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Research Article

Optimization and Simulation of an English-Assisted Reading System Based on Wireless Sensor Networks

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In this paper, wireless sensor network technology is applied to an English-assisted reading system to highly simulate and restore the context and improve the performance of all aspects of the English-assisted reading system to optimize the English-assisted reading system. The product designed in this paper is based on wireless sensor network technology with Linux as the core operating system and supports POSIX (Portable Operating System Interface Standard) standard application development interface; QT is used as the component and framework of the system to support many applications. Based on player open-source multimedia audio and video technology, optimized and tailored for the hardware platform, it well supports multimedia learning and entertainment functions; this paper also adopts open-source database technology based on SQL (Structured Quevy Language) and Berkeley DB, using them as a platform for data storage and access, supporting a million-level thesaurus and high-speed, example sentence search. In this paper, we describe the user's personalized needs by creating interest models for the user, recommending the text content, and reading order that can help with understanding through the interest models and reading articles and expanding the recommended text range by making expansions to the reading content through references and related articles to further help the user understand the text. Based on the above work, this paper implements an assisted reading system; finally, a multihop self-organizing network system is formed through a wireless sensor network to make the rigid and boring English reading easy and interesting.

1. Introduction

In recent years, with the continuous development of communication technology, wireless communication methods have gained more attention with their advantages of convenience and efficiency. Multimedia technology-assisted English reading teaching is a common teaching tool, which has a certain positive effect on improving the effectiveness of language learning and teaching quality. Reading, as the main and most important means of language input, plays an important role in language learning and has always been the focus of English teaching. How well students perform in reading determines to a large extent how well they learn English [1]. In high school English teaching, reading is undoubtedly one of the most important learning contents and skills, and it takes up a considerable amount of weight in the English Advanced Placement exam papers. In English learning, students' reading ability also directly affects their learning and training of other English skills, so the basic position of reading should not be underestimated. Therefore, improving student's English reading ability is one of the priorities of high school English teaching. However, in the actual English reading teaching, grammar and vocabulary teaching is still the main content of high school English reading class, and teachers pay much more attention to language knowledge than to language skills [2]. This way of teaching also makes high school students in the process of English learning do not pay attention to the learning and training of reading skills, resulting in the wrong concept of good English learning which is to remember more words and grammar errorless, which is not difficult to explain the phenomenon that students achieve high scores in English but can not read an English article.

Psychological research shows that certain stimuli in the environment can cause people's orientation response, thus arousing people's attention and making them interested.

Multimedia technology combines text, graphics, color, sound, video images, and other information together, graphic and sound, which can activate students' perceptual organs and attention and fully mobilize students' learning interest. The goal of language learning is to cultivate the communicative ability, and the cultivation of communicative ability first requires a large amount of input of real language materials and, then through repeated practice and practical application, gradually transformed into the learners' inner language ability [3]. The specific steps for establishing an interest model are as follows: (1) users provide relevant information, including majors, courses, hobbies, and published or downloaded articles; (2) perform word segmentation, keyword extraction, deduplication, weighting, and other operations on the information to obtain a keyword set; (3) get the insertion position, get the nearest common ancestor node of the keyword and the node in the interest model in WordNet, and add it to the interest model; and (4) repeat step 3. Multimedia equipment playing audio and video materials can create a real language environment, which is conducive to the development of communicative activities in the classroom and the cultivation of students' sense of language. In English learning, the role of reading is irreplaceable and the level of English is inseparable from the amount of reading. Reading is also the most basic way of learning for students; learners can constantly improve their sense of language, increase their vocabulary, and improve their English reading comprehension and oral communication skills in reading materials; we all know the important role of vocabulary in English reading level, and reading is one of the effective means to memorize words, without relevant English language environment; it is ineffective to memorize words by rote. In the reading classroom, if we continue to use the unchanging traditional teaching method, it is far from enough for students to improve their sense of language and vocabulary; therefore, the necessity of using multimedia technology reasonably in English reading teaching is especially important.

The age of artificial intelligence demands a distinct personality and a very creative mind for each person. The difference in creativity reflects the difference between people, and for this reason, using all the advantages of artificial intelligence, we can pay attention to the personalized development of students and the differential teaching of students, so that each student does not fall behind [4]. Artificial intelligence facilitates teachers to understand the dynamics of information from individual students and provides more scientific and accurate personalized tutoring. The development of micro-learning, flipped classrooms, big data analytics tools, and many other forms have given rise to a variety of intelligent interactive teaching systems that are gradually making digital teaching a reality. This real-time feedback and assessments provide intelligent suggestions for teachers to implement precise teaching strategies, effectively improving classroom teaching effectiveness and student learning efficiency.

2. Related Works

The research on the ability of multimedia technology to assist in foreign language teaching began in the United States. Because of the rapid development of information technology in the United States, the research related to multimedia technology in teaching and learning started in the United States in 1963 and was applied in a practical work. From the 1990s to the present, information technology in education has been developed rapidly worldwide, so the auxiliary function of multimedia technology in teaching has been widely recognized and fully used in the teaching of various subjects [5]. The use and development of multimedia technology in the field of education have had a development history of several decades, and the research on multimedia in language teaching has been conducted for quite some time. The earliest systematic research on multimedia-assisted teaching can be traced back to the American audiovisual educational psychologist Dale, who studied the use of audiovisual media in actual teaching and the teaching effects brought about by them [6]. The most famous of these is the "Tower of Experience" theory. He divided the sources of human learning experiences into ten levels according to different levels of abstraction and grouped these ten levels into three major categories. Among these ten levels, there are multimedia elements such as text, sound, and images. However, scholars have researched multimedia-assisted foreign language teaching, which has reflected its certain superiority in some educational practices and educational ideas and provided a good basis for our later research and development, but there is still little research on the aspects of problems arising from multimedia technology in English teaching [7].

The research on multimedia teaching and the emergence of research results are slightly behind those of advanced countries and regions, and only in the 1980s did they begin to explore the relevant aspects of multimedia-assisted teaching. However, the slow development of information technology during this period made it difficult to create good hardware conditions for practical activities, and research on related aspects of software had not yet begun. This article sets up a default value for the weight of a hobby. After each reading, you only need to determine whether there is hobby-related content in the reading content. If there is, update the weight of the hobby, so that it can be prioritized. In the first decade, theoretical research was mainly conducted in multimedia-assisted teaching, as well as translation and study of advanced theories and experiences. The two journals "Chinese Electro-Chemical Education" and "Research on Electro-Chemical Education," which were found in the nascent period of multimedia education, have provided a lot of theoretical knowledge for educators since they were first published in 1980 [8]. Through these two journals, educators were able to learn about the advanced experience and the process of technological development at the early stage of technology development, and therefore, they are known as the base of theoretical research on e-education. The first teaching aids incorporated in foreign language teaching were electronic media as well as speech labs, and it was only in the 1990s that real multimedia aids were introduced [9].

From 1981 to 1994, the annual research literature was within three digits, and from 1995 to 2000, the annual research literature did not exceed four digits, but after entering the 21st century, from 2001 to 2014, the annual research literature in related fields has been increasing [10]. The research trend shows that multimedia-assisted English teaching has been valued since the new century and has been a hot research topic for scholars in related fields. From the content of the research, multimedia-assisted English teaching is mostly carried out from two aspects: theory and practical application. First is the theoretical research aspect. At the early introduction, whether multimedia could enter teaching had also been questioned. Dr. Yang analyzed the possibility of multimedia entering language teaching from the technical point of view, pedagogy, and the possibility of language teaching and suggested that multimedia could help language teaching and classroom to be organically integrated [11].

3. Design of English-Assisted Reading System for Wireless Sensor Networks

3.1. System Analysis and Architecture. WordNet is a cognitive linguistics-based English dictionary designed by a consortium of psychologists, linguists, and computer engineers at Princeton University. WordNet is superficially like a thesaurus in that it groups words based on their meanings. However, there are some important differences. First, WordNet is not just about word forms and strings of letters, but also about the specific meanings of words. Words that are very close to each other in the network are disambiguated semantically. Second, WordNet marks semantic relationships between words, whereas the grouping of words in a synonymy thesaurus does not follow any explicit pattern other than the similarity of meaning. WordNet is a large database of English words. Nouns, verbs, adjectives, and adverbs are grouped into cognitive synonym sets, each expressing a different concept. The synonyms are related to each other by conceptual semantics and lexical relationships. The structure of WordNet makes it a useful tool for computational linguistics and natural language processing [12]. The main relationships between words in WordNet are synonyms, such as the relationship between shut and close or car and automobile. Synonyms represent words that share the same concept and are interchangeable in many contexts, grouping text into unordered sets (synonym sets). Each of WordNet's 17,000 synonyms is linked to other synonym sets by a small number of "concept relations." In addition, a synset contains a short definition and, in most cases, one or more short sentences describing the use of a synset member. Forms of words with several different meanings are represented in as many different synsets as possible. Thus, each form-meaning pair in WordNet is unique.

$$M_i = \frac{\ln \left[1 + \left(N_{10}^{i}/2N_i^{0}\right)\right]}{\ln \left(1 - \left(1/f(x)\right)\right)}. \quad (1)$$

The system defaults to the basic common dictionary, in the download dictionary, can copy the dictionary to the specified directory; using a list display, the user selects any thesaurus as the current query dictionary. The system uses Unicode encoding to build a powerful word bank to support multinational languages. The picture, sound, phonetic, and example dictionaries are all built-in by default, and all dictionaries share these data. The picture library, sound library, example sentence library, and basic lexicon can be updated in a data upgrade. The lexicon is stored using SQLite, and word lookup uses the database's query function. The routing module can also act as a relay router in the entire network, so that some routing modules far away from the aggregation module can relay communications through the closer routing modules, which can reflect the large-scale deployment of the entire network and multihop routing features. The use case for analyzing the lookup dictionary is relatively simple; the user enters the word or looks it up by taking the word from the screen. The user downloads the different dictionary libraries to the machine [13]. The dictionary server receives all the word lookup requests sent to it, queries the database, or replaces the current dictionary and then sends the results back to the requesting client. The dictionary lookup function is needed in many parts of the system. If the dictionary is loaded as a dynamic library, each application that needs to look up words will link to the dynamic library and open the dictionary in its process to look up its data, which may encounter a series of synchronization problems such as resource usage. So, the dictionary needs to unify the word search interface, and this topic will be designed as a client-server model, as shown in Figure 1.

The process of interest model building includes acquiring information, processing the information, determining the insertion position, and adding to the interest model step by step. The specific steps for building the interest model are as follows: (1) the user provides relevant information, including majors, courses, interests, and published or downloaded articles; (2) the information is divided into words, keyword extraction, deweighting, weighting, and other operations to obtain the keyword set; (3) obtain the insertion position, obtain the nearest common ancestor nodes of the keywords and nodes in the interest model in WordNet, and add them to the interest model; and (4) repeat step 3, get the preliminary interest model for the professional model, and then build the interest model according to the content of the course syllabus, which generally includes the subjects that need to be studied before taking this course, the key chapters of the course, the key definition concepts, etc., and the division of class time, etc., according to the chapter where the key definition concepts are located in the course syllabus to determine the insertion position. Thus, ensure hierarchy and for linkage, examine whether this concept or definition is linked to other nodes in the model of interest, and if so, establish a connection. In the case of previously taken courses, it is determined if there is a link to other subjects based on the information taken in the course syllabus. For the hobby model, it is simple to determine the superordinate term of the hobby, i.e., the category to which the hobby belongs, and if the category of the hobby exists in the model, it is placed directly under the category, if not, the category is put into the model together with the hobby, and the weight of the hobby, based only on the hobby provided by the user, cannot determine the priority

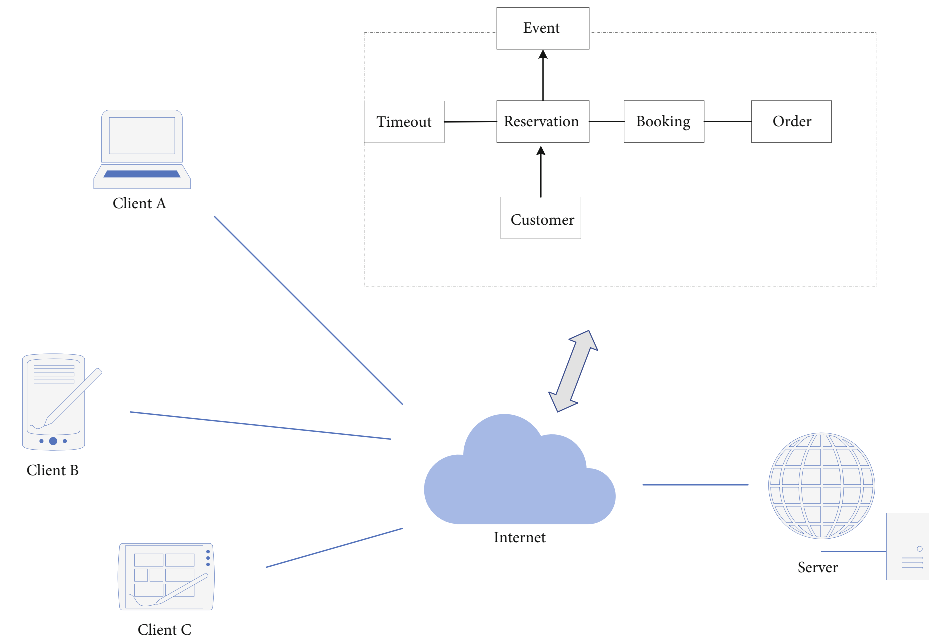

Figure 1: Domain modeling diagram for the client-server model.

of the hobby; so this paper establishes a default value for the weight of the hobby, and after each reading, in this paper, the default value of hobby is set; so after each reading, we only need to determine whether there is any hobby-related content in the reading content; if there is, then, the weight of the hobby will be updated so that the priority can be classified.

$$\omega = \frac{1}{W_1 + W_2 + \cdots + W_n}. \tag{2}$$

To reflect the characteristics of wireless self-assembling sensor networks such as large-scale deployment, self-organization, reliability as well as low-power consumption, and multihop routing, this chapter designs a LoRa-based multihop wireless sensor network. The LoRa-based wireless self-assembling sensor network mainly consists of a common module, routing module, and aggregation module. The common module is the lowest layer of the whole network and the most numerous modules in the network, so it can be externally connected to sensors and act as a data collection role, and the common nodes cannot communicate with each other. The routing module belongs to the upper layer of the common module and is responsible for the management of the surrounding common modules to form multihop communication data links. The aggregation module is the core of the whole network, managing all the routing modules in the network, which can be connected to the PC control center to complete the data collection of the whole network, and the operating instructions of the whole network are also issued by the administrator through the control center to the aggregation module and then distributed to the submodules at the lower level. The routing module can also act as a relay route in the whole network so that some routing modules that are far away from the aggregation module can relay the communication through the closer routing module so that the large-scale deployment and multihop routing characteristics of the whole network can be reflected. The aggregation module broadcasts synchronization frames periodically after powering up, and the non-logged-in routing modules will send login ACKs to the aggregation module after receiving the synchronization frames, and the aggregation module assigns an incremental route ID to each routing module and records it in the routing table according to the order of receiving the login ACKs from the routing modules. Once a routing module is dropped in the sensor network at a later stage, the corresponding ID position in the routing table will be vacated, and the vacant ID will be assigned in priority when waiting for the next new routing module to log in, reflecting the self-organization of the whole network. At the same time, in the whole network, except for the aggregation module which is not powered by an external lithium battery, the aggregation module and the common module are powered by a lithium battery. To reduce the power consumption of the modules and improve the survival cycle of the network, all the common modules and routing modules use the hibernate-wake-up-hibernation cyclic working mode, as shown in Figure 2.

