Fast Integration System of English Online Learning Resources Based on Multi Sensor Network

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Abstract. Common English online learning resources rapid integration system, resulting in the system in the traffic load gradually increases, there is a throughput reduction phenomenon, can not meet the needs of users, this paper proposes a multi-sensor network based English online learning resources rapid integration system. In terms of hardware, the browser/server architecture and client/server architecture are combined to configure the hardware architecture of the system; according to the way of multi-sensor network collecting English online learning resources, the multi-sensor network structure is determined, and the hardware design of the system is completed. In terms of software, based on OAIS and multi-sensor network, the overall structure of English online learning resource integration system is designed; according to the three steps of resource collection and submission, resource storage and management, resource release and service, the system function module is designed to complete the system software design. Design the test environment and system performance test interface, experimental results: after the traffic load increases, the designed system has no obvious change compared with the two groups of commonly used system throughput, low loss rate and false detection rate, and high integration efficiency.

Keywords: Multi sensor network · English · Online learning · Resource integration

1 Introduction

Network education is a promising new field of education, attracting a large number of social funds, enterprises and celebrities (including IT enterprises, social education organizations, investors, subject experts, it talents, etc.) to develop and construct network curriculum resources. The core of network education is network course, and the integration of network course resources plays a basic and overall role in the quality of network education [1]. However, the lack of integration of network course resources is very prominent, which greatly reduces the efficiency and quality of network teaching

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and learning. Therefore, on the basis of network curriculum resources, in the process of communication and interaction between network educators and network educates through network environment, the links and elements of curriculum content, curriculum objectives, teaching strategies, design standards, curriculum management, curriculum sharing, network teaching means and network teaching evaluation are organically integrated, and the internal components of network curriculum resources are integrated and standardized in one [2]. In this paper, a new method of anchor control is proposed. And constantly from the network environment to obtain new knowledge and information, human and material, sharing and cooperation, so as to greatly improve the efficiency of online education and the quality of online learning innovation process.

Overseas research on the integration of digital resources is earlier, and has achieved more research results, which have been applied to practice. We have designed and developed systems such as encompass, chameleon iportal, iport, etc., and built the portal website for the integration of MetaLib and SFX resources [3]. Researchers and software companies in related fields in China have conducted a lot of research on resource integration, and also launched related application systems, such as USP, TRS IIP and other platforms, webbridge, CALIS, CSDL and other systems [4]. According to the theoretical background of the integration of English online learning resources, literature [5] discusses the current situation of College English Teaching in the information technology environment, and then from the perspective of humanism and constructivism, integrates College English teaching resources by means of information technology, enriches English learning context, and improves learners' Autonomous Learning ability. Literature [6] analyzes the existing online learning resources and the characteristics of Higher Vocational Students' English learning, integrates ubiquitous learning resources, designs ubiquitous resource platform, and promotes English learning. On the basis of previous studies, this paper introduces multi-sensor network and proposes to design a fast integration system of English online learning resources based on multi-sensor network.

Based on the above problems, a fast integration system of English online learning resources based on multi-sensor network is proposed. In the design of the system, the structure of the multi-sensor network is determined, the hardware structure of the system is designed, and the corresponding functions of the software module are designed to complete the design of the system and improve the rapid integration of English online learning resources.

2 Hardware Design of Fast Integration System of English Online Learning Resources Based on Multi Sensor Network

2.1 Design System Hardware Architecture

This time, the multi-sensor network technology is applied to the integration of English online learning resources. Considering the integration speed of online learning resources, the system has the function of Integrating English online learning resources. Based on the resource integration system designed by previous researchers, the hardware architecture of the rapid integration system of English online learning resources is designed, as shown in Fig. 1.

