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Retraction

Retracted: Application of Wireless Sensor Network Computer Technology in Financial Management System

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1].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) Manipulated or compromised peer review

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] J. Wei, "Application of Wireless Sensor Network Computer Technology in Financial Management System," *International Transactions on Electrical Energy Systems*, vol. 2023, Article ID 7304590, 9 pages, 2023.

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Research Article

Application of Wireless Sensor Network Computer Technology in Financial Management System

Jianhua Wei

School of Management Engineering and Business, Hebei University of Engineering, Handan, Hebei, China

Correspondence should be addressed to Jianhua Wei; 18404032@masu.edu.cn

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In the current enterprise competition, the core of the management information system is the financial management information system. Building a more comprehensive and efficient financial management information system can effectively establish a more efficient innovative enterprise and promote the transformation and development of the enterprise. This paper first designs a set of financial management system templates, including general ledger, accounts receivable, and accounts payable. Second, according to the characteristics of wireless sensor network technology, this paper proposes a financial management system based on the wireless sensor network and designs a load balancing topology control algorithm (LHTCA algorithm), which balances the energy consumption of network nodes and helps to improve the network life cycle. Finally, the management system is tested and validated. The test results show that the financial management system can realize the electronicization of financial data and paperless vouchers, improve the efficiency of financial work, and promote the sharing and integration of resources.

1. Introduction

With the advent of the digital information age, digital transformation of enterprises is an inevitable choice to adapt to the development of the times, and information technology is an important means to help enterprises achieve digital transformation. Enterprise development requires an information platform that can support enterprise development, strengthen centralized financial management, complete more online audit work, and reduce operational risks. In the economic and social development plan proposed by my country, it is emphasized that the digital economy innovation leads the development plan and completes the new infrastructure construction. Therefore, enterprises should pay attention to the huge advantages brought by the financial management information system to the enterprise and build a more complete financial management. Information system promotes the development and progress of enterprises. Digital management can not only realize the integration of enterprise management information but also help enterprises to achieve a qualitative leap in their management level.

The information construction of enterprise financial management can promote the improvement of the economic benefit level of the enterprise, which is mainly reflected in the improvement of the business performance of the enterprise, the reduction of transaction costs within the enterprise, the improvement of the overall work efficiency of the enterprise, the reduction of material waste, save costs, reduce the workload of corporate financial staff, and reduce work intensity [1, 2]. At the same time, the valuable experience of many successful enterprises in my country also proves that the information construction of enterprise financial management has indeed played a huge role in promoting the economic benefits and management level of enterprises. In addition, in the past, the financial management information system could not meet the current situation [3–8]. Therefore, to build a more complete financial management information system, enterprises must pay attention to avoid problems with enterprise information and affect the operation of the enterprise.

The wireless sensor network is an intelligent and comprehensive information system that integrates information collection, information transmission, and information processing [9–13]. This is not only the most active research field but also has broad application prospects. Because the system integrates the following four technologies, it can perceive, monitor, and collect various types (regions) information in real time: one is embedded computer computing; the other is sensors; the third is distributed information; the fourth is communication technology [14, 15]. It has the ability to obtain and process information and finally send the information to the user. Based on wireless sensors, humans can obtain all kinds of useful information anytime, anywhere. In short, no matter from which aspect, it has a strong application prospect and has very considerable practical value and scientific research value, especially in various fields such as antiterrorism, industry and agriculture, rescue and disaster relief, environmental monitoring, military, and national defense, increasingly important role [16]. It is precisely because of this that it has been called the most influential technology in this century and has attracted great attention from all walks of life in all countries and fields.

From the analysis of research level, the wireless sensor network is undoubtedly a brand-new scientific research [17]. Relevant workers are required to deeply study the basic theory and verify the analysis in actual construction. Network management is a crucial part of it. What is network management? As the name implies, it effectively monitors the communication equipment and transmission system of the network and performs related operations such as control and diagnostic testing, and through these measures, the network performance is greatly improved. Network management is one of the important factors to ensure the stable, safe, reliable, and efficient operation of sensor networks. The effective solution to the problems of system heterogeneity, shared resources, network autonomy, and similarity is the sensor network, that is, to achieve unified management and maintenance of system resources, resource configuration, communication, performance, and faults, to ensure that the network system is efficient and reliable operation [18, 19]. Overview of the research status in this field, combined with the existing typical network management system, on this basis, the wireless sensor network management system is designed, and the monitoring and management are realized to make it play the best performance.

The world' first wireless sensor network management framework MANNA was proposed by Ruiz et al. It is a network management system based on policy integration. It dynamically collects management information and maps it to the design model. On this basis, it executes related services and management functions [20, 21]. The model maintains the entire network state. Network management can be implemented based on specific operating conditions. Related management functions. It integrates the following three levels of wireless sensor network management: one is the management function, the other is the logical management layer, and the third is the wireless sensor network. Based on the design goals of self-organization, self-healing, self-diagnosis, and self-management, MANNA's design philosophy separates network applications from network applications. The functional system, information system, and physical system constitute the MANNA management structure.

WinMSI is a sensor network management system, which is formed based on policies and can fully improve network performance due to its self-management function advantages. It can realize unattended and still manage network nodes efficiently. WinMS can be reconfigured in combination with the current network characteristics, including data in the data aggregation tree, MAC protocol, and powerful management functions such as collection and distribution. It can self-govern a single node according to the neighbor network status. At the same time, using the network management mode, it can perform management; centralized network management mode performs effective prevention, correction, and other management functions according to the global information of the wireless sensor network. On the basis of the above, WinMS proposes the management function of transmission system resources, that is, sending network resources for other parts. WinMS activity is dependent on the specific sensor network model.

MARWIS is a heterogeneous wireless sensor network management architecture, which was proposed by Wagenknecht et al. In a heterogeneous wireless sensor network environment, MARWIS common management tasks are update program code, monitoring, and configuration. At the same time, the backbone network of the system is a mesh structure, which allows the heterogeneous sensor network environment to operate. It belongs to the gateway of each heterogeneous subnet. The subnet contains all kinds of the same sensor nodes. The mesh gateway is a prerequisite for subnet communication.

2. Related Work

At present, the sensor network has designed a research model with reference to the Open System Interconnection (OSI) reference model of the existing network [22], as shown in Figure 1, which can be divided into the following layers: one is the physical layer; the other is the data link layer; the third is the network layer; the fourth is the transport layer; the fifth is the application layer.

With the in-depth research, the sensor network system is further refined, as shown in Figure 2, which is the wireless sensor network architecture. The new architecture is still composed of network protocol stack and management platform, but two parts of positioning and clock synchronization are added to the protocol part, and topology, QoS, and network management platform are added to the management platform, making the system more in line with wireless sensor networks.

From the analysis of the location level, the clock and positioning synchronization sublayers are in a special position in the protocol stack. They run through the communication protocol (three layers) and rely on data to cooperate with the transmission channel, that is, to synchronize the clock and positioning. On the other hand, it can be a network protocol. Necessary synchronization information and location at all levels in the system should be

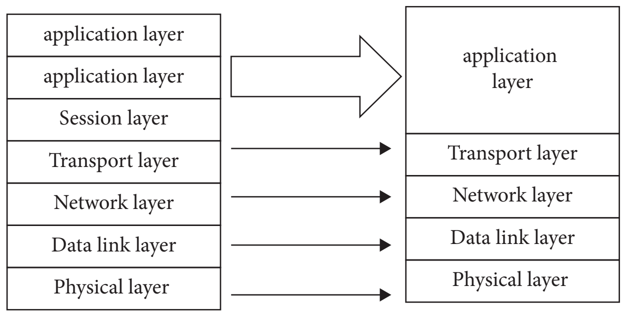

Figure 1: Research network model of the wireless sensor network.

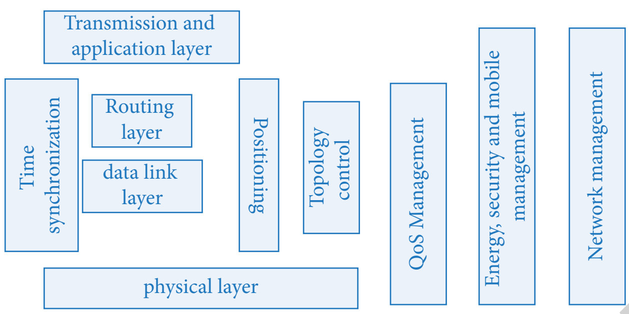

Figure 2: Wireless sensor network architecture.

provided. Each protocol layer should be assisted to realize functions more effectively.

The newly added QoS management subplatform is responsible for tasks such as queue management, bandwidth allocation, and service priority configuration in each protocol layer, and the topology control and management subplatform is responsible for the network topology, providing the necessary topology for the physical layer, MAC layer, and network layer [23]. Information, a good network topology will effectively improve the efficiency of the protocol. The construction of network topology depends on the effective operation of physical layer, MAC layer, and network layer protocols. The network management subplatform regularly collects the operating status and traffic information of the protocol, is responsible for the information interfaces embedded in each layer of the protocol, and also undertakes the task of coordinating the operation of each protocol component of the network.

As a two-way wireless communication technology, Zigbee technology mainly has the advantages and characteristics of low cost, low power consumption, simplicity, and short distance [24]. It is widely used in the field of remote control and automatic control and is formulated to meet the wireless network of small and cheap equipment. Zigbee technology is based on the IEEE802.15.4 standard and has developed an application protocol that can be shared among different manufacturers. In the working state of Zigbee technology, the amount of data that can be transmitted is small and the transmission rate is low, so the time for sending and receiving signals is short. On the contrary, in the nonworking state, Zigbee is in a dormant state. Zigbee has the advantages of low transmission power consumption, high data reliability, and low cost. The characteristics of Zigbee technology make it show great advantages in some aspects. Its starting point is to build a low-cost wireless network that is easy to deploy. The main application fields are industrial control, medical equipment control, military, agriculture, and other fields.

3. Financial Management System Template Design

3.1. General Ledger Section. The general ledger section is the core of the accounting module. Basic elements such as accounting subjects, accounting periods, currency, and book sets in the system are set in the general ledger section [25]. Each submodule will transfer the generated accounting entries to the general ledger block during business processing, generate journals, and update account balances to generate subsidiary ledgers, general ledgers, and various financial statements. Since the financial information of the enterprise will be automatically posted to the general ledger section through the system and other submodules will also share data with the general ledger section, the general ledger section should be the best platform for querying company information, as shown in Figure 3.

3.2. Accounts Receivable Segment. The accounts receivable section is mainly used to manage the customer's current business and business collection and settlement business, including managing and saving customer data and information, issuing sales invoices integrated with the BOSS system, and managing customer accounts receivable and payment collection information, record receipt vouchers, and control the aging of customer arrears [26, 27]. At the same time, the accounts receivable section can automatically import the data of the business daily report interface provided by the BOSS system into the business accounts receivable invoice and import the bank receipt information into the accounts receivable section through this interface and then batch verification of invoices received. The core functions and business processes of the accounts receivable segment are shown in Figure 4.

3.3. Accounts Payable Segment. The payables section is used to manage business transactions with suppliers. The section contains basic information about suppliers such as supplier locations, contacts, and bank accounts. For the invoice management of the business transactions of the enterprise, the invoice needs to be paid after a strict approval process. The payment method can choose single payment or batch payment. The core functions and business processes of the accounts payable segment are shown in Figure 5.

4. Construction of Financial Management System

In order to facilitate the administrator to better manage the network and ensure the safe, reliable, and normal operation of the network, especially in the case of a harsh environment,

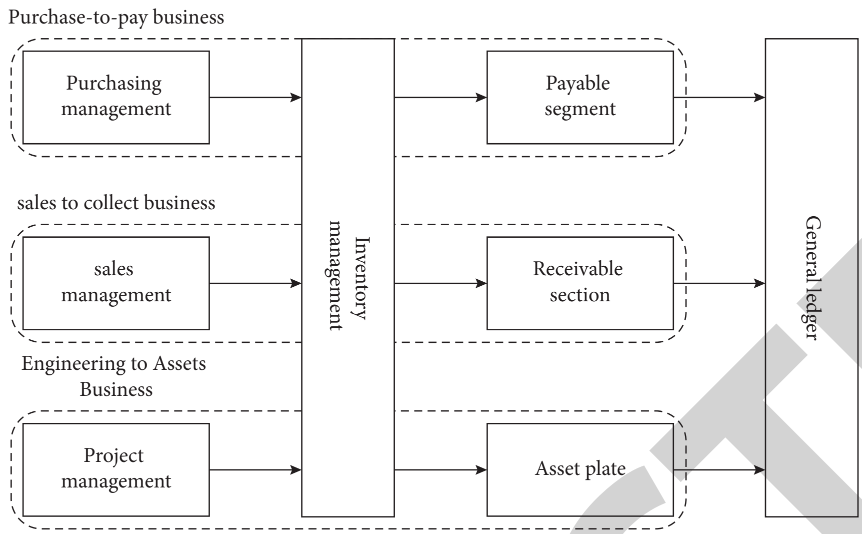

Figure 3: Wireless sensor network architecture.

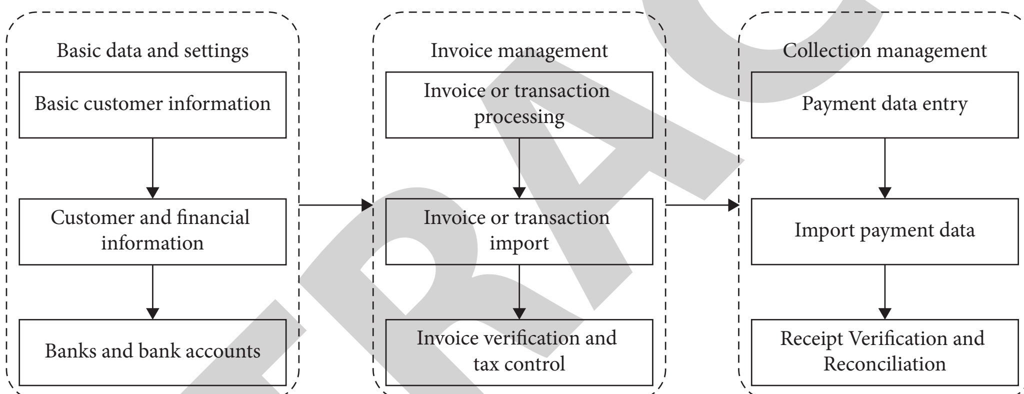

Figure 4: Core functions and business flowchart of accounts receivable segment.

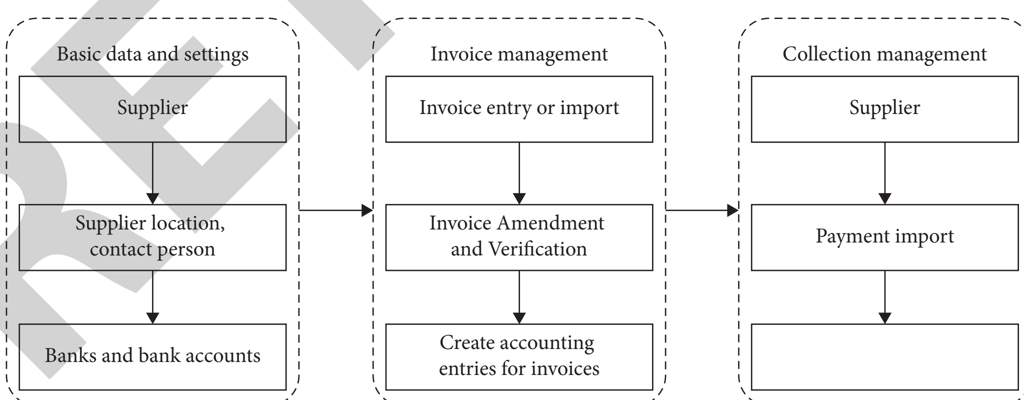

Figure 5: Core functions and business flowchart of accounts receivable segment.

it is very special to develop a reliable and safe network management software, importantly,

(1) Configuration function: this function can mainly complete the setting of the network topology and can modify the relevant network parameters, restart the network and other functions, improve the management of the network, and ensure that the network is in a good state.
(2) Topology display function: this function can mainly display the current network topology in time.
(3) Data storage function: real-time storage of network node data to provide a favorable basis for future

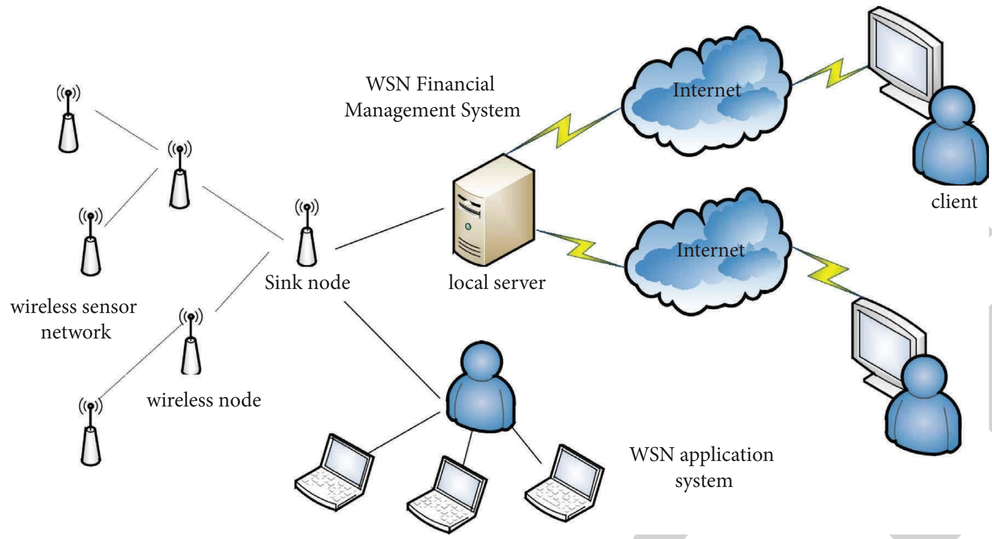

Figure 6: Core functions and business flowchart of accounts receivable segment.

network analysis. This function is able to store not only information related to node data but also status information.

(4) Troubleshooting function: this function can have a real-time fault alarm function and can set a fault valve area. If there is an abnormality during the network operation, such as when the node in the network is disconnected, the data packet is lost, the node energy is exhausted, and so on, the software can make corresponding processing according to different faults and notify the relevant management personnel in time or deal with it according to the previously set method.

(5) Query function: provide users with a variety of query interfaces, and users can easily grasp the actual situation of the network operation through the software.

To sum up, the wireless sensor network management software has the responsibility of maintaining and managing the entire network. In other words, it can supervise the entire network to ensure that the entire network can be in a normal operation state at all times, and at the same time, it can collect abnormal information in the network. The following describes the functions of the sensor network management software and other situations.

The geographic location of the WSN management software in the entire network is shown in Figure 6. The client can directly interact with user information and has the function of displaying and configuring tasks; the server is responsible for collecting and processing data in the network management software. The network management software will not affect the actual application of WSN; it can be completely independent of the application system, but directly read the required data from the base station.

4.1. REDM Model. The REDM model sets d as the distance between the receiving and transmitting nodes. First of all, it is necessary to assume the threshold value d_0. The energy consumption of the node to send k bit data packets is

$$E_{TX}(k, d) = E_{\text{elec}} \times k + \xi_{\text{amp}} \times k \times d^r. \tag{1}$$

The energy consumption of receiving k bit data packets is

$$E_{RX}(k) = E_{\text{elec}} \times k. \tag{2}$$

The energy consumption of data fusion is

$$E_{DA}(k, n) = E_{da} \times k \times n. \tag{3}$$

Among them, $E_{\text{elec}} = 50nJ/\text{bit}$ is used to describe the energy consumption required to transmit or receive 1 bit.

$\xi_{\text{amp}} = 100\,pJ/\text{bit}/m^2$ can be used to describe the consumption of the signal amplifier in sending 1 bit data to the unit area.

4.2. Cluster Establishment Stage. The selection of cluster heads at this stage should clearly affect the three factors that affect the selection of cluster heads: the first is the remaining energy of the node, the second is the distance of the cluster center, and the third is the current actual communication radius, and the node capability function F_{omdbilt} should be fully considered:

$$F_{\text{capability}} = E_{\text{resident}} \times r_1 + \left(\frac{1}{D}\right) \times r_2 + R \times r_3 \;\; (r_1 + r_2 + r_3, r_1 > r_2 > r_3), \tag{4}$$

where D is the distance, which is used to describe the distance between the cluster center and the node. Here, it is assumed that the location of the network node has been determined by the positioning algorithm; E is used to describe the remaining energy of the node; R is the radius of the node's current communication, that is, the node under the current transmitting power. The distance of transmission information, r_1, r_2, and r_3 are used to refer to the proportion of each part, and the sum of the three is exactly equal to 1. It is worth mentioning that each proportion needs to be set in advance.

4.3. Data Communication Phase. The algorithm was first proposed by Chandrakasan et al. It is adaptable to the clustering topology algorithm and has the characteristics of low power consumption and periodicity [28]. The idea of this algorithm is to organize nodes into clusters, and each cluster has a cluster head. The other nodes are ordinary nodes; all ordinary nodes can only communicate with the cluster head node of their own cluster, and at the same time, it can collect a large amount of node data. After fusing the data, it is aggregated to a sink node.

LEACH proposes the concept of "round," which includes the following two stages.

The specific algorithm of cluster head election is as follows: each node randomly generates a number in the [0, 1] interval; if the number is less than the preset threshold $T_{(m)}$, the node will declare itself as the cluster head node.

$$T_{(n)} = \frac{p}{1 - p \times [r\text{mod}(1/p)]}, \quad n \in G. \tag{5}$$

Among them, p is the probability of becoming a cluster head in a node, r is the current number of rounds, r mod $(1/p)$ refers to the number of selected cluster head nodes in this round, and G refers to the collection of nodes that have not been selected in each cycle. Its probability can generally be represented by $T_{(m)}$, and $T_{(m)}$ will increase with the increase of the number of rounds; assuming that the node has been elected as the cluster head, the remaining rounds of $T_{(m)}$ can be set to be equal to zero. In other words, for a node that has not yet been elected as a cluster head, it means that after the next round, it has a better chance of becoming a cluster head, and all nodes will eventually have the opportunity to be elected as a cluster head.

4.4. Data Communication Phase. The above analysis needs to involve a problem, how to judge the load capacity of the cluster head node. This calculation shows the introduction of the load evaluation function method:

$$F_{\text{load}} = E_{\text{resident}} \times t_1 + \left(\frac{1}{D}\right) \times t_2 \left(t_1 + t_2 = 1, \text{t}_1 > t_2\right). \tag{6}$$

Among them, D represents the distance between the node and the center of the cluster, and E_{resident} represents the remaining energy of the node; F_{load} has a load threshold F_{load0}, t_1, t_2, which needs to be set in advance according to the actual situation. After calculating the load F_{load} of the cluster head according to the formula, $F_{\text{load}} < F_{\text{load0}}$ judges the load.

Because the wireless sensor network is easily susceptible to external environment interference and other characteristics, due to the problem of instability, it means that the node has a low load capacity and has the characteristics of suddenness and short-lived [29–32]. Based on this, considering the need to avoid mistakes, it is assumed that when the node load od < oan, the number of errors is determined, and the final judgment result is less than the load capacity, the cluster head can be ready to be abandoned.

By comparing the capabilities, the cluster head is formed, which means that the cluster head point formed will have all the capability information of other nodes. Assuming that the load capacity of the cluster head node is too low, it is necessary to combine the information list to determine the replacement cluster. The first node, that is, the excellent node within the selection range. At the same time, in order to prevent the abovementioned problems of the newly selected cluster head node, that is, the problem of too low load capacity, it is necessary to evaluate the load capacity of the replacement cluster head, and this work needs to be carried out before it officially becomes a cluster node. Only by passing the test and verifying that the load capacity of the replacement cluster head meets the requirements, can it become a real cluster head. At this time, the original cluster head node needs to send the information of other nodes in the cluster in the form of a list to the new cluster head node, and the cluster continues to enter the stable data communication stage; otherwise, the original cluster structure needs to be explained first, that is recombination, that is, redetermining all nodes of the cluster by random integers, and thus re-entering a new round of cluster establishment [25, 26].

5. Simulation Results and Analysis

This paper sets the area of 100 M ∗ 100 M wireless sensor network model and distributes 100 nodes in the area, and these nodes are randomly generated. In order to make the results more realistic, the experiments in this paper were repeated 400 times. Finally, all the collected results are averaged to obtain the final data. After analysis and comparison, corresponding conclusions are drawn. The simulation parameters are set as given in Table 1.

The simulation scene of this paper is in a square area with base station coordinates (50, 175), the size of the area is 100 M ∗ 100 M, 100 nodes are randomly distributed, and the initial energy of each node is 2 J.

5.1. Cluster Head Selection. First, according to the process of cluster head selection, this paper uses Marble software to simulate the LEACH algorithm and the LHTCA algorithm. The simulation results are shown in Figure 7. *o* represents noncluster head ordinary node; * represents the selected cluster head node. Figure 7(a) is the cluster head selection diagram of the LEACH algorithm. We can see that its cluster head selection is unevenly distributed. In some areas, the distribution of cluster heads is concentrated, but there are no cluster heads in some areas and some common nodes. It is far away from the cluster head, and the result is that too much energy is consumed in the process of data transmission, and there are too many ordinary nodes in the area where the cluster head is located, which will lead to the accelerated death or failure of the cluster head node, which will eventually lead to network load distribution, seriously out of balance. Figure 7(b) shows the cluster head selection

Table 1: Setting of simulation parameters.

Parameter name	Set parameter value
Number of nodes	100
Area size of the wireless sensor network	100 M $*$ 100 M
Power consumption of transmission amplifier	10 Pj/bit/m^2
Packet size	200 B
Data processing energy consumption	5 nj/bit
Energy consumption of sending and receiving data	50 nj/bit

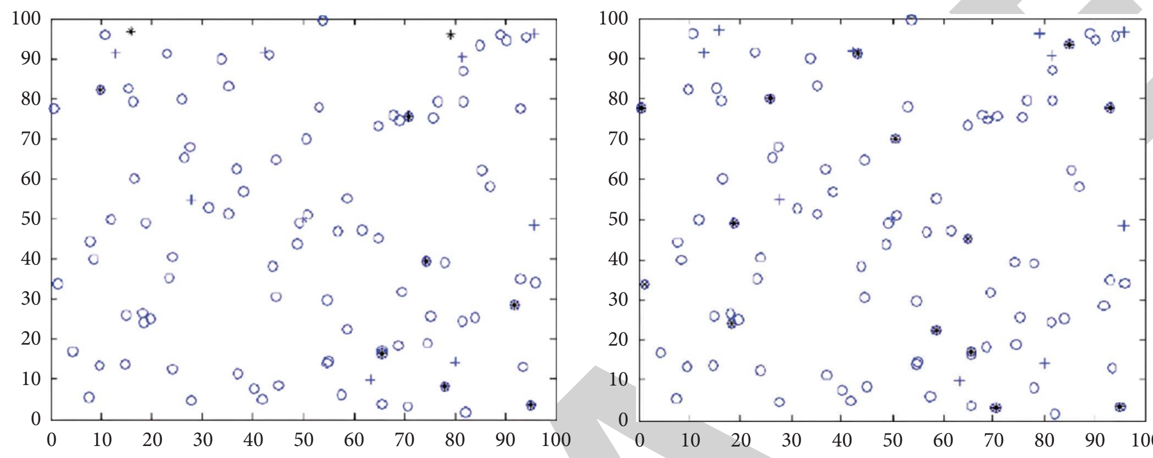

Figure 7: Cluster head election process of LEACH and LHTCA algorithms. (a) LEACH cluster head selection process. (b) LHTCA cluster head selection process.

process of the LHTCA algorithm. By comparing the above two sets of figures, we can see that the cluster head distribution of the LHTCA algorithm is more balanced, the probability of node death or failure is greatly reduced, and the network load is balanced. Sex is naturally high.

5.2. Lifecycle. From Figure 8, we find that when *a* takes different values, the life cycle of the LHTCA algorithm is much higher than that of the LEACH algorithm.

5.3. Energy Consumed by the Network. From Figure 9, we can see that in the first 25 seconds of network operation, the network energy consumption of the three algorithms is not very different, but from 25 seconds to 300 seconds, the curve changes between the LHTCA algorithm and the LEACH algorithm and the HEED algorithm. It tends to be more stable, and the network energy consumption of the LHTCA algorithm is much smaller than that of the other two algorithms. The resource utilization of the network system is improved, which indicates that the LHTCA algorithm has higher performance.

Through comparative analysis, it can be seen that the improved LHTCA algorithm has many advantages, such as good performance and load balancing, and at the same time, it helps to prolong the network life cycle, reduce network energy consumption, and improve the utilization of network system resources, in line with the purpose of the expected improvement in this paper.

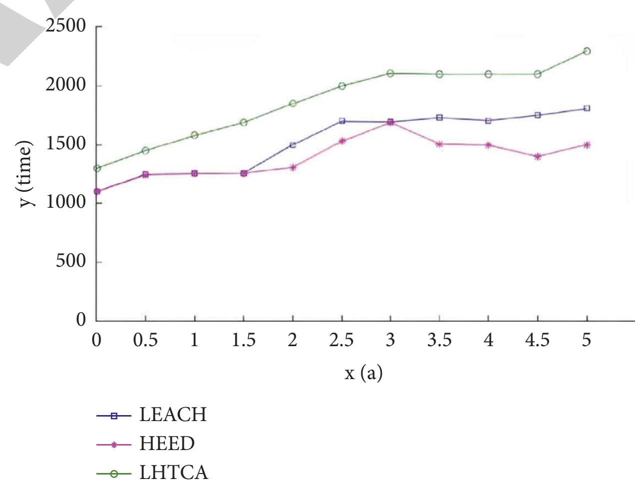

Figure 8: Life cycle comparison chart.

5.4. Performance Management Testing. Performance management is embodied in statistics and collection of performance management information, such as information related to sending and receiving data, delay, packet loss rate, and so on. At the same time, considering the actual situation of statistics, that is, it takes time, so it is usually necessary to design a certain time interval, and this article is suitable for 5 minutes. Through design, statistical analysis of all node performance information of network nodes is performed. Figure 10 shows the packet loss rate of a specific node.

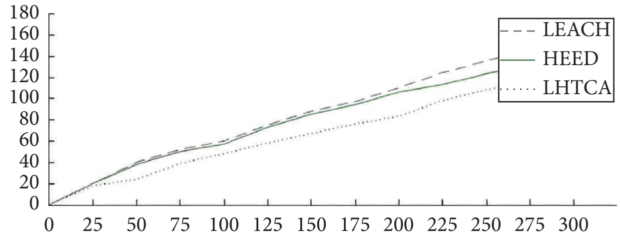

FIGURE 9: Total energy consumption of WSN.

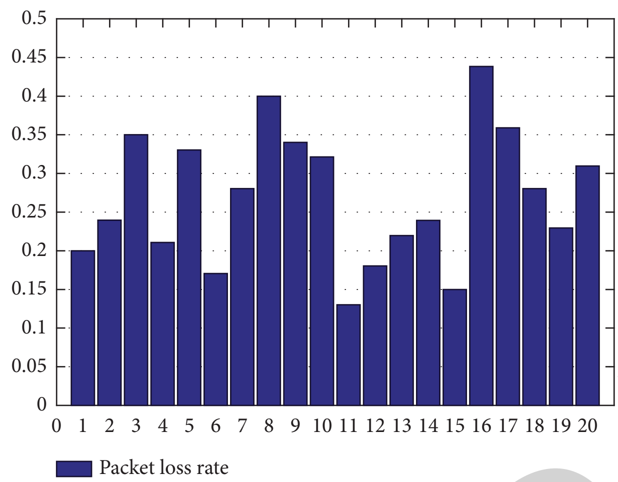

FIGURE 10: Histogram of node packet loss rate collected.

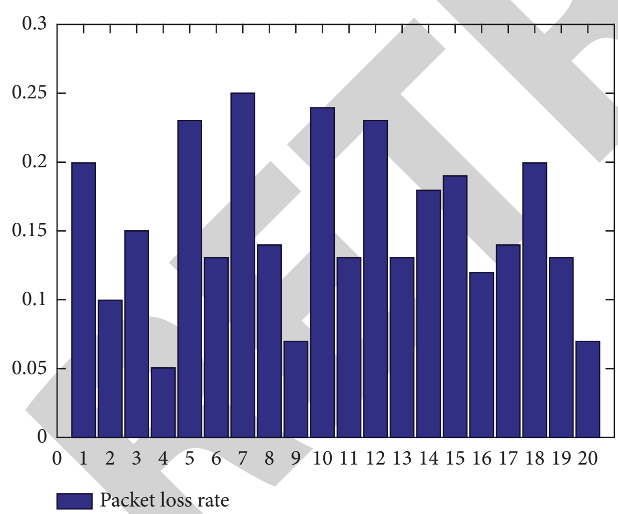

FIGURE 11: Average delay of nodes.

The statistical calculation results show that the average private contract rate of 20 nodes reaches 26.9%, of which the highest and lowest are 44% and 13%, respectively. The average delay of each node is shown in Figure 11.

As shown in the figure above, the average delay of 20 nodes within 5 minutes reaches 0.97 seconds, of which the highest and lowest delays are 1.8 seconds and 0.26 seconds, respectively. In addition, it is found through the graph that the node 20 is closest to the gateway, which fully shows that the node delay is related to the gateway distance.

6. Conclusion

With the rapid development of the economy, the financial management work of enterprises is increasing day by day, so the efficiency of financial management is becoming increasingly prominent. Enterprise development requires an information platform that can support enterprise development, strengthen centralized financial management, complete more online audit work, and reduce operational risks. This paper first designs a set of financial management system templates and optimizes the general ledger section, accounts receivable section, and accounts payable section. These optimizations can effectively reduce the workload of financial personnel and business personnel who use the system. Next, this paper designs a load balancing topology control algorithm (LHTCA algorithm) and proposes a financial management system based on wireless sensor networks. Finally, the management system is tested and validated. The test results show that the financial management system can improve the management efficiency, improve the economic situation, ensure the safe use of funds, reduce the workload of financial personnel, make financial analysis and decision-making more scientific, and improve the efficiency of resource use.

Data Availability

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

Conflicts of Interest

The author declares that there are no conflicts of interest.

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