



Implementing an Embedded Systems Approach in Teaching Oral English with IoT and Fuzzy Control

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Abstract. The development of social internationalization has made all countries pay more attention to the education of oral English. Colleges and universities are the key venues for cultivating students' practical ability of oral English. Foreign trade-related companies also reported that the recruited students did not have the ability to communicate in English. The comprehensive analysis found that there are some problems in the current practice teaching methods of oral English in colleges and universities, and these problems have led to the lack of current students' oral English ability. With the continuous advancement of the Internet of Everything concept in various industries, the Internet of Things is the key technology for the realization of the Internet of Everything concept, and the types of sensors that are the core devices of the Internet of Things are also constantly being discovered. Such sensors have been widely recognized in the innovation of informatization teaching in many colleges and universities. Applying various IOT sensors to the practical teaching of spoken English can provide auxiliary tools for student learning and teacher analysis. The fuzzy control method is based on fuzzy mathematics-related algorithms to simplify the calculation process of a variety of variable factor systems. The process of oral English practice involves a variety of variables related to students and teachers. Objectives, content, process and evaluation need to be optimized.

Keywords: IOT sensor; fuzzy control; oral English; teaching method; implementing an Embedded System

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1 INTRODUCTION

1.1 Iot Sensors

IOT sensors refer to a type of hardware devices with specific types of data collection and data processing. Initially, IOT sensors can only collect data related to physical quantities such as basic

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pressure, light, and temperature. The types of data that can be collected by networked sensors are also increasing. Sound categories, environmental categories, and other human biological state data have also become objects collected by sensors. IOT sensors are usually connected to the IOT gateway, and the data of the same type of sensor is transmitted to the computer for analysis and storage in the background through the IOT gateway. In order to ensure the validity and timeliness of data transmission, the IOT sensor usually uses a wired connection for data transmission. Storage, IOT sensors for wearables are connected to the gateway through Bluetooth, Lora, and Wifi. The agency predicts the future development trend of IOT sensors combined with VR as shown in Figure 1.

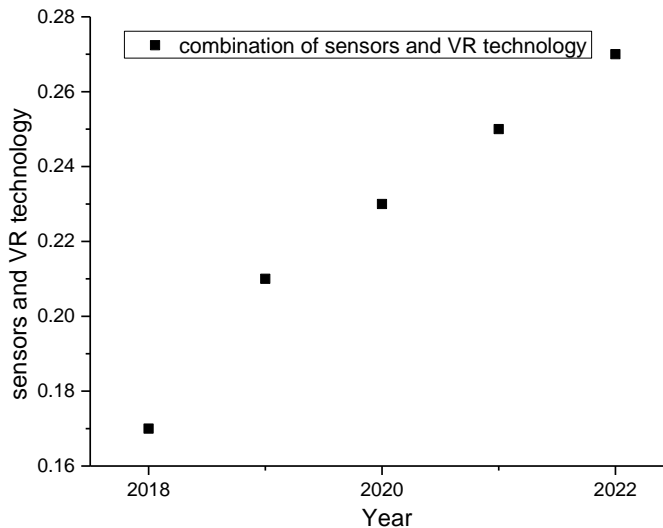


Figure 1: The Development Trend of the Combination of Sensors and VR Technology.

1.2 Fuzzy Control

The core idea of fuzzy control is to use fuzzy set theory to simplify the processing process and make the process that requires a lot of computation more indirect. Fuzzy control achieves the ultimate computational simplification through four key components, including input fuzzing, database matching, fuzzing, and result interpretation. The first step is to match the membership functions required for fuzzy processing to the requirements. Then, the fuzzy matching is carried out in combination with the empirical database related to the data that needs to be fuzzy processed, and the relevant rules of fuzzy processing are designed, and then the fuzzy data is processed in combination with the rules, mainly relying on the mathematical theory of fuzzy sets. By interpreting the obfuscated data into data types that can be used for real problems [4][27][23].

1.3 Practical Teaching of Oral English

Oral practice teaching has now become a necessary part of English education in colleges and universities. Its goal is to let students get rid of the mode of high school focusing on English problem-solving and writing, and improve students' practical English communication ability. At present, the practical teaching of oral English in colleges and universities is divided into two types: classroom and on-campus [12]. The practical teaching of oral English on campus is mainly carried out in the form of interest clubs, English corners and English proficiency competitions. Due to the burden of

college students' schoolwork and examination certificates, Students rarely have time to participate in English corners and ability competitions in their spare time.

2 QUESTIONNAIRE SURVEY AND ANALYSIS.

In order to understand the current situation and existing problems of oral English practice teaching, questionnaires were distributed to students and teachers related to oral English practice teaching in various grades and colleges. 5,000 questionnaires were distributed through the online platform, and the final recovery rate of valid questionnaires met the standards of the questionnaire platform. The survey content mainly includes the degree of matching between the current oral English practice teaching content of the institution and the needs of students, the method of oral English training, the participation of students in oral practice, the evaluation of the effect of oral practice teaching, and the level of oral classroom informatization. Among them, the degree of matching between the teaching content of oral English practice and students' needs is the key to students' learning interest and learning efficiency [14][17][16]. If students can always learn and practice the content related to their oral interests in the classroom, they can always maintain the highest enthusiasm for learning. The questionnaire survey selected three students with typical average characteristics to display the data, and the matching degree between the practical teaching content of oral English and the needs of students is shown in Table 1.

<i>Student</i>	<i>Demand matching</i>
<i>A</i>	<i>0.33</i>
<i>B</i>	<i>0.25</i>
<i>C</i>	<i>0.42</i>

Table 1: Degree Matching Between the Practical Teaching Content of Oral English and Needs of Students.

It can be seen from Table 1 that among the three typical students, the average demand matching degree of classmate C in the oral practice class is the highest and only 0.42, while the average demand matching degree of classmate B is only 0.25. This data shows that the current college students' oral English practice class There is a problem that the content of teaching does not match the needs of students. When students cannot obtain information related to their interests in the classroom, their enthusiasm for learning is also not high. The problem of low matching between the content of oral English teaching and students' learning needs is the current One of the important reasons for the poor oral ability of students [2][24][29].

Oral training method refers to the oral practice mode arranged by college teachers when guiding students to learn oral English or teaching practical methods in class. College oral training is usually based on the situational dialogue content in textbooks, and the content of textbooks is due to cultural differences and cultural differences. There are differences between time and space distance and other issues in real life, so the oral language training method that is not integrated with reality cannot allow students to obtain real practical experience [30].

<i>Student</i>	<i>Oral training method</i>	<i>Classroom training ratio</i>
<i>A</i>	<i>Repetition of Textbook Scenario Dialogue</i>	<i>0.29</i>
<i>B</i>	<i>Simulate real life conversations</i>	<i>0.36</i>
<i>C</i>	<i>random conversation</i>	<i>0.35</i>

Table 2: Oral Training Methods.

It can be seen from Table 2 that the three typical students involved different types of oral language training methods in the classroom, but only 0.36 of the dialogues were close to the really life situation, and the proportion of random dialogues and repeated textbooks was higher, but It is difficult for students to obtain useful information from it [5].

The student's oral practice participation refers to the active degree of students participating in oral practice in the classroom or other oral practice teaching process on campus. Finally, the improvement of speaking ability is also high. Table 3 shows the content of students' participation in oral practice in this questionnaire survey.

<i>Student</i>	<i>Participation in speaking practice</i>
<i>A</i>	<i>0.41</i>
<i>B</i>	<i>0.33</i>
<i>C</i>	<i>0.26</i>

Table 3: Students' Participation in Oral Practice.

From the representative student data in Table 3, it can be seen that the participation of students in oral practice is still at a low level. It can be seen from this that some students still find it difficult to focus on the practical teaching process even if they are in the oral practice teaching place.

The effect evaluation of oral practice teaching is an important method to evaluate the students' oral practice learning effect and teachers' teaching efficiency in a timely manner. The effect evaluation can not only summarize the learning situation, but also allow teachers to improve their own teaching methods by finding problems, so that students can adjust themselves in time. method of learning. Table 4 shows the data about the effect evaluation of oral practice teaching in this questionnaire survey.

<i>Teacher</i>	<i>The accuracy of teaching effect evaluation</i>
<i>A</i>	<i>0.25</i>
<i>B</i>	<i>0.39</i>
<i>C</i>	<i>0.26</i>

Table 4: The Effect Evaluation of Oral Practice Teaching.

From Table 4, it can be seen that the average accuracy of the three typical teachers' teaching effect evaluation is low, and the highest teacher's teaching evaluation accuracy is less than 0.4.

Therefore, it can be found that the current teaching effect evaluation is still poor, and more effective methods are needed. The assessment method completes the improvement of oral practice teaching.

The level of oral classroom informatization refers to the precision of the electronic equipment in the oral practice teaching place. A classroom with a high level of informatization can provide more auxiliary equipment support for students and teachers. More auxiliary support means that students and teachers are related to oral practice teaching. Data can be collected and used more effectively to provide more help for students' learning efficiency and teachers' teaching methods improvement [3][9][7].

Combined with the further analysis and summary of the questionnaire data by the algorithm, it is found that there are two key problems in the current oral English practice teaching methods: teaching scenarios and students' personalized needs-targeted learning. The algorithm formula involved is shown in (1)-(5).

$$M_J^1 : \{Pr_{j_i}^{x_i}, F, NM_{i2}, T_J^1\} \quad (1)$$

$$Q_i \cdot W + c \cdot W_i \prod_{ij} \frac{\alpha_{i2}}{\alpha_{i2} - \alpha_{j2}} = r_i \cdot x_i \quad (2)$$

$$X_i \in [1, t-1] (i = 0, 1, 2 \dots, t-1) \quad (3)$$

$$F = \sum_{i=1}^t X_i \cdot Z_i \text{ mod } k \quad (4)$$

$$CX_{uai} = Total_{vague} \cdot E \quad (5)$$

M represents the overall set of questionnaire data, J represents the number of questionnaires, Pr represents encryption parameters, F represents the basic data of the questionnaire, NM represents the participants of the questionnaire, T represents the time-consuming of the questionnaire, and Q and W respectively represent the information about the questionnaire. Oral practice teaching content, X represents the teaching parameters, Z represents the type of the questionnaire, and C represents the objects included in the questionnaire.

3 THE KEY PROBLEMS IN THE PRACTICAL TEACHING OF ORAL ENGLISH

3.1 Teachers Tend to Ignore the Quality and Effectiveness of Oral English Practice Teaching

Teachers have low requirements for the presentation effect of oral English practice. Spoken English practice has the characteristics of a dialogue drama. If it is placed on the stage, oral English practice also has rich visual effects, such as lighting, costumes, scenes and props. This is a complete English practice speaking needs to present the effect [1][20]. Although the oral English practice in the classroom does not need to be too gorgeous, it also needs a certain scene effect support. However, teachers have low requirements for the presentation effect of oral English practice. The purpose of most teachers applying oral English practice teaching is to consolidate knowledge. They think that as long as students communicate in oral English and consolidate knowledge in certain scenarios, they do not spend too much time preparing for oral English practice [28][25][8].

3.2 Insufficient Attention of Teachers to Differences in Students' Personalities and Learning Levels

In the practical teaching of oral English, there are certain differences in the learning level of students, and the learning ability of oral English will be different. Some students can organize and express English fluently, and express personal information more fluently in oral practice. Some students have lower levels and fluency will be lower. Teachers should give oral practice guidance and evaluation to students of different levels. Students will have differences in personality and different expressiveness to oral English practice. Some students like to take on important roles with higher difficulty and more lines. Such students like to show their abilities and are not afraid of other people's eyes [21][11][6][10]. They have an advantage in speaking practice, while some students prefer

roles with low difficulty and weak presence. However, teachers do not pay enough attention to the differences of students. When assigning oral practice groups, they do not assign them according to students' personality characteristics and learning level differences. The students' group abilities are unbalanced, and there are active groups and quiet groups, which leads to easy order in oral English practice. A chaotic or boring situation. Teachers almost always allow students to freely divide their roles, so the opportunities for students to exercise are often unequal. Students who like to perform often take the initiative to take the main role, and it is easy to feel complacent, which will also affect the effect of oral English practice. cause an impact. Introverted students have a certain fear of difficulty in oral practice, and they do not show the vividness of oral practice. Teachers need more encouragement and guidance. They must make different levels of requirements and evaluations according to students' differences. Step by step, students can gradually overcome Fear of embarrassment [19][26][18][22].

4 THE PRACTICAL TEACHING METHOD OF SPOKEN ENGLISH BASED ON IOT SENSORS

From the questionnaire and the interactive display of teaching scenarios in oral English practice analysed in Chapter 3, it can be seen that the teaching process of oral English practice needs to improve students' concentration and immersion, and sensors combined with VR equipment can solve the current situation in English. The problem of poor presentation of oral practice teaching scenarios, in which VR virtual reality helmets are used for inertial motion-related sensors to obtain the effect of head movement in students' English oral practice scenarios, while other hand and foot-related motion acquisition sensors are used for Sensors related to eye movement and gesture recognition have also become important sensors that can be used in the practical teaching of spoken English [13][15]. After effectively combining various sensors with VR rendering images, students can use VR The head-mounted device immerses the English practice speaking scene, and the oral practice teaching combined with the VR sensor can greatly improve the students' participation in the oral training. The specific situation is shown in Figure 2.

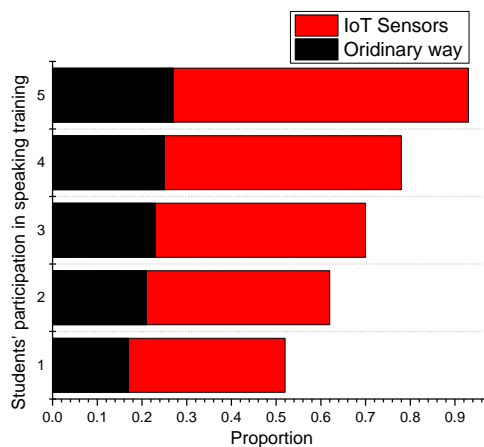


Figure 2: Students' Participation in Oral Language Training.

The use of VR combined with sensors can also make the electronic equipment in the classroom look more intelligent, and the students' oral practice can also be implemented in more scenes, and the degree of informatization in the classroom has also been greatly improved. The specific situation is shown in Figure 3 shown.

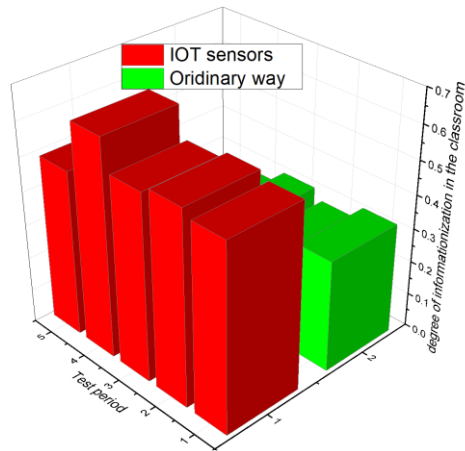


Figure 3: The Degree of Informatization in the Classroom.

5 THE PRACTICE TEACHING METHOD OF ORAL ENGLISH BASED ON FUZZY CONTROL

In view of the situation that teachers cannot accurately obtain students' oral English learning needs information and personal English oral learning ability in the current oral English practice teaching, taking spoken English and spoken English as the input of fuzzy control and membership function parameters, and decrypting the encrypted data in combination with the characteristics of fuzzy set data, the optimal oral practice teaching method for the student group can be obtained. Through the second investigation, it is found that the targeted changes of teachers' teaching content after combining with fuzzy control technology are shown in Figure 4.

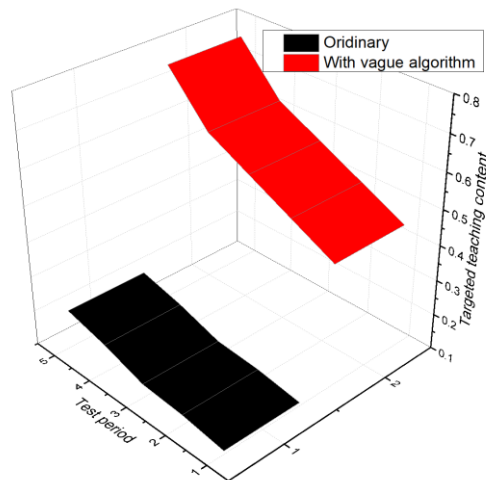


Figure 4: Targeted Teaching Content.

Aiming at the problem of low accuracy in the evaluation of teachers' oral English practice teaching effect, combined with the manual statistical error that always used the teaching system, questionnaire or oral interview to evaluate teachers' oral English practice teaching effect. The

process of evaluating teachers' oral practice teaching effect involves a variety of factors. The fuzzy control system is suitable for solving problems related to various complex parameters.

6 CONCLUSION

Influenced by exam-oriented education, students now often focus on reading and writing when they study English. Through the interview, we can know that the relationship between the four abilities of listening, speaking, reading and writing in English affects the whole body. In addition to learning English in the classroom, students should start from themselves. Only when students realize the importance of oral English from the bottom of their hearts and are full of interest in oral English, will they be happy with any method of practicing and improving oral English. In order to correctly understand the position of oral English in English learning, give full play to the inner motivation of learning, work hard to learn oral English, improve the self-confidence of oral English, and develop a good habit of actively and continuously practicing oral English. The source of students' oral language learning is mainly from English teachers, and the speaking English level of English-taught teachers usually meets the requirements, and students' English listening ability can be trained in the classroom. However, at this stage, the teaching is still not perfect due to the lack of technical assistance, and the students' oral language learning atmosphere is lacking. This paper distributes questionnaires to students and teachers related to oral English practice teaching in various grades and various colleges and universities to investigate the problems existing in the current oral English practice teaching process. Objectives, content, process and evaluation need to be optimized. Through the Internet of Things sensors and fuzzy control methods, the corresponding English oral practice teaching methods are designed respectively. Technology-improved teaching strategies are more in line with students' learning needs. embedded systems, such as IoT sensors and fuzzy control methods, into oral English practice teaching, the learning experience can be significantly enhanced. These technologies provide real-time feedback, adaptability, immersive experiences, and increased accessibility, thereby addressing the current limitations of oral English practice teaching.

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