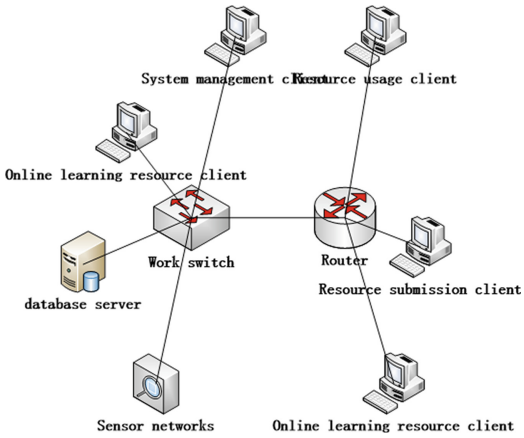

Fig. 1. Hardware Architecture of the System

The system adopts the combination of browser/server architecture and client/server architecture to configure the hardware architecture of the system. For the application of English online learning resources, as well as the audit management of English online learning resources, the client/server architecture can better improve the operation efficiency of resource management. For resource query, download and other functional applications, the browser can be used/the server architecture pattern can make users more convenient and flexible to use the required functions. Therefore, in the application layer of the system, the software component of English online learning resource submission and audit is deployed on the user's client, while the function component of resource query and download is deployed on the website server, and the client calls the system functions through the browser. Each functional component of the business logic layer is deployed in the application server of the system, which is called by the client software and website server in the form of service [7]. The sensor network is also deployed in the application server, and the components in the sensor network provide support for the business logic layer components. The database of the system is deployed in the database server, including relational database and file database, which is responsible for the storage of teaching resources.

2.2 Determine the Structure of Multi-sensor Network

In the rapid integration system of resources in multi-sensor network, each sensor node samples the English online learning resources according to its own sampling period, and then transmits the collected raw data to the estimator, which estimates according to the information transmitted by the sensor. Of course, a sensor node can not only transmit the status information of English online learning resources collected by itself, but also act as a routing node to help other sensor nodes transmit data. In this case, the sensor node does not do data processing, only for acquisition and transmission, the structure is shown in Fig. 2.

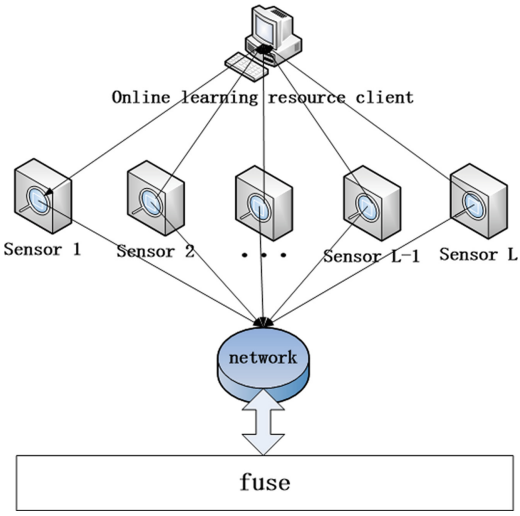

Fig. 2. Multi sensor network structure

In Fig. 2, the sensor is used to perceive the measurement unit of English online learning resources, to perceive the state of English online learning resources, and to transform the information into measurement signals and send them to the estimation center. Communication network is the communication medium between the components. The fusion center receives the data from the sensor, and then estimates these data. With the development of intelligent sensor technology, the current sensor equipment has a certain storage capacity and computing capacity. In order to reduce the computational pressure of the fusion estimation center, the sensor uses its own computing power to preprocess the collected raw data, so that the sensor can obtain the local optimal estimation, and then transmit the local optimal estimation to the estimation center. The information fusion estimation center performs the fusion estimation on the basis of the local optimal estimation, so as to obtain the global optimal estimation the optimal estimation of the model.

By using the estimation system of the above structure, users can monitor English online learning resources well. In practical application, it is often necessary not only to know the real status of English online learning resources, but also to respond to some unexpected status of English online learning resources. Communication and control originally belong to different research directions. Communication theory focuses on how to ensure the effective and reliable transmission of two endpoints, regardless of the purpose of information, and rarely consider the feedback of information [8]. The purpose of common control system is to achieve a certain performance target through the information. Sometimes the influence of communication limitation may be ignored when only considering control. However, with the introduction of wireless communication and the increasing scale of the system, researchers have to consider the combination of communication and control. Therefore, a control unit (controller) and an execution unit (actuator) are added to the system for acquiring state information. In this way, the whole

system can not only achieve real-time monitoring, but also achieve the effect of online decision-making and real-time response.

3 Software Design of Fast Integration System of English Online Learning Resources

Based on the system hardware framework and the determined multi-sensor network, this paper designs the system English online learning resources fast integration functional structure, as well as information acquisition, resource storage, resource management and other functional modules, so as to promote the system to have the function of fast integration of English online learning resources.

