Based on the study of dormitory sound monitoring system

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Abstract. In order to bring convenience to the management of college dormitory, through the continuous communication and investigation of college students and administrators, and the continuous practice and research on the system functions, a set of student dormitory assistant management system based on sound monitoring is developed to replace the purely artificial way to manage the dormitory of boarding school. This system includes mobile terminal, hardware terminal and server, and the combination of the three, as far as possible to achieve real-time monitoring of dormitory sound, and timely feedback, so that students can abide by the discipline in the dormitory, have a good rest environment purpose. The hardware terminal of the project is able to identify the source of the sound by detecting the decibel value of the sound and artificial intelligence. There is no recording function, so there will be no privacy issues involved.

1. Introduction

1.1. Research background and significance
With the growth of school enrollment scale, the number of students in the school is more and more, for students’ daily life management, is not a simple problem. The traditional management method is as follows: the dormitory management personnel make a round of listening at bedtime and distinguish whether there are students who violate the dormitory management system based on the tone. Due to the backward management technology, the workload of dormitory management staff is large and the management effect is not obvious, which cannot create a good rest environment for students. This project relies on the information technology and gives full play to the advantages of the campus network, changes the past working mode, transforms from the human resources management to the information management, realizes the school management efficiency qualitative leap, only then can stand firm in the modern efficient development, also can realize the school lasting development.

This system based on the automatic sound decibel collection and processing, changed the traditional student dormitory management system, reduced the workload of the dormitory management personnel, improved the efficiency of the dormitory management personnel, and fundamentally eliminate the violation of the dormitory management system personnel lucky psychology, improve the dormitory rest environment.

1.2. Research status of dormitory sound monitoring system
Student dormitory management is an important part of efficient management, which plays a very important role and has great practical significance in the development of the school. With the
increasing penetration of computer technology and Internet technology in various fields, many universities at home and abroad have proposed the development plan of realizing the construction of digital campus [1]. The development and use of management information system [2] is a key link to realize the construction of digital campus. Through the use of management information system, school management can be optimized, improve work efficiency, so as to achieve the stable and lasting development of the school. Therefore, in view of the student dormitory management work in more multifarious, there has been a lot of researchers on the dormitory management system carried out extensive research, they are based on different research goals, from different school dormitory management work according to the actual situation of using the combined method of software and hardware successfully developed a number of students' dormitory management system.

In terms of the research objectives, starting from the functional modules that should be provided by daily dormitory management, Huang Ying [3] and Jiang Weiyu [4] respectively designed and implemented the student dormitory management system, which provided abundant functional modules for the dormitory, greatly reduced the workload of dormitory management personnel and improved the efficiency of dormitory management. From the basis of the safety of the dormitory, Jie Xiuye [5] the dormitory entrance guard management system design and implementation, this system increases the dormitory door state presupposition, and dormitory intelligent management, to monitor student dormitory and detailed records, through record attendance statistics and analysis of information, and automatically generate attendance report, safety in an orderly way in and out of the dormitory for students to provide reliable information management.

2. System related technology
This Chapter Mainly Introduces The Related Technologies Involved In System Development, Including Mobile Terminal Development, Hardware Terminal And Server Construction.

2.1. Mobile terminals
Mobile terminal refers to the computer equipment that can be used in moving again. In a broad sense, it includes mobile phones, laptops, tablet computers, Pos machines and even vehicle-mounted computers. But for the most part, that means a phone or a smartphone or tablet with multiple applications. With the development of network and technology towards more and more broadband, the mobile communication industry will move towards the real era of mobile Internet. On the other hand, with the rapid development of integrated circuit technology, the processing power of mobile terminal has already possessed powerful processing power. Mobile terminal is changing from a simple communication tool to a comprehensive processing platform. This system USES the mobile phone terminal to locate the location of the dormitory, record and statistics the existing problems in the dormitory, and give feedback on the handling opinions of the problem dormitory.

2.2. Hardware terminal
This system mainly USES the hardware terminal as the sound detection point, which is composed of sound sensor, alarm module, clock module and wi-fi module. Through detection and analysis of the sound in the dormitory, real-time monitoring is carried out and data is sent to the server. At the same time, artificial intelligence voice recognition is studied and artificial intelligence voice recognition elements are introduced.

2.3. The server
A server is a type of computer that is faster, more loaded, and more expensive than a normal computer. The server provides computing or application services to other clients in the network. The server has high-speed CPU computing power, long time reliable operation, strong I/O external data throughput capacity and better scalability. According to the service provided by the server, generally speaking, the server has the ability to respond to the service request, undertake the service and guarantee the service. In this system, the data is visualized, recorded and summarized periodically.
3. Requirements analysis

This chapter mainly carries on the demand analysis to the student dormitory management system, including the feasibility analysis, the functional demand analysis and on-functional requirements analysis.

3.1. Feasibility analysis

(1) Technical feasibility [6]: This article in the design of dormitory management system before the technical feasibility analysis, mainly considered the hardware, software can meet the system development, whether to ensure the smooth completion of the system. Using the android mobile platform recognized by the majority of developers for system development, the use of object-oriented method combined with the database system, so can meet the system development technology.

(2) Economic feasibility [6]: Student dormitory management system is for the student dormitory management work and the development of the application software, input small software system, and the system itself also provides the system maintenance function for the user, reduce the system maintenance costs.

(3) Operational feasibility [6]: This system runs in the Windows environment, the system interface friendly, easy to understand, practical strong. The user is the student and the dormitory management personnel, only needs to read the operation method carefully and the simple computer operation knowledge, may use this system freely.

3.2. Functional requirement analysis

(1) User login management: mainly responsible for the management and maintenance of system user registration, login, user name and password maintenance and other operations.

(2) Alarm management: no matter whether the monitoring system is on any interface, it can also prompt the alarm automatically, display and print the alarm information in a timely manner. All alarms adopt visual sound and light alarm signals. When the alarm occurs, the operator can confirm the alarm. Because the software structure adopts multi-threading and multi-task structure, the system can shield, filter and suppress the alarm information that does not need to respond to the concurrent alarm in multiple places and events. The system can query, statistics and print all kinds of historical alarm information.

(3) Real-time voice acquisition: the real-time sampling service has two main tasks, which are to accept the client's request instruction, and then immediately sample the monitoring site data, and then transmit the data to the data center and the client after sampling.

(4) System data backup function: the monitoring system shall communicate with the data center at regular intervals every day, and store all the data of the day into the data center to form a historical database for convenient query in the future. The system saves alarm historical data, alarm status, alarm occurrence time and alarm confirmation time.

3.3. Non-functional requirements analysis

(1) Data security requirements: System security requirements are reflected in software security, database security, information security and system platform security. Therefore, in the software design of student dormitory sound monitoring system, the separation of application software and data should be achieved as far as possible, so as to realize data sharing and prevent data loss or destruction. Database security in addition to the security provided by the database management system itself, the application system should also be able to assign user rights. To improve the security of the database, different user permission levels are set to treat different user operations on the database differently. The security of system platform is embodied in the security of operating system, computer system and network system.

(2) Extensible maintainability requirements: According to the theory of software engineering, the maintenance of the system accounts for the largest proportion in the whole software life cycle. Therefore, in the design of the system structure and the determination of the hardware and software
platform of the student dormitory management system, the standards, expansibility and maintainability should be fully considered. Application system design and development on the basis of the standardization and modularization design idea, set up with certain flexibility and scalability of the application platform, and fully consider the maintainability of the system, and can provide according to the need to modify a module, add new functions and the structure of the reorganization system, so as to achieve the goal of process reuse. The design of data storage structure should be based on full consideration of its rationality and specification, and provide maintainability, so that the modification and maintenance of database tables can be completed in a short time.

(3) Reliability requirement: System reliability requirements are embodied in hardware system reliability, software system reliability, information collection reliability, communication system reliability and other aspects. The idea of software engineering should be fully applied in the development of student dormitory sound monitoring system, so as to reduce and control the possible errors in the future program design in the stage of system analysis and system design, so as to prevent the errors from spreading and amplifying with the progress of project construction. The influence of unexpected events should also be fully considered in the program design. In the process of information collection, information verification should be considered, information reporting system should be established, and data interface between systems should be standardized.

4. The system Design
According to the demand analysis and the actual situation of the dormitory monitoring system, the main functions of the dormitory sound monitoring management system are user management, mail management and dormitory management.

4.1. System function module and test
(1) User login management module: This system includes students and administrators of two user roles, login management module is mainly responsible for the management and maintenance of system user registration, login, user name and password maintenance and other operations.
(2) Mail management module: Mail management module mainly includes administrator send mail, students receive mail and other operations.
(3) Dormitory management module: Dormitory management module mainly includes the addition and maintenance of dormitory information, modification of dormitory status and other operations.

4.2. The system test
Software in the development process, is not perfect, there are some factors that affect the development of software, such as the development tool of the error, the developer's carelessness, cause the loopholes in the system, so you have to use the basic function of testing to improve software, testing software is wrong in the run, only in this way can make the software more perfect.
Software testing \(^{(1)}\) can be summarized into three stages:
(1) Unit test: test a module immediately after writing it.
(2) Integration testing: On the basis of unit tests, test whether there is a problem when the unit is assembled. It mainly checks for errors in the outline design.
(3) The system test: In the actual running environment, a series of integration and validation tests are carried out on the computer system. Test the integration of the various parts of the information system with the direct participation of users.

5. Conclusion
This system is in line with all for the healthy growth of students' idea, take the efficient scientific management as the core, take the science and technology product as the foundation, makes the modernized dormitory management way. It will replace the large, inefficient, purely manual management of middle school dormitories; It will more effectively create a good environment for students to rest, for students to study in the day to provide security. This is also in line with the trend
of contemporary information, the introduction of artificial intelligence into educational management, has a strong advanced nature and practical value.

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