Scholar Publishing Group
International Journal of Engineering Technology and Construction
https://doi.org/10.38007/IJETC.2022.030305
ISSN 2789-7176 Vol. 3, Issue 3: 61-76

The Remote Monitoring System Based on the Internet of Things and Its Monitoring Method in the Design of Construction Machinery

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Keywords: Internet of Things Technology, Construction Machinery Design, GPS Real-time Monitoring, Machinery Management

Abstract: The construction machinery design based on the Internet of Things remote monitoring system is an important direction of the development of construction machinery design in China. Based on the principle of Internet of Things, this paper expands the global positioning GPS module module and GPRS wireless through the design and implementation of the construction machinery monitoring subsystem, and can send the construction machinery positioning data and bus status information to the monitoring center at any time. The software of the display and the remote monitor adopts the real-time system as the operating system, and various interfaces are extended with corresponding drivers. The hardware design of the construction machinery monitor adopts the popular embedded design in the market, and the relatively mature interface circuit is selected to ensure the stability of the hardware platform, reduce the difficulty of hardware development, and greatly shorten the development cycle of product hardware. Experimental data shows that combining the construction machinery design with the Internet of Things, the monitoring system adopts PHC monitorable programming system and PDRF system, which can realize the full cycle monitoring of the construction machinery design process. Experimental data shows that the Internet of Things system and the construction machinery engineering system can better complete the work, which improves its work efficiency by about 20%, and 80% of computer professional technicians apply the relevant Internet of Things technology in intelligent Has conducted in-depth exploration in the field of construction machinery monitoring.

1. Introduction

With the development and replacement of computer technology, mechanical automation technology and communication technology, the rising Internet of things technology promotes the innovation and upgrading of various industries, making the application of intelligent engineering machinery design system more and more widely.In the traditional power supply, water supply, energy, environmental protection, rail transit, oil, airport, railway, petrochemical and in our daily life and work.Internet of things technology applications emerge in endlessly.Internet of things (Internet of things), that is, through RFID, sensor, positioning system, scanner and other sensing layer devices, access the pre agreed data communication protocol of collected information data to the Internet, complete the data transmission, reception, processing, exchange, application, and realize the positioning, identification, tracking, monitoring and management of objects.The supervisory control and data acquisition system based on Internet of things is an intelligent system for automatic production and resource scheduling.The system completes the real-time monitoring and acquisition of data collection, measurement, parameter adjustment and other information of all equipment on the job site, compares and verifies with the preset parameter information in the system, and timely makes early warning, regulation, processing and other responses.The equipment, products and personnel for on-site operation can be connected to the Internet, which is convenient for unified management and adjustment.

In the design of civil machinery, the construction engineering technology is used to study the relationship between design elements and perceptual value.This study has made a few discoveries on the plan of development apparatus, which consider the impact of human awareness like activity or acquiring power, or mental solace factors, for example, commonality, fascination and solace [1].It is accounted for that plan advancement has been upgraded using this touchy database.The relationship with industry is utilized as a logical strategy to help the plan of development hardware, and human responsiveness is remembered for the application design.It is likewise utilized in statistical surveying to lead factor examination on popularity items by involving kasie an incentive for similar assessment.

González-Blanco J created rules for the proceeded with safe activity of light water reactors since it gives specialized means to screen parts in thermal energy stations that are regularly checked simply by manual exercises. The explored remote valve position pointer can give nonstop viable position sign rather than occasional powerful position sign. Contrasted with long haul work rates, the utilization of reasonable innovation to give valve positions progressively (on the web) is basic to establish arrangement, and it gives data that can be utilized in an assortment of plant designing, upkeep, and the board applications. As of now, the identification of the checking framework is still in a condition of semi-machines and numerous works, which is likewise one of the weaknesses of the quick advancement of detained apparatus fabricating [2]. The operating conditions and structures of construction machinery are complex and sturdy, and construction machinery has high electromechanical properties. Therefore, the firmware of the automatic control system requires advanced technology and novel ideas. Han J introduced a construction method and proposed an automatic control system for industrial and mining enterprises based on the controller area network (CAN) bus. The design method of automatic control module based on AT89C52 single-chip microcomputer and CAN bus is proposed. The experiment proves that the intelligent module can complete the measurement of working condition signals. The implementation of this system has reference value for the design and development of other CAN control module systems [3].

In order to explore whether the design process of construction machinery can be perfectly combined with the Internet of things system, so as to achieve a perfect full cycle of equipment monitoring, this paper aims to monitor the static and dynamic information of construction machinery design.Static information mainly includes design information, manufacturing information, circulation information, maintenance information, etc.; dynamic information mainly includes state parameter information of main parts of products, such as pressure, flow, temperature, voltage, current, etc.Experimental data shows that the Internet of things system can achieve the collection, storage and query of static information of construction machinery, and real-time collection of state information, so that the staff can monitor the construction machinery in full cycle [4-5].