3.1 Design the Functional Structure of the System

According to the overall structure of the designed English online learning resource integration system, and based on the open archive information system model (OAIS) and multi-sensor network, this paper puts forward the functional structure of the computer network teaching resource integration system, as shown in Fig. 3.

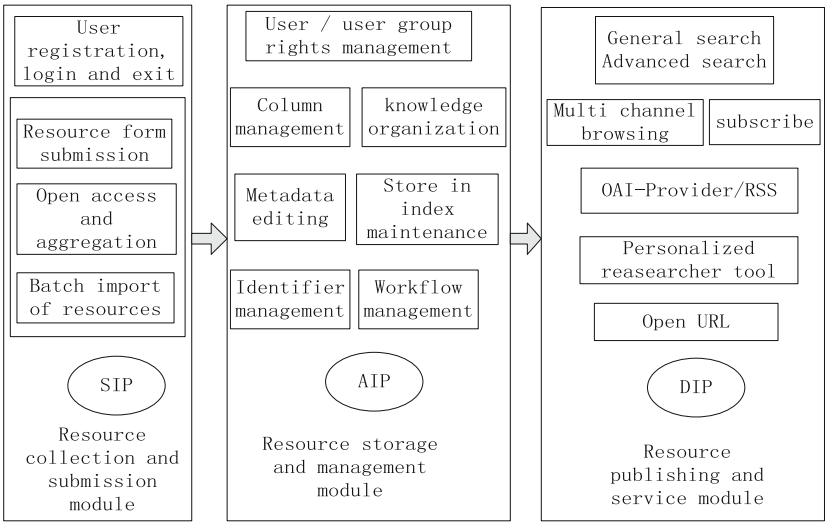

Fig. 3. System function structure

According to the functional structure diagram shown in Fig. 3, the workflow of English online learning resource integration system based on multi-sensor network is mainly divided into three steps: resource collection and submission; resource storage and management; resource release and service. The overall flow of the system is shown in Fig. 4.

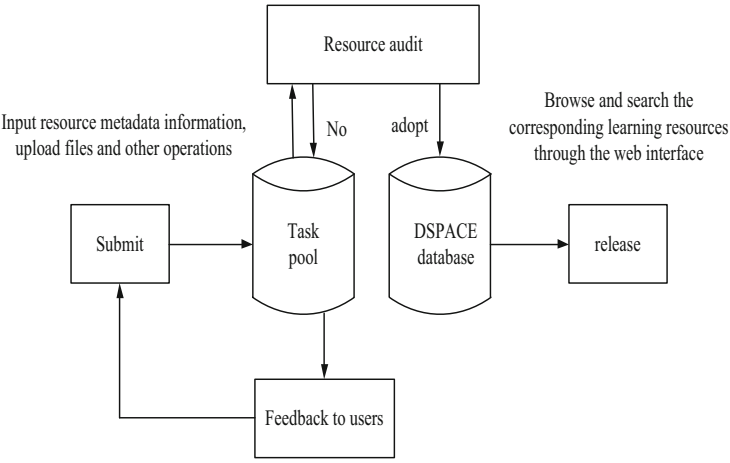

Fig. 4. Overall process of resource integration system

3.2 System Function Module Design

Resource Collection and Submission Module

In the collection and submission module of the designed resource integration system, in addition to the system administrator, the resource maintenance personnel need to register to fill in personal information, and add it to the corresponding departments and topics. After logging in to the system, they enter "my work area", and gradually complete the description, indexing and uploading of the resources to be submitted through the interface. At the same time, you can modify and import resource information in my workspace. The workflow is shown in Fig. 5.

According to the workflow of the acquisition and submission Module shown in Fig. 5, its main functions are as follows:

1. User registration, login or exit. This is the most basic function of the system. Ordinary users can browse, retrieve and open download resources anonymously, but for new users, if they want to upload teaching resources, e-mail notification or resource management functions, they must be registered and authorized by the system administrator before they can use them [9]. For the registered users, they must go through the verification of account and password before they can log in to the system and use these functions.

   (1) User registration function: unregistered users can register a user name, and provide a password and simple personal information, such as e-mail address, you can register successfully. It should be noted that the user name cannot be repeated. Users who have successfully registered can log in to the system according to the user name and password just registered. Therefore, the input data items of the registration function include e-mail user name and password.

