M. Abdelshaheed, “Using flipped learning model in teaching English language among female English majors in Majmaah university,” *English Language Teaching*, vol. 10, no. 11, pp. 96–110, 2017.

[11] O. Tarnopolsky, “Principled pragmatism, or well-grounded eclecticism: a new paradigm in teaching English as a foreign language at Ukrainian tertiary schools?” *Advanced Education*, vol. 11, no. 10, pp. 5–11, 2018.

[12] N. I. Sayakhan and D. H. Bradley, “A nursery rhymes as a vehicle for teaching English as a foreign language,” *Journal of University of Raparin*, vol. 6, no. 1, pp. 44–55, 2019.

[13] D. A. W. Nurhayati, “Students’ perspective on innovative teaching model using edmodo in teaching English phonology: a virtual class development,” *Dinamika Ilmu*, vol. 19, no. 1, pp. 13–35, 2019.

[14] M. Siregar, “The use of pedagogical translation in teaching English by scientific approach,” *Budapest International Research and Criticsin Linguistics and Education (BirLE) Journal*, vol. 2, no. 4, pp. 111–119, 2019.

[15] A. Ibrahim, “Advantages of using language games in teaching ENGLISH as a foreign language in Sudan basic schools,” *American Scientific Research Journal for Engineering, Technology, and Sciences (ASRJETS)*, vol. 37, no. 1, pp. 140–150, 2017.

[16] Y. Li and L. Wang, “An ethnography of Chinese college English teachers’ transition from teaching English for general purposes to teaching English for academic purposes,” *ESP Today*, vol. 6, no. 1, pp. 107–124, 2018.