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Retraction

Retracted: Design and Implementation of Office Automation System Based on Internet of Things Technology

Wireless Communications and Mobile Computing

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

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[1] Y. Xiao, Y. Chen, Y. Tang, and H. Jung, "Design and Implementation of Office Automation System Based on Internet of Things Technology," *Wireless Communications and Mobile Computing*, vol. 2022, Article ID 5196542, 8 pages, 2022.

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Research Article

Design and Implementation of Office Automation System Based on Internet of Things Technology

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In order to solve the problem of office automation, this paper proposes the design and implementation of office automation system based on Internet of things technology. This method is to carry out mobile office function through smart phones to realize business message exchange and real-time processing of process approval business. The system adopts b/s structure and adopts the form of front-end machine to realize information sharing between the mobile system and the original system. When users choose to send mail or reply to mail, the client can read the current user name as the sender by itself. The number of uploaded attachments is limited to three at most, and the total size of attachments is not greater than 100 m. *Conclusion*. This method effectively improves the work efficiency of employees.

1. Introduction

With the continuous development of the Internet function, it has been possible to deal with some office businesses through mobile phones. Although office is still in the stage of continuous development, if scientific methods and development tools are used, the office functions of most businesses can be realized. At present, the business system has become an important topic actively planned by the competent government departments and major communication operators. Mobile office system can manage and control business, information, and data; supervise the operation status of various functions in the platform; and carry out fault handling and safety management in time. This system adopts Java, Internet of things (M2M), and SQL Server database technology and pays attention to the functional applications of mobile office, short-distance wireless transmission, and so on, fully taking into account the needs of users, the use process is not only flexible, stable, but also safe and reliable, and the interface is reserved, which can easily access other functions. The research results have practical production significance and application value in the office field.

2. Literature Review

Sisavath and Yu said that sJava is an object-oriented development language and an open technology [1]. Gennaro and others said that they have the characteristics of mutual compatibility. Their advantages are platform portability, versatility, and security. They are applied to all kinds of data centers, personal computers, mobile terminals, etc. and have the world's largest professional developer community [2]. Belkadi and others said that Java is also a widely used programming language. Its main feature is that it is an object-oriented and cross platform language [3]. Gunderson and others said that cross platform refers to that programs can run across multiple platforms (microsoftwindows, applemacincash, Linux, etc.). The cross platform implementation of Java language actually provides a Java virtual machine (JVM) for each computer system [4]. Mohsen and others

said that the Internet makes Java the most popular programming language at present, and Java has a far-reaching impact on the Internet [5]. Olowoleni and others said that Java can be seamlessly integrated with HTML, turning static hypertext files into executable applications, greatly enhancing the interoperability of hypertext [6]. Down and others said that Java solved this problem with a special program called applet, which enables Java applets to run through browsers that support Java [7]. LV and Li said that mobile communication technology is a very important part in the field of information technology. Mobile communication technology can enable users to communicate with others at anytime and anywhere and provide good convenience for people's life and work [8]. Tan and others said that in recent years, the mobile communication industry has developed rapidly, and with the continuous improvement of people's living standards, OA systems based on fixed networks and desktop computers have gradually failed to meet the current needs of small and medium-sized companies [9]. Kong and others said that they have stricter requirements on the mobility of communication, the timeliness of communication, and the convenience of information needs [10]. In this way, employees of the company can use mobile communication devices to directly access the Internet, so as to obtain more comprehensive information and complete more work. Mobile Internet is the product of the integration of mobile communication technology and Internet technology, which can meet the purpose of people who want to obtain effective information anytime and anywhere, and has a great impact on all aspects of people's work and life. Therefore, it has gradually become a necessary part of people's life, and "work anytime and anywhere" has also become the most urgent demand for office automation. The office automation system is shown in Figure 1.

3. Method

Due to the rapid development of science and technology, using advanced technology to serve small and medium-sized enterprises, the importance of management and office activities is becoming increasingly prominent. At present, just like many small and medium-sized enterprise office systems, the company has realized the transformation of office from manual mode to digital mode. However, due to the continuous expansion of the company's business, more and more company employees have proposed the idea of "working anytime, anywhere" [11]. Therefore, we need to be familiar with all kinds of work businesses of the company and analyze the workflow of the personnel in all departments of the company, so as to get a reliable basis to provide beneficial information for the system, design, and implementation. Therefore, after detailed investigation and analysis, the company hopes to improve the office efficiency of employees and the business processing ability of leaders through the construction of "mobile office system," so as to improve the competitiveness of the company in the market [12]. In terms of hierarchical topology control, topdisc algorithm only considers forming as few clusters as possible on the premise of ensuring network connectivity. The residual energy of nodes and how to improve the robustness of the network are not considered. The GAF algorithm based on geographical grid clustering and its improved algorithm need to know the exact location of nodes in the network, and the influence of the distance between nodes in the cluster on data aggregation is not considered. The selection of cluster head in LEACH protocol has certain randomness, and other factors that affect the system performance, such as transmission distance and network dynamics, are not fully considered. HEED protocol is a clustering protocol with fixed cluster radius. The selection of cluster head in heed protocol is mainly based on the primary and secondary parameters, which are used to measure the communication cost within the cluster. The primary parameters depend on the residual energy. The standard to measure the communication cost in the cluster is the average reachability power (AMRP) in the cluster. Each node sends campaign messages with different initial probabilities. The initial probability is CH_p, as shown in the following formula:

$$\mathrm{CH}_p = \max\left(\frac{C_p + E_{re}}{E_{\max}, P_{\min}}\right). \tag{1}$$

Among them, C_p and $p_{\min}$ are unified network parameters, which have an impact on the convergence speed, and ere1emx is the ratio of initial energy and residual energy of nodes. Compared with LEACH, this protocol has an improvement in clustering speed and takes into account the communication overhead within the cluster after clustering, but the selection of cluster head is still random. When selecting clusters and cluster heads, VCDAC takes full account of the relationship between the state of the network and the residual energy and distance of nodes. For the network model defined in the above section, assuming that K cluster heads are selected in the r-round election, each cluster contains $(N1k) - 1$ member node and a cluster head node. According to the energy consumption formula, we can get the energy consumed by the cluster head node in a round, as shown in the following formula:

$$E_{\mathrm{CN}} = \left(\frac{n}{k} - 1\right) l \bullet E_{\mathrm{elec}} + \frac{n}{k} l \bullet E_{\mathrm{DA}} + l \bullet E_{\mathrm{elec}} + l \bullet \varepsilon_{fs} d^2_{\mathrm{toBS}}, \tag{2}$$

where k is the number of cluster head nodes, E_{DA} is the energy consumed by cluster head nodes in data fusion, and d_{toBs} is the average distance between cluster head nodes and base stations, as shown in the following formula:

$$d_{\mathrm{tobs}} = \int_A \sqrt{x^2 + y^2}\, \frac{1}{A}\, dA = 0.765 \frac{M}{2}. \tag{3}$$

The energy consumed by noncluster head nodes in a round is shown in the following formula:

$$E_{\mathrm{nonCH}} = l \bullet E_{\mathrm{elec}} + l \bullet \varepsilon_{fs} \bullet d^2_{\mathrm{toCH}}, \tag{4}$$

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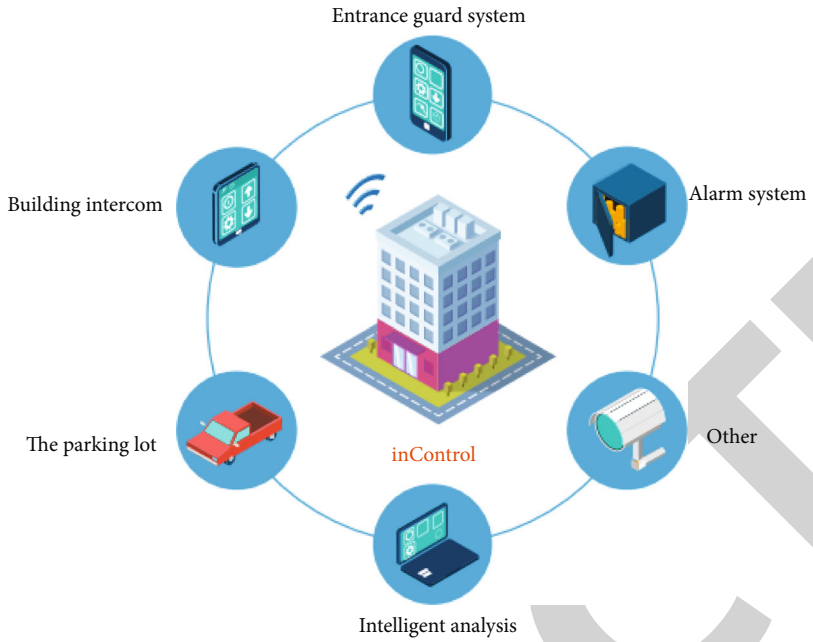

Figure 1: Office automation system.

where d_{toCH} is the average distance from the nodes in the cluster to the cluster head. Assuming that the nodes in the cluster are evenly distributed and the distribution density is $p(x, y)$; then, it is shown in the following formula:

$$d_{\text{toCH}}^2 = \int_{x=0}^{x=x_{\max}} \int_{y=0}^{y=y_{\max}} (x^2 + y^2)\rho(x, y)dxdy = \frac{M^2}{2\pi k}. \quad (5)$$

Therefore, the energy consumption in a single cluster is approximately as shown in the following formula:

$$E_{\text{cluster}} = E_{\text{CH}} + \frac{n}{k}E_{\text{nonCH}}. \quad (6)$$

In a round of operation, the energy consumption of the whole network is shown in the following formula:

$$E_r = l\left(2nE_{\text{elec}} + nE_{\text{DA}} + \varepsilon_{fs}\left(kd_{\text{toBS}}^2 + nd_{\text{toCH}}^2\right)\right). \quad (7)$$

We take the derivative of E and k and make the result 0, as shown in the following formula:

$$E_r' = l\varepsilon_{fs}\left(d_{\text{toBS}}^2 - \frac{N}{2\pi}\frac{M^2}{k^2}\right) = 0. \quad (8)$$

As shown in the following formula:

$$k_0 = \sqrt{\frac{n}{2\pi}}\frac{M}{d_{\text{toBS}}}. \quad (9)$$

Bring d_{toBS} in as shown in the following formula:

$$k_0 = \sqrt{\frac{n}{2\pi}}\frac{2}{0.765}. \quad (10)$$

It can be seen that in the scenario we set, the optimal number of cluster heads is only related to the number of nodes in the cluster. With the operation of the network, it is necessary to dynamically adjust the number of clusters in the monitoring area to prolong the survival time of the network. In addition, the node information in the cluster, such as residual energy, location, and other information, can be sent to the convergence point by piggyback in order to obtain accurate information without increasing the overhead of the system. In other algorithms, the estimation method is usually adopted, which is extremely inaccurate.

4. Experiment and Analysis

The mobile office platform is composed of two parts: Web terminal and mobile client [13, 14]. The web side has the administrator authority function, which can add and delete ordinary administrators and can add and modify resources. Since I am mainly responsible for developing the client of mobile office platform, this chapter mainly discusses the design of the client. The design and development of the client mainly includes mobile office platform client main interface, system notice announcement, personal schedule management, company internal mailbox, and company employee address book and lunch reservation. The overall structure of the system is shown in Figure 2.

Just like many small and medium-sized enterprises now, the company uses the main enterprise internal information network, LAN OA, and other information systems. Such management cannot achieve the goal of working anytime and anywhere. Therefore, we should master the advanced management methods of large enterprises, so as to improve the office efficiency of enterprises [15]. Mainly to analyze whether the technical conditions can make the development work complete smoothly. In terms of software, we should

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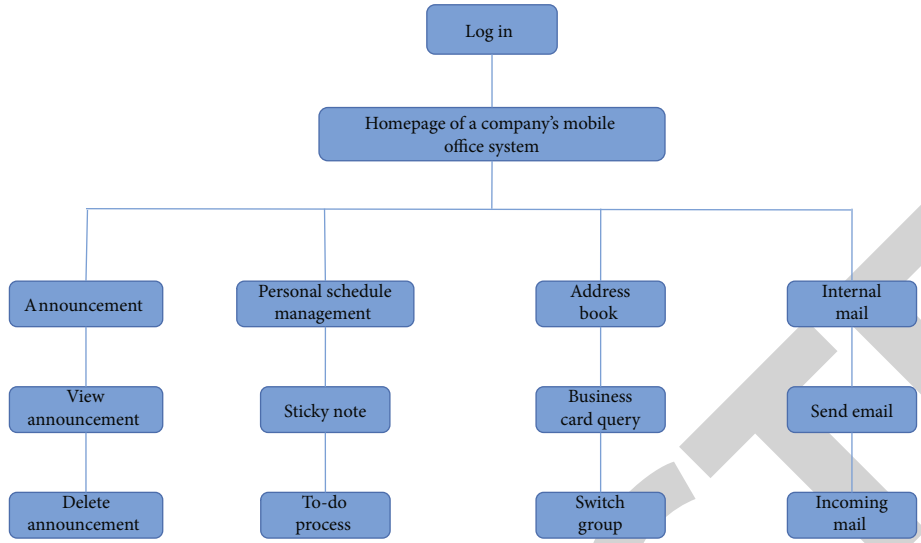

Figure 2: Overall structure of the system.

mainly consider the configuration of the operating system. The configuration and function of the system are easy to use and flexible, which is conducive to the development of this software. And personally, I have a certain programming foundation and have carefully studied the principle of database and can skillfully use it. The mobile office system is analyzed according to the business work and personal schedule management of the personnel of each department of the company, and different rights are given to users according to the permissions of the company's employees, so that the company's employees and department leaders can reasonably use the system [16, 17]. The users of the software are mainly divided into company employees and department leaders. Because the level of company employees varies, the permissions to access system data are also different. The company's employees, including the staff in the company's office, mainly use various application systems for personal schedule management and company information viewing. Department leaders are mainly used to monitor whether the operation of the whole system is normal. At the same time, they have the functions of issuing notices and announcements, managing address book management, managing personal schedule management, and booking lunch. These modules are the main modules of the system [18]. After the system is started, the user needs to verify the user name and password on the main interface of the client. After successful verification, he can enter the main interface of the client, and through the main interface of the system, he can enter each submodule. The system divides the permissions of employees into two types. One has the authority to publish company announcements, that is, after logging in successfully, you can view published announcements, publish announcements, and delete published announcements. The other one does not have the authority to publish company announcements. After logging in, such users can only query published announcements and cannot publish announcements or delete published announcements. Other function modules can be used by all users, such as company announcement, personal schedule management, office business card, email management, and lunch reservation module. Click the icon on the interface to enter the corresponding module. After the user logs in the main interface of the client, the client will immediately send a request for the permission to publish the company's notice [19]. If we have the permission to publish company announcements, the icons of publishing announcements and deleting published announcements will appear: if you do not have the permission to publish company announcements, only the chart of viewing company announcements will appear. The overall use case diagram of this system is shown in Figure 3.

The system is only available to employees of the company, so people outside the company cannot use the software. In order to ensure the security of the system, the username and password of the system are verified to protect the company's information. Due to the different levels of employees, the company's announcement authority is also different. After logging in the main interface of the client, determine whether the employees of the company have the authority to publish announcements and delete published announcements. Therefore, it is necessary to design the main interface module of the client, which has been logged in and authority verification functions [20]. In order to facilitate the company's employees to view the company's notices and announcements anytime and anywhere, so that the notices and announcements can be communicated to each employee in a timely manner, a modification module is specially set up. Through the notification and announcement module, employees can view the announcement information anytime and anywhere, which avoids the problem of notifying each department one by one. At the same time, it also avoids the problem that some employees do not view the announcement information in time and can view the historical announcement at any time. However, since not every employee has the permission to send notices and announcements, the company's employees are divided into two parts according to the login and permission verification

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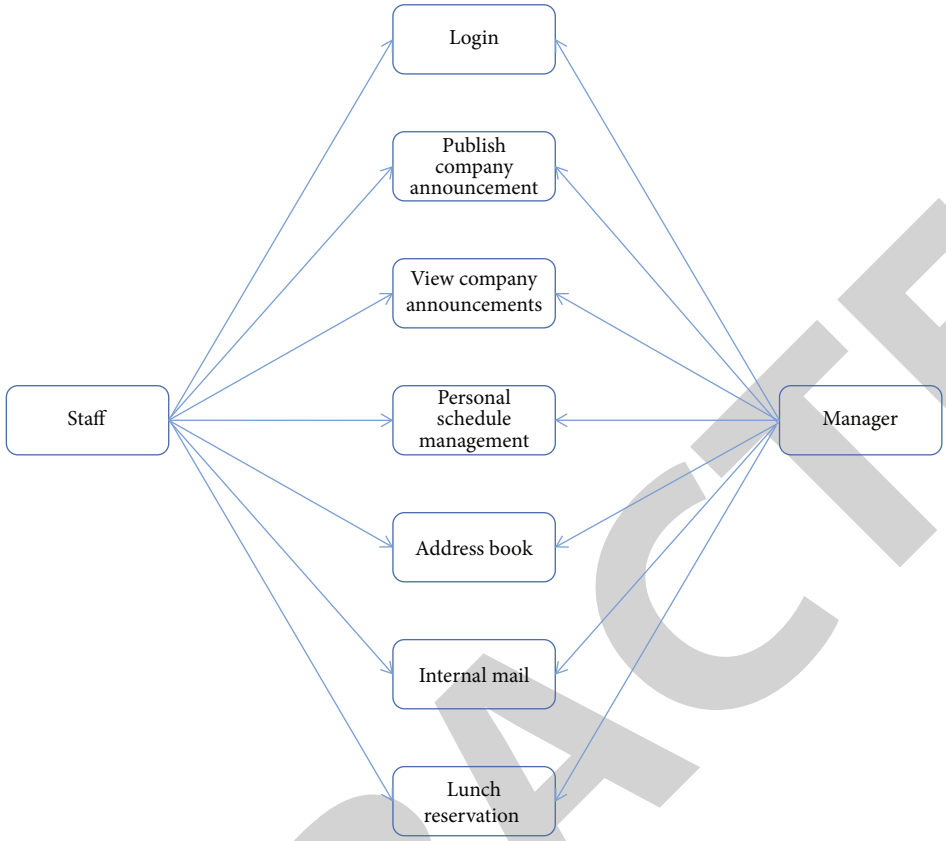

Figure 3: System use case diagram.

module. One part is the company's employees, which only has the function of viewing notices and announcements. The other part is the administrator, which can not only view the announcement notice but also publish the company announcement and delete the issued announcement. The use case diagram of this module is shown in Figure 4.

The personal schedule management module needs to add content according to each user's own definition and requirements, so it is mainly divided into three modules: memo, to-do process, and done process. The memo is used to record the daily life affairs of employees. The to-do process and the done process are related to the company's affairs. If the to-do process is completed, it will be automatically divided into the in-process process. If the in-process process is completed, it will be automatically divided into the done process, which is convenient for employees to query their own work affairs. The use case diagram of this module is shown in Figure 5.

The cluster head election interval of each round is defined as 9 s. The number of client requests is between 1 and 300. All experiments were repeated 30 times to calculate the average value. Each client will wait for a random time interval (selected in the interval [0 s, 9 s]) to broadcast a random service request. If the node providing the service is in the working state at this time, the two interact directly without delay; otherwise, wait for the node providing the service to wake up, and once it wakes up, form a single request/response interaction to use it [21, 22]. We designed a service discovery method without sleep mechanism as a comparison, which is called nondormancy method. In this method, all nodes are always awake. When the client broadcasts the service request, the matching service node will respond and can be used continuously. For the convenience of calculation, we ignore the cluster head election delay and state transition delay. The service request interaction delay of S1B3, S2B3, and nondormancy is given, as shown in Figure 6.

The core of the company's mobile office platform is the enterprise's own LAN. Users mainly rely on the enterprise system domain network and external network for interactive access. The platform of mobile office system is mainly a three-tier c/s structure of client application, web server, and database, which can ensure the maintainability and scalability of the software. The division of the three-tier structure can make the system have more independent logic and can see the tasks of the requirements module more clearly. In mobile client application, mobile phone software developed based on Android system is used to facilitate users' real-time operation. In core application module, this module is mainly responsible for processing data and transaction logic, communicating with the adapter module, and interacting with each terminal. The module adopts J2EE architecture, and the design of the system adopts MVC mode and integrates different technologies, so that the system can have good performance on different operating systems. In adapter module, it implements mobile communication protocol interfaces with various application systems, such as API interface and

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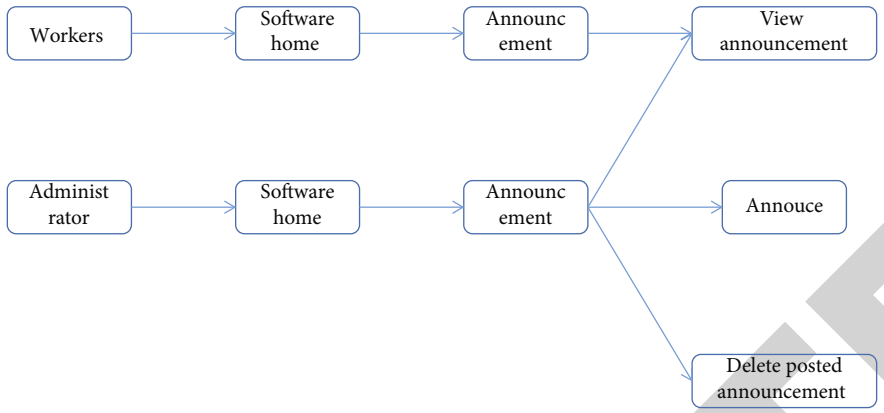

Figure 4: Use case diagram of company announcement module.

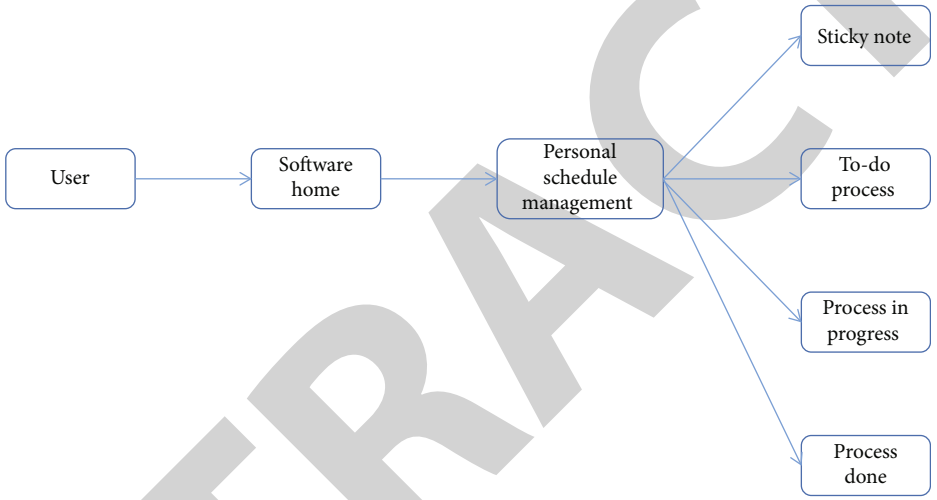

Figure 5: Use case diagram of personal schedule management module.

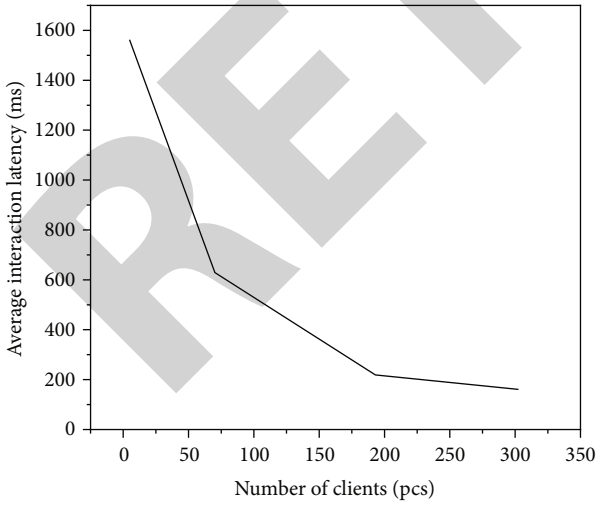

Figure 6: Service request interaction delay.

database interface [23]. The management module is configured and its main function are centralized management and configuration of the system, self-maintenance and management of the system, and the ability to query user status. The design of the client is the most important part of the whole system. If the client program design does not meet the requirements, then, the design of other functions has no effect. MVC mode is adopted in the design of client main interface of mobile office system. In the main interface, the buttons of each function will be displayed on the. When you click the button, the system will read the coordinate value of the icon, then judge according to the corresponding monitoring method and jump to the corresponding interface [24, 25]. Through MVC mode, the interface, data layer, and presentation layer of the system can be effectively isolated, so that the system development is more organized, and it is convenient to modify each functional module in the future. After entering the main interface, the user can see the icon of the notice and announcement and click the image to enter the content page of the notice and announcement. Through the notification and announcement module, the personnel of each department of the company can view the detailed information of all public information anytime and anywhere. For users with the permission to publish announcements, they can also publish announcements and delete published announcements. The company's announcements are sorted according to the release time, which reflects the importance of the latest notice

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announcements, so that the company's employees can quickly browse the latest announcements. Personal schedule management is mainly used to record personal daily work tasks, including to-do processes, ongoing processes, completed processes, and personal notes. Through the personal schedule management module, the personal information management of the personnel of each department of the company can be realized, and the personal work schedule can be recorded, which is convenient for the personnel of each department of the company to reasonably arrange and plan the time. The small things in daily life can be recorded in a memo. For work affairs, you can add and view to-do processes and query the completed processes to facilitate reporting to leaders. In the to-do process, the time reminder function can be set to assist in managing the progress of work tasks. This module mainly realizes the formulation and planning of personal work plans. Address book design is to build user information table through data form function. The address book function is convenient for company employees to view the public contact information of each department of the company, so as to facilitate the cooperation and communication between departments. You can also add the contact information of friends to my address book, which is clearly grouped and convenient to find. The address book module mainly includes my contact, internal address book, and public address book. The main functions of this module include browsing contacts, adding or deleting contacts, and editing and viewing contacts. After selecting a contact, you can call the contact or send a short message to the contact. The storage of contact information in the address book module requires the use of a database for management and maintenance. This module uses the database provided in Android to implement; now, you can query, modify, add, and delete contacts. In order to realize the function of browsing contacts, you need to design a menu for users to operate, and you can design a list to show to users. At the same time, set the events that users click on a column of information and long-term press on a column of information to facilitate users' choice of contacts. For the interface of adding and modifying contacts, textview is used to display contact phone, name, and other labels. At the same time, EditText is used to realize the contact editing function. The internal e-mail module is mainly used to send e-mails, so that company employees can view their received e-mails in this module, read the contents of e-mails, and choose whether to reply to e-mails [26]. At the same time, the module can also help the company staff transfer electronic materials and download electronic materials. The email content mainly displays the subject of the email, the information of the recipient and sender, the sending time, the body content, and other information. The email and attachments should have a 1-to-many relationship, which is conducive to sending the email to multiple recipients at the same time. Therefore, it is necessary to design the basic information table of e-mail and the information table of e-mail attachments. The system needs to realize the functions of sending email, viewing email, replying to email, deleting email, uploading, or downloading attachments [27, 28]. The interface of the internal mail system is divided into three parts: writing new mail, inbox, and outbox. The inbox and outbox interfaces can display 300 email messages of users. Users can read the details of emails by clicking on the email header. For the convenience of operation, when the user chooses to send or reply to mail, the client can read the current user name as the sender by itself. The number of uploaded attachments is limited to three at most, and the total size of attachments is not greater than 100 m. This paper introduces the overall design of the system; analyzes the overall architecture of the software, the functional design of each submodule, and the design of the database according to the needs of users; and introduces it in detail. Through the research on the overall architecture of the whole system and the functions of each module, the author has a clear architecture of the whole system.

5. Conclusion

With the development of science and technology and the progress of society, the electrical equipment inside the intelligent building is also increasing. As an important part of the intelligent building, the building equipment management system is facing new challenges. On the one hand, the number of electrical equipment and monitoring points is increasing. On the other hand, the system is not running well. At this time, it is necessary to use the Internet of things technology to realize the analysis and processing of massive data in the system and the remote monitoring and management of building equipment. This paper studies the application of Internet of things technology in building equipment management system, studies and designs the remote monitoring scheme of building equipment based on the data application service platform of Internet of things, and verifies its feasibility through an engineering example. The main work of the research is as follows: first, by analyzing the architecture of the Internet of things, the application requirements of the Internet of things technology in the building equipment management system are studied. Second, the widely used M2M technology is used to study the data access of the Internet of things, and the data access between the building equipment management system and the Internet of things platform is realized. Then, it studies the implementation of the building equipment remote monitoring and management system based on the Internet of things platform, puts forward the overall structure scheme of the system, and then designs the elevator remote monitoring subsystem in the building equipment management system for specific engineering projects, which realizes the remote monitoring and management of building equipment and various application services.

Data Availability

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

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Acknowledgments

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