3.2. Wireless Sensor Network Data Fusion. Since multisensor data fusion technology has a wide range of research components and applications, so far it does not have a standard definition that can be universally accepted. Although there are multiple definitions of data fusion, they are consistent. As a focused military area, multisensor data fusion mainly includes target detection, data correlation, target estimation, and identification and situational assessment and threat estimation to achieve multilevel integrated processing of multisensor data. Nowadays, multisensor data fusion technology

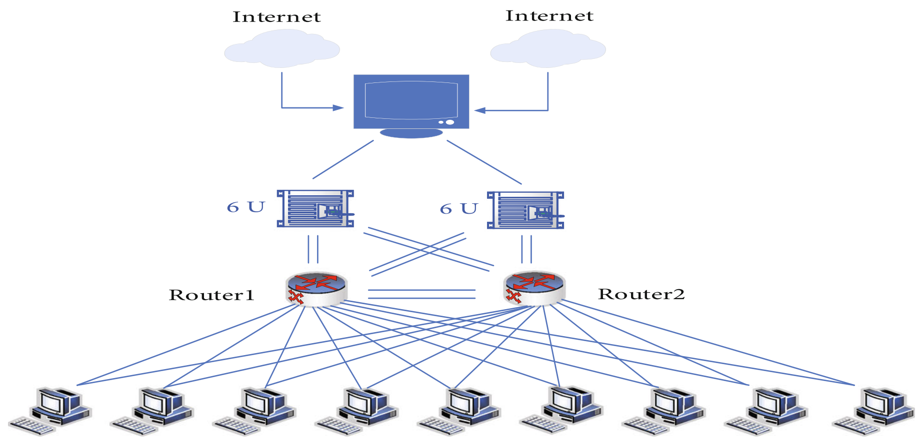

Figure 2: Network topology diagram.

has become an independent discipline, and the definitions proposed based on a particular application area are not representative. However, based on the substance of these definitions, taken together, multisensor data fusion can be simply defined as the use of computers to optimally synthesize multisensor observations to obtain more accurate and reliable target information. Multisensor data fusion techniques combine multiple sources of information according to some criterion that takes full advantage of the complementary and redundant nature of multiple sensors to obtain maximum reliable information about the target. Multisensor data fusion is divided into five levels of fusion based on the form of information abstraction, including detection-level fusion, position-level fusion, attribute-level fusion, situational assessment, and threat estimation.

$$p(k) = \left[\sum_{j=1}^{n} p_y^{-1} \times k^2 \right]^{-1}. \quad (3)$$

Target tracking (TT), through the comprehensive application of modern scientific theories such as statistical estimation, stochastic decision-making, and intelligent computing, first discriminates the data detected by the sensors and forms the corresponding observation set to give the total number of targets being tracked and then uses the target observation information to reliably estimate (filter) and predict the target state. The observations are generally derived from sensor measurements, i.e., target state observations obtained in the presence of noise pollution, and the target state generally includes kinematic components (position, velocity, acceleration, etc.), other components (radiated signal strength, spectral characteristics, and "property" information, etc.), and constants or other retardation parameters (coupling coefficients, propagation velocity, etc.). Multiple target tracking (MTT) refers to the simultaneous processing of observations from multiple targets and the maintenance of state estimates for multiple targets. However, the implementation process is the same for both single target tracking and multiple target tracking, and the schematic diagram is shown in Figure 3.

In a multisensor target tracking system, target motion state estimation mainly refers to the position estimation and velocity estimation of the moving target. Target position estimation includes the estimation of distance, altitude, bearing, and elevation angle; velocity estimation contains both velocity estimation and acceleration estimation. At the same time, in the entire network, except that the aggregation module is not powered by an external lithium battery, both the aggregation module and the ordinary module are powered by lithium batteries. To reduce the power consumption of the module and increase the life cycle of the network, all common modules and routing modules adopt the sleep-wake-sleep cycle working mode. In 2002, Mitchell and House Kamer et al. processed sounding, satellite, and aircraft data using the EnKF filtering algorithm and explored the problem of the influence of the number of ensemble members, model errors on the filtering results in complex situations [14]. In 2003, Snyder et al. completed an experimental approach to assimilate radar data with ensemble Kalman filtering. In 2004, Dowel applied EnKF to assimilate actual radar measurements. Since the frequency information acquired by the sensors contains information about the relative motion velocity between the target and the observation platform, the introduction of frequency information can determine the velocity of a moving target, an important measurement in target tracking techniques. This chapter uses a multisensor target passive tracking model that jointly utilizes the angle of arrival and Doppler frequency, as shown in Figure 4.

The Monte Carlo method is a numerical method to solve the problem by mathematical simulation and statistical analysis of random variables. The Monte Carlo method first establishes a corresponding stochastic model according to the characteristics of the problem to be solved and generates random variables with known probability distribution by the stochastic model; then sample random data according to the distribution characteristics of each random variable to conduct statistical experiments to obtain a large amount of experimental data is obtained; finally, statistical analysis is performed on these experimental data to obtain the final solution of the problem being solved. As a key military field, multisensor data fusion mainly includes target detection,

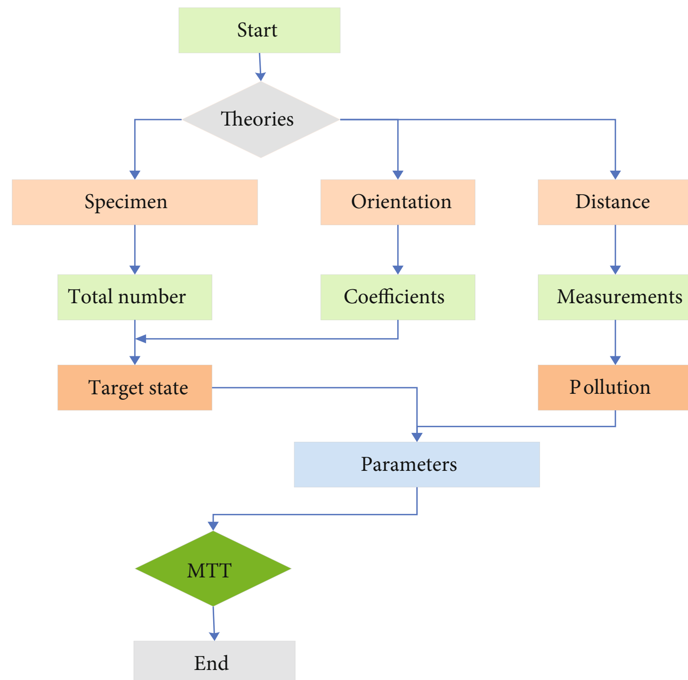

Figure 3: Basic schematic of target tracking.

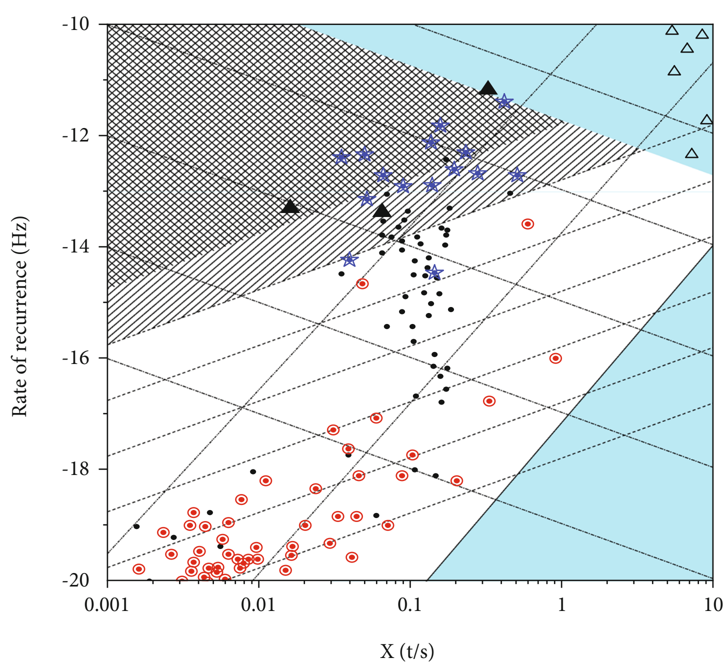

Figure 4: Model of target tracking system.

data association, target estimation and recognition, situation assessment, and threat estimation, to achieve multilevel comprehensive processing of multisensor data. The Monte Carlo stochastic simulation theory is used in the target tracking system. One place is to use Monte Carlo theory to generate the initial set $X_0 = [X_0^{\ 1}, X_0^{\ 2}, \cdots, X_0^{\ N}]$ of the EnKF algorithm set with membership number N. The other place is for generating the observation set by perturbing the observations using the Monte Carlo method. If the same observations and the same returns are used to update each ensemble member, the analysis error covariance will be underestimated, causing degradation of the analysis function and even leading to filter divergence. If the number of ensemble members is large, the problem of underestimation of the analytical error can be mitigated by adding the correct random perturbation to the observations to generate the ensemble of observations using the Monte Carlo method. A perturbation with a mean of 0 and a variance of the noise scale factor multiplied by the Gaussian white noise of the observations is often applied to the observations.

$$\xi(k) = \cos\left(\frac{1}{x(k)^2 + y^2(k)}\right). \quad (4)$$

After the global observation fusion results are obtained, a smoothing estimation can be performed using a filtering algorithm to obtain the global system state fusion estimate and the corresponding error covariance. The key aspect of the weighted fusion algorithm is the determination of the weighting factors for the input information. Currently, it is common to assign weights by the method of great likelihood, least squares, etc. These methods use the measurement variance of each sensor to determine the weighting factors. However, the random interference existing in the sensors themselves and the external environment makes the observed information uncertain and correlated, which in turn leads to uncertainty in the corresponding measurement variance, making the weighted fusion effect not optimal or the effectiveness of the fusion performance reduce. In addition, when the measurement accuracy of a sensor is low, the direct use of sensor observation information for weighted fusion will cause further degradation of the track fusion performance. Based on this, by studying the weighted fusion algorithm proposed in the literature, this chapter proposes a weighted fusion algorithm based on local state estimation and uses the idea of weighted fusion algorithm to achieve an improvement on the stepwise filtered fusion algorithm proposed in the literature and reduce the impact on the performance of the fusion algorithm when directly using the observation information. The algorithm is made less effective when directly using the observed information because of some factors. The main influencing factors are as follows: first, the sensor itself performance and the external environment random interference see information uncertain and correlated, which leads to lower observation accuracy; second when the accuracy of multiple measurement devices differs greatly, the correlation leads to a large mutual influence between the observation information in the fusion process. To this end, this section proposes a weighted track fusion algorithm based on local state estimation and verifies its effectiveness through simulation comparison.

$$Z(k) = \chi_1(k) + \chi_2(k) + \cdots + \chi_n(k). \quad (5)$$

The weighted fusion algorithm based on local state estimation mainly uses the local state estimation of each sensor to complete the weighted combination of multisensor filtering to achieve the target fusion track. The specific process of the algorithm is as follows: first, the preprocessed observation information of the multisensors is used to estimate the target local state of each sensor using the filtering algorithm; then, a suitable support function is selected according to the local state estimation information of the multisensors, and the support matrix between the multisensors is established; then, the support matrix is used to calculate the weighting factor of each sensor and the weighted combination of the local state estimation information. Finally, the position fusion estimation information is filtered and estimated to compensate for the neglect of the correlation between the front and back of the data in time by the support degree matrix, and finally the fusion estimation value based on the global system is obtained. In the multisensor target tracking system, target motion state estimation mainly refers to the position estimation and velocity estimation of the moving target. Target position estimation includes estimation of distance, height, azimuth, and elevation; velocity estimation includes velocity estimation and acceleration estimation.

Table 1: Simulation parameter settings.

Area	8 m∗ 8 m	Name	Number
Number of labels	30	Positioning area	20
Reference tags	20	Reference tags	16
The position of the tags	16	Nearest reference tag	14
k	4	n	2.2

4. System Performance Testing

4.1. Analysis of Simulation Results. In the simulation of the LANDMARK positioning system, MATLAB r2014a is used for simulation, according to the previous simulation analysis, the k value; the number of reference tags and the position of the tags to be positioned in the system will affect the positioning accuracy. The final positioning area is an $8 * 8$ space, and within the positioning area, a total of 16 reference tags and 20 tags to be positioned are set, and the layout of the reference tags is all laid out according to a square. The nearest reference tag k value is selected according to the previous analysis and is chosen as 4. The channel transmission model is a log-path statistical model, where the environment factor is taken as 2.2. The simulation settings are shown in Table 1.

Root Mean Square Error (RMSE) and Cumulative Distribution Function (CDF) are mainly used in the simulation analysis of localization error in this section. To determine the localization performance of the DISTANCE-LIMIT-LANDMARK algorithm, a comparison experiment is conducted with the LANDMARK localization algorithm, VIRE-LANDMARK localization algorithm, and ADAPTIVE-SELF-LANDMARK localization algorithm to compare the localization error of each tag to be localized under the same experimental environment. The DISTANCE-LIMIT-LANDMARK localization algorithm proposed in this paper has better localization accuracy than the other three localization algorithms for most of the tags to be located; the average localization error of all tags is about 0.3596 m. However, it is obvious that the tags to be located with numbers 14 and 20 are poorly localized, and the average localization error is very high (high, which is also consistent with the conclusion that the location of the to-be-located tags at the edges). This is also consistent with the conclusion of the previous analysis that the positioning

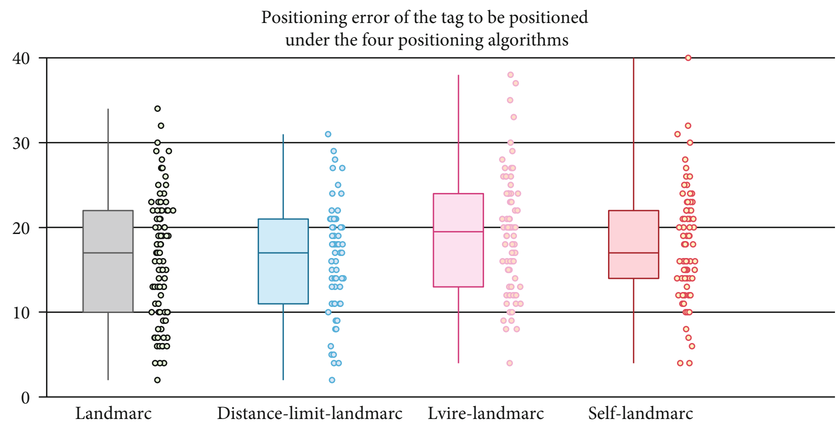

Figure 5: Positioning error of the tag to be positioned under the four positioning algorithms.

accuracy is greatly reduced when the tags are located at the edge of the positioning area, as shown in Figure 5.

In this section, this paper examines the estimation accuracy of the anomalous nodes in the key classes returned by the FDP (Fast Detection Protocol (FDP)) protocol [15]. The estimation accuracy contains two levels, firstly whether the probability of the class nodes with the highest number of anomalous nodes appearing in the set ruler is satisfied and secondly whether the number of anomalous nodes in these K classes is estimated accurately. If the most anomalous nodes appear in the top 10 classes of nodes, respectively, the experimental results show that the frequency of node class 18 appearing in the TOP~k set is 95%, which satisfies the default query accuracy of this paper, while the frequency of nodes in classes 9 and 10, appearing in the TOP~k set, seems to be lower than the expected value. Could the FDP protocol not satisfy the predefined precision? It can not. This paper can find that the probability frequency of nodes in categories 9 and 10 appearing in TOP-10 is still much higher than those of the other node categories that follow. Because the first 10 categories of nodes appear in the TOP~k set with the greatest frequency, this paper counts whether their estimated number of anomalous nodes is accurate when they appear in the TOP~k set, as shown in Figure 6.

In this paper, we aim to identify the class K nodes quickly and accurately with the highest number of anomalous nodes and accurately estimate the number of anomalous nodes in a large-scale wireless rechargeable sensor network system. To solve this problem, this paper proposes an EPC C1G2 compliant FDP protocol that can use the difference between the virtual time slot frame vector and the actual time slot frame vector to estimate the number of anomalous nodes in the corresponding class and can dynamically eliminate those node classes with a particularly small number of missing nodes, so that only the limited communication resources need to be reserved for those node classes that are more likely to belong to the TOP~K set. The specific process of the algorithm is as follows: first, use the filtering algorithm to estimate the target local state of each sensor using the preprocessed observation information of the multisensor; then, select the appropriate support function according to the local state estimation information of the multisensor, and establish the multisensor. Then, the support matrix is used to calculate the weighting factor of each sensor and the weighted combination of the local state estimation information, realizes the weighted fusion of the local state estimation, and obtains the corresponding target position fusion estimation information and, finally, the position. The fusion estimation information is filtered and estimated to compensate for the ignorance of the support matrix to the temporal relevance of the data before and after, and finally, the fusion estimation value based on the global system is obtained. This paper presents extensive theoretical analysis to ensure the accuracy of the query and optimizes the parameters involved in the FDP protocol to minimize its time cost. Extensive simulation results show that when the number of node categories is large, the FDP protocol can improve up to 80% in terms of time efficiency over existing protocols. The FDP protocol proposed in this paper is essentially a probabilistic solution, and although it can provide query results with guaranteed accuracy, it still cannot give 100% accurate query results, especially for those node classes that are at the boundary of the FDP.

$$P_{ij} = \begin{bmatrix} 0.7 & 0.02 & 0.02 \\ 0.02 & 0.88 & 0.02 \\ 0.02 & 0.02 & 0.9 \end{bmatrix}. \quad (6)$$

4.2. System Functionality Test Results. Most of the users have used handheld PDA devices, the cumbersome operation interface makes those non-professionals a headache for a while, so the interface production effect is very important for these people; these nontechnical aspects of the test are very necessary; interface friendliness is also one of the important indicators to evaluate the system [16]. To make the system interface beautiful and generous, you need the help of workers to complete and determine the background tone, with relevant pictures and text color to form the overall style and then insert a variety of functions based on this interface, the title within the page to generate static connections, relevant URLs, and database connections. At this point, the system interface has been basic.

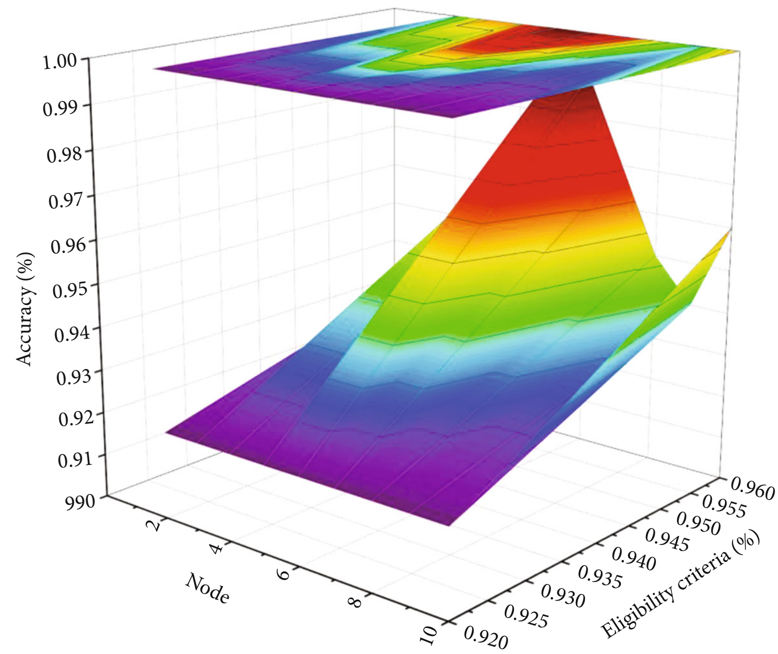

Figure 6: Frequency of the top 10 types of anomalous nodes being correctly estimated.

Table 2: Interface test protocol and results.

Test methods	Conclusion	Test methods	Conclusion
Whether the window is updated in time	Yes	Is the text accurate	Yes
Is the information standardized	Efficient	Is the password format wrong	Yes
Whether the link valid is well	Adaptation	Is the positioning accurate	Yes

Meet the public requirements; at this point, you need to get people at all levels to look at the page to correct the expenses. Finally, it is given to the client for review. For the above requirements of interface testing and performance testing, evaluate its testing index. During the testing process, many problems were found and simple solutions were concluded in the process of correction [17]. These included a variety of errors such as design flaws, coding errors, and improper hardware pairings. The corrections improved the reliability of the system and increased the corresponding speed of the system. The results from each test are listed, as shown in Table 2.

The UBLQ transmission mechanism proposed in this paper can converge quickly, and the goal of maximizing the network effect is achieved. The pairwise experiments are based on the problem of maximizing the network utility to obtain the link transmission cost parameter through the pairwise problem, which is used to find the transmission rate of the data stream. In the experiments, the algorithm chooses the same utility function as in this paper. Since the algorithm needs to know the size of the link transmission capacity, the transmission capacity of each link is set to 35 pkts/s in this paper. The UBLQ protocol in this paper converges faster compared to the distributed algorithm and can ensure that the utility of the network maintains fluctuating in the optimal value range [18]. It shows that this protocol can maximize the network utility by increasing the exploration algorithm to adjust the transmission rate of one-hop nodes and distributing the rate to multihop nodes according to the link quality in a joint algorithm. Also, by setting different transmission capacities, all the algorithms in this paper can find out the current maximized network utility faster, different link transmission capacities constrain the transmission rates of nodes in the network, and by assigning the node transmission rates so that they forward the data collected by sensor nodes to the aggregation nodes at the maximum transmission rate, the efficiency of collecting data is greatly improved. Finally, the difference between the transmission rates assigned to each node of the UBLQ transmission mechanism in this paper and the results obtained by the distributed algorithm are analyzed. The difference between the transmission rate of the nodes assigned by this algorithm and the distributed algorithm in the case of link transmission capacity is within 1 pkts/s, which increases the throughput of the network while ensuring maximum network utility, as shown in Figure 7.