2. Proposed Method

2.1. Three key technologies of Internet of Things

(1) Sensor technology: as the key technology of the perception layer of the Internet of things, it is related to the data collection and information perception of the whole construction machinery system.At the same time, the photoelectric signal of the sensor is converted into the photoelectric signal that can be processed by the computer or other processing equipment to complete the collection of data samples.

With the quick advancement of portable Internet and Internet of things applications, conventional concentrated distributed computing is confronting extreme difficulties, like high inactivity, low-recurrence otherworldly productivity (SE) and non versatile machine type communication.To address these difficulties, another innovation is driving a pattern that moves the abilities of unified distributed computing to the edge gadgets of the network.Several edge processing advancements from various foundations have arisen, which can diminish idleness, further develop Se and backing enormous scope machine correspondence types [6].

(2) RFID tag technology: as a sensor technology, it integrates RF technology and embedded technology to complete the identification of various types of objects, the collection and control of unclassified data [7].

(3) Embedded technology: complex technology integrating computer hardware, sensors, integrated circuits and electronic applications.The special computer system is designed by using application centered and computer-based collaborative hardware and software. The application program has reliable application program, stable system, low cost and small size.The complementarity test shows that the connection between the two advancements dissected is a restrictive replacement, while the connection between the two innovations and the development of creation limit is a contingent complementarity.

2.2. Technical Scheme Design

(1) Information collection: according to the type of information, different components are used for information collection. For dynamic information, the sensor installed on the corresponding components is used to realize the collection; for static information, the RFID tag is used to record the static information [8].

We give frameworks and techniques to naturally identifying inactive parts in correspondence frameworks utilizing radio recurrence distinguishing proof ("RFID") tags.A coupling circuit is given in the framework between correspondence organization and RFID tag. RFID labels are related with aloof parts of a disseminated recieving wire system. The coupling circuit can permit the RFID signal got from the RFID transmitter to be sent to the RFID tag through the correspondence network. The coupling circuit can essentially forestall the versatile correspondence signal on the correspondence network from being communicated to the RFID tag [9].

(2) Information transmission plot: information transmission takes on remote and wired modes. In request to actually use remote assets, the proposed conspire empowers gadgets out of gear state to

send little bundles without controlling the association foundation cycle of radio resources. This can work on the greatest number of upheld gadgets in NB IOT framework with deficient remote resources. The mathematical outcomes show that the most extreme number of gadgets upheld by the plan is expanded by around 60% contrasted and the customary plan. Field data is transmitted via CAN bus. Can bus is connected to physical bus through two output terminals can-h (high level) and can-l (low level) of can transceiver interface chip 82C250 [10].For remote data transmission, the global positioning system (GPS) terminal uses general wireless packet service (GPRS) for transmission. The GPS terminal uploads and receives data from the remote monitoring service center by wireless way, and the remote monitoring service center and the construction machinery fault diagnosis expert system exchange data through the computer network.

(3) Data storage scheme: Based on the data storage relationship, the database management system determines a query plan to access the first data set relative to the first data storage medium and the second data set relative to the second data storage medium. The information gathered by the framework is handled and put away in the data set server, and every subsystem and its clients call the necessary information as per their power. To forestall information misfortune, the information is put away in the reinforcement data set server as well as in the data set server [11].

(4) Geographic location information collection scheme: integrating voluntary geographic information (VGI) into environmental monitoring has been regarded as a good way to improve public participation and expand the scope of data collection. This study assumes that building VGI will improve managers' use of VGI in the decision-making process. The construction machinery monitoring system realizes the real-time collection of the geographic location information of the construction machinery products through GPS and GPRS technology [12].

(5) Fault intelligent processing: by running heuristic algorithm to automatically rebuild the routing table of fault link or router, intelligent network management engine can implement fault-tolerant routing to maximize network performance. By establishing the basic form of construction machinery fault, the relationship between fault reason and fault handling method, the system forms the basic way of fault handling, and realizes the intelligent handling of construction machinery fault.

(6) Incorporation plan of every subsystem: we propose another incorporated regulator with three layers construction to arrange the communication among dynamic suspension framework (ASS), dynamic front controlling (AFS) and direct yaw second control (DYC). The system is divided into modules according to functions, each subsystem is developed independently, and the subsystem is integrated through data transfer and call.In subsystem design, it is required that each subsystem shall adopt unified development language (C language) to ensure the interoperability of each subsystem by establishing a unified monitoring center (platform) [13].

2.3. System Hardware Design

The hardware of the system includes two parts: the hardware of the monitoring center and the hardware of the monitoring station. We discuss the implementation aspects related to the physical variables (voltage, current, temperature, etc.) required for measurement, as well as the balance issues and strategies. Finally, the security and reliability of the system are studied. The hardware of the monitoring center mainly includes a PC with In Touch configuration software and a server for storing data. The hardware structure of the monitoring station is divided into three modules according to the completion of functions: equipment control module, data acquisition module and wireless communication module.