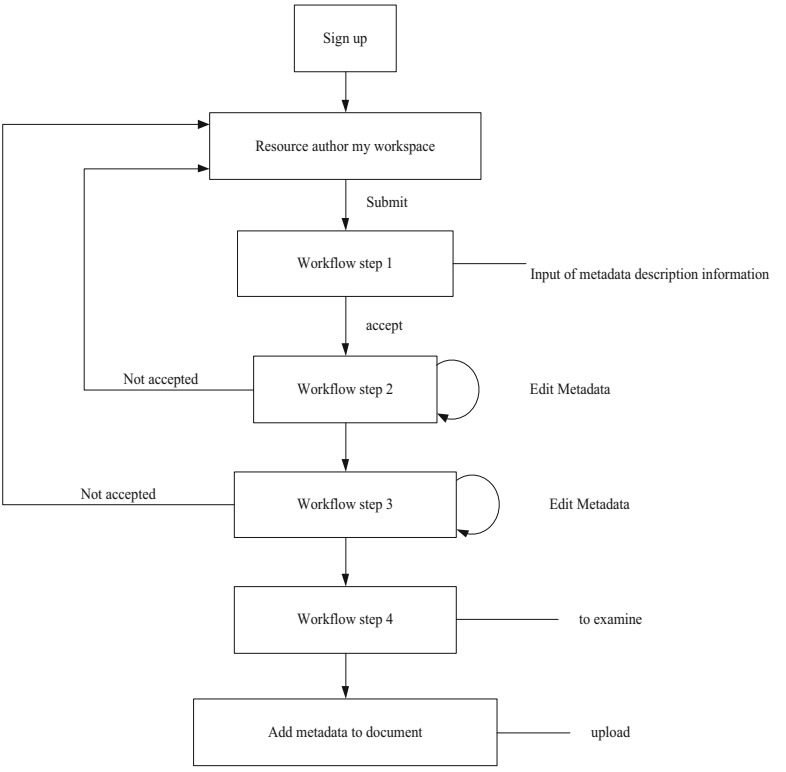

Fig. 5. Workflow of acquisition and submission module

(2) User login function: Only registered users can log in to the system. Login system is very simple, just need to provide login user name and password can login system. Therefore, the input data items of login function include e-mail user name and password.

(3) User exit function: after logging in to the system, the user has the corresponding operation authority of the system. On the basis of this system, more operation functions can be developed. The logged in users can log off their personal login information through the exit operation, so that the user no longer has the internal management function of the system. After the user leaves the system, other people will not be able to operate, which improves the security of the system.

2. Upload and submit resources. In the module of resource collection and submission, the multi-sensor network supports two ways of resource submission: one is based on Web page, which supports any user with submission authority to submit the required content to the system. Generally, through the traditional web interface, the data are uploaded to the system step by step, starting with the selection of the corresponding collection, and then filling in the corresponding metadata information and the selected uploaded documents by the submitting party.

The other is batch import, which supports batch import of resource files conforming to dSPACE SIP format into the system. Generally, the resources are uploaded in batch on the server side of the system through the program provided by the multi-sensor network. When the data is uploaded to the collection, each collection can set up a special auditor according to the needs. In order to ensure the quality of the resources, the system will audit the resource items uploaded by the submitting party. If the resources are denied in the process of audit, the system will notify the submitting party by e-mail. On the contrary, if it is approved, the resources will be formally included in the system database.

3. Open access and aggregation. By rediscovering, reorganizing and integrating the information in the scattered teaching resources around a specific resource topic, we can more quickly establish a digital resource integration system that is in line with the habit of teachers and students in our college to obtain and use thematic information, and at the same time, the content of the information resource database will be more widely found and used.

Resource Storage and Management Module

The archive and management module of resource integration system is to audit the format and metadata description of resources submitted by users, and modify the non-standard metadata description [10]. The resources that meet the requirements will be submitted to the resource library and published to the public. The resources that do not meet the requirements will be returned to the user. The user will see the management personnel's modification requirements for the resource description in his own workspace. At the same time, the module can also set and modify user permissions and workflow. Its main functions are as follows:

The original intention of this system is to solve the problem of English online learning resources storage. It can store any format of literature, such as documents, books, databases, computer programs, multimedia publications and audio and video. Therefore, two storage modes of "digital stream save" and "functional save" are designed for the system. The former is to save a digital document according to its original shape, which may not be read out after several years due to software upgrade, and can only be identified by using special software or coding by special experts; the latter requires that its usability be maintained all the time when the technical format and media medium change. Obviously, "functional preservation" is a more rational storage mode. In order to improve the storage function of the system, the file format is divided into the following three levels.

(1) Supported format: use the format migration technology to save this file functionally; (2) known format: this format file means that it is unable to complete the functional saving, but as a popular format, you can try to complete the format migration through the conversion tool provided by a third party to achieve functional saving; (3) unsupported format: according to the current technology Unable to complete functional save.

2. Resource management. The design of the system will integrate all kinds of teaching resources together, the main purpose is to facilitate management. When the qualified resources are submitted to the resource database, the related resources will be organized and managed according to the hierarchical classification of "learning stage – learning

project – resource entry", and the topic tree navigation will be provided to facilitate resource management.

3. System management and user rights management. The system administrator can manage the resources, users and user groups in the system. In order to perform certain operations on an object, users must have corresponding permissions. The design of the system uses the "default reject" policy. The operation of authorization system identification includes:

(1) Read: know that an object exists, and browse all the metadata related to it. (2) Write: modify metadata related to objects. But it cannot be deleted. (3) Add: adds objects to the thematic space. (4) Remove: removes objects from the thematic space. (5) Workflow: a workflow that can be added to a set, such as having the right to reject a specific submission to enter a set.

4 System Test

In order to verify the design of English online learning resources rapid integration system, two groups of common English online learning resources rapid integration system are selected. By means of system comparative test experiment, the English online learning resources of a school are taken as the experimental object of the system comparative test, and the design of English online learning resources is verified on the a1419 computer operating platform This paper introduces the method of pattern recognition. The throughput, loss rate, false detection rate and integration efficiency of three groups of English online learning resources rapid integration system are compared.

4.1 Experimental Preparation

During the experiment, we need to detect the system throughput, loss rate, false detection rate and integration efficiency, so we use tamosoft throughput test software to complete the detection. Tamosoft throughput test can simulate TCP and UDP data streams in real time, calculate important indicators, and generate test results in digital or graphical form. In order to ensure that the system can be successfully tested and compared on the a1419 computer operating platform, the selected experimental test environment is shown in Table 1.

According to the a1419 computer operating platform environment shown in Table 1, input the original values of three groups of systems to test the performance of the system. In order to ensure the accuracy and preciseness of the test results, except for the experimental objects, other experimental variables are the same.

4.2 Experimental Result

First Group of Experimental Results

In the experiment, according to the experimental results of the online learning system, six groups of parameters are selected.

Table 1. Test environment

Environment	Name	Specifications
Software environment	Operating system	Windows 2000
	Browser	IE 6.0
	Database	Posttgre SQL 8.3
	Open source software	DSpace 1.5.2
Hardware environment	CPU	Intel Pentium 4
	CPU main frequency	1.6 GHz
	RAM	80G
	Network card	100/1000 M self-adaption
	Hard disk	40TB SRS

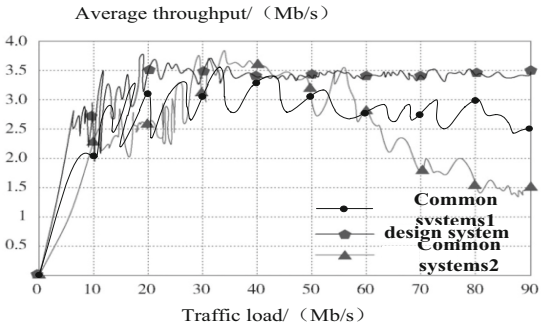

Fig. 6. Test results

It can be seen from Fig. 6 that when the traffic load is kept at 0–45 mb/s, the throughput of common system 2 is almost the same as that of the design system, which increases with the increase of network traffic and the increase of network utilization, but the traffic load increases to 45. After mb/s and higher, the network congestion caused by too many packets in the network, the network throughput curve of the original system began to change gradually, showing a downward trend. It is proved that when the network traffic load is too large, the original system can not keep normal operation and meet the user's resource demand; common system 1 differs from the design system, and the traffic load is different from the design system After increasing to 50 mb/s and higher, it shows a downward trend. It is proved that the original system can not keep normal operation and meet the resource demand of users when the network traffic load is too large. However, the throughput curve of the system is stable, and it will not cause network congestion due to the increase of traffic load and meet the needs of users.

The Second Group of Experimental Results

120000 digital resources are randomly selected from an English online learning platform for integration. The system in this paper and two common systems are tested. After the integration of the resources of the online learning platform, the loss rate and error detection rate of resources are compared. The performance of the three groups of systems is compared. See Table 2 for the comparison.

Table 2. Comparison of the results of system loss rate and error detection rate of three groups (%)

System	Number of resources	Loss rate	Noise factor
Design system	20000	0	0
	40000	0	0
	60000	0	0
	80000	0.14	0
	100000	0.21	0.13
	120000	0.33	0.12
Common systems 1	20000	0.38	0.31
	40000	0.79	0.42
	60000	1.21	0.56
	80000	1.56	0.95
	100000	1.89	1.47
	120000	2.43	2.38
Common systems 2	20000	0.27	0.21
	40000	0.46	0.29
	60000	0.78	0.37
	80000	0.95	0.46
	100000	1.23	0.53
	120000	1.45	0.79

It can be seen from Table 1 that after the design system is used to integrate the resources of the English online learning platform, the error detection rate and loss rate of the resources are far lower than those of the two groups of commonly used systems. Among them, the error rate of the proposed system integration resources is only about 0.14% when the number of resources is 80000, while the error rates of the other two methods are about 1.56% and 0.95% respectively. With the continuous increase of data, the error rates of the three methods have a rising trend, but the error rate of this method is lower. Therefore, the integration success rate of the design system is higher and the system performance is better.

The Third Group of Experimental Results

On the basis of the second group of experiments, the time of three groups of systems for the integration of English online learning platform resources was recorded, and the results were analyzed and compared to get the integration efficiency of different systems. The comparison is shown in Fig. 7.

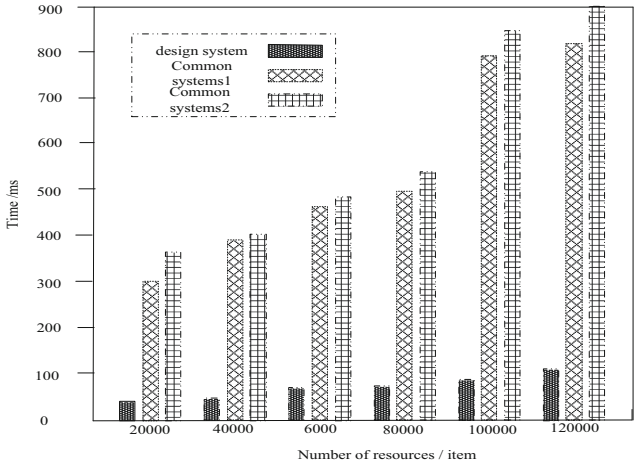

Fig. 7. Comparison of resource integration efficiency

It can be seen from Fig. 7 that the design system takes the shortest time to integrate the digital resources of university library, and with the growth of the number of resources, the overall rise of the time is relatively slow, and there is no phenomenon that the growth of the number of resources takes too long. However, the time of the other two groups of common systems grows faster when the number of resources is higher, indicating that the performance of the other two groups of common systems is unstable It's settled. Among them, the highest speed of Resource integration in this paper is about 100 ms, while the highest speed of other two systems is about 800 ms and 900 ms, respectively. In contrast, the speed of the proposed method is faster. Therefore, the design system has high integration efficiency and stable performance.

5 Conclusion

In conclusion, the design of a rapid integration system of English online learning resources based on multi-sensor network, which makes full use of the multi-sensor network, collects English online learning resources. The system test results show that the design has practical significance for the improvement of data throughput. The application of the design system to the integration of the resources of the current online learning platform can effectively improve the data processing ability of the integration of the resources of the online learning platform. In addition to the continuous improvement of dynamic resource configuration and access interface, the integration degree of

new integrated resources should be increased through further research on integration mode and integration technology, so that users can use all kinds of resources of public technology service platform more conveniently and effectively. In this system design, the corresponding sensor position is designed to improve the speed of resource collection.

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