In this chapter, firstly, some problems encountered during the project are analyzed and studied, and the solutions are elaborated. The method can complete the modulation identification in the multipath channel environment using only the higher-order accumulation characteristics of the received signal, which requires less a priori knowledge and

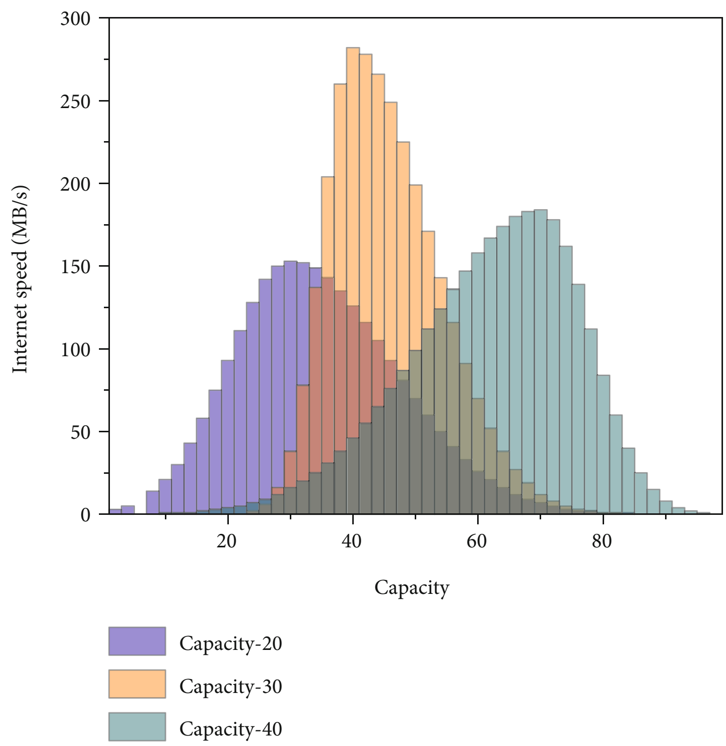

FIGURE 7: Maximum network utility achieved for different transmission capacity conditions.

high identification performance. Finally, the simulations are performed and the results of the simulations prove the effectiveness of the algorithm proposed in this paper, and the whole project development process is made more complete by the work in this chapter.

During the experiment, the teachers did not find the experiment to be a burden on their teaching. During the experiment, teachers could use the digital learning resources in the "Speak Easy" intelligent speech system to recommend to students to use, and students could complete the recommended practice tasks on time, and the software also provided feedback on students' completion, which was positive and effective. At the same time, students also reflect that when they use the system, they like the practice module in the system, and they can choose their favorite video clips according to their interests [19]. To solve this problem, this paper proposes an FDP protocol that conforms to the EPC C1G2 standard. It can use the difference between the virtual time slot frame vector and the actual time slot frame vector to estimate the number of abnormal nodes in the corresponding category and dynamically eliminate those with a particularly small number of missing node category, so only the limited communication resources need to be reserved for those node categories that are more likely to belong to the TOP~K set. These clips include classic movies, cartoons, speeches, and dramas, which can greatly enrich students' choice preferences, and by practicing some classic dialogue bridges, they can well stimulate their learning interests and thus improve their English listening and speaking abilities. The five aspects of clarifying the importance of students' listening ability, providing rich contexts, cultivating students' independent listening ability, attaching importance to students' listening feelings and interest in listening, and conducting diversified evaluation prove that the experimental hypothesis of this study is correct, and the applied strategies are effectively verified, and the English listening ability cultivation strategy based on intelligent speech system for junior high school students can improve students' English listening ability; i.e., the English listening ability based on intelligent speech system-based English listening and speaking ability development strategy is effective.

5. Conclusion

In this paper, we design and implement an English-assisted reading system based on a wireless sensor network. The system uses user information to construct a user interest model, maps interest communities to reading content, reconstructs the reading order of interest articles and expands reading content based on references, and updates user interest in real-time according to user reading content [20]. The study proved that applying wireless sensor network technology to an English-assisted reading system is beneficial to help students improve their reading attitudes, train their reading skills, and improve their reading performance. In conclusion, this study, through educational observations, surveys, interviews, and experiments, has demonstrated to some extent the positive impact of multimedia teaching on English reading instruction, which is worth implementing in educational practice. Although the research in this paper has obtained certain results, admittedly, this study is inevitably deficient due to the influence of objective and subjective factors. In the subsequent research, it can be summarized from the aspects that teachers themselves need to improve in the actual teaching activities as well as the time and laws of multimedia technology used in English reading teaching, to drive students' initiative in learning English and improve students' learning ability as well as their learning autonomy in a comprehensive way, which hopefully can provide a reference for the relevant research afterward.

Data Availability

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

Conflicts of Interest

We declare that there is no conflict of interest.

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