The gadget control module utilizes a programmable regulator (PIC).In PLC testing, manual choice of experiments is as yet the most well-known strategy practically speaking [14].However, it is tweaked, tedious and blunder prone. Traditional model-based techniques can scarcely manage modern scale frameworks with countless state and sensor and actuator signals. Programmable controller for global distributed automation network. In addition, a general management engineering and information system for this globally distributed automated network is described. Most of the traditional control modules used in the global distributed automation network are single-chip computers, which are small in size, easy to embed and low in cost. However, they are not universal and easy to maintain in case of failure, especially in the field of complex environment of construction machinery industry. Pic is a mature control system composed of single chip microcomputer. It consists of integrated circuit and micro relay with microcomputer technology. It has compact structure, relatively closed, strong anti-interference ability. The failure rate is very low and persistent. It not only has the function of logical operation, but also has the function of data processing and transmission. Meet the specific requirements of industrial control, such as process control, data processing and communication. Pic module is the core of the whole monitoring system, which provides a control scheme for the safe and effective operation of engineering machinery design [15].

The data acquisition module uses sensors. The turn of events, assessment, adjustment and field use of a novel, somewhat modest, vision based sensor framework are utilized. The sensor framework utilizes industrially accessible off the rack gear to understand the autonomous information assortment of street conditions. In request to defeat the vision based estimation bending brought about by the movement of the observing stage, different specialized techniques and calculations are assessed and upgraded exhaustively. The progress of wireless communication and electronic technology promotes the development of low-cost sensor networks. Sensor networks can be used in a variety of applications (e.g., health, military, home). The sensor is a sort of location gadget, which changes the identified data into electrical sign result as per certain standards, meeting the prerequisites of data transmission, handling, capacity, recording and control. The monitoring system mainly detects analog signals, such as the vibration of information biology, the size of ore discharge port, the rotation speed of rotating shaft, the pressure of main shaft, oil supply temperature, the same oil temperature, oil flow and switch signals, such as system start and stop interlocking. In addition, input signals (such as water intake, cooling water temperature and water flow) can be used as optional extensions according to user requirements. Through the pressure sensor, temperature sensor, liquid level sensor and other sensors with different functions, the data acquisition module is formed to form the sensor network of the monitoring system [16-18].

2.4. System Architecture

As shown in Figure 1 is the architecture flow chart, the video monitoring system uses event discriminator to extract video primitives and events from video primitives. According to the three-layer architecture and functional requirements of the monitoring system, the system structure is designed into three layers: application layer, function layer and technology layer. The application layer is used to realize the monitoring of manufacturing, after-sales, product, logistics, field management and other fields. The function layer is the function realized after the application of the monitoring system, and the technology layer is the technical development for the realization of the monitoring system. The monitoring subsystem developed for the realization of the comprehensive monitoring of construction machinery mainly includes: manufacturing process monitoring system, logistics management monitoring system, construction machinery monitoring RFID application system, construction machinery fault diagnosis expert system, construction machinery status monitoring system, etc. [19].

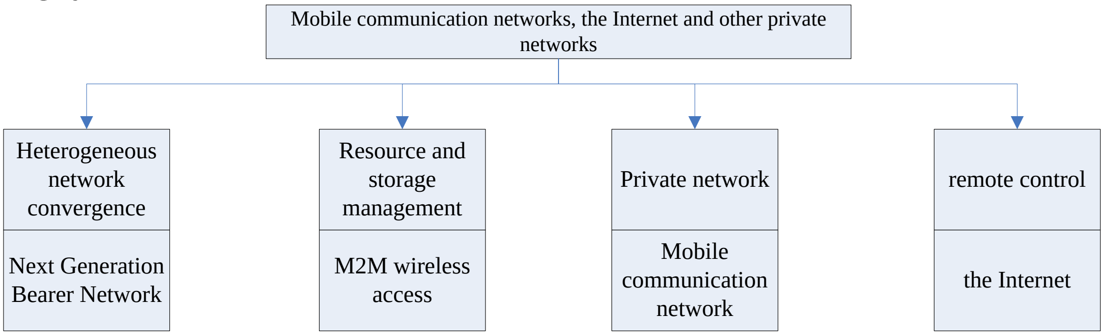

Figure 1. Information processing application layer

2.5. Data Processing of Sensors and Programmable Controllers (PIC)

(1) We can use Hall current sensor. According to its working mode, Hall current sensor can be divided into direct measurement mode and zero flux mode. In the frequency converter, the zero flux mode is chosen because of the need of precise control and calculation. Amplify the output voltage of the hall device, and then amplify the current. Let the current flow through the compensation coil, and make the magnetic field generated by the compensation coil opposite to that generated by the measured current. If the condition 1 = is2 is satisfied, the magnetic flux in the core is 0, then the formula is as follows:

$$Lo = Ls\frac{N_2}{N_1} \tag{1}$$

In is the measured current, that is, the current in the primary winding in the core, N1 is the number of turns in the primary winding, is the current in the compensation winding, and N2 is the number of turns in the compensation winding. It can be seen from the above formula that when the magnetic balance is reached, IO can be obtained by is and turn ratio N2 / N1.According to the types of information, different components are used for information collection. For dynamic information, it is realized by sensors installed on corresponding parts; for static information collection, static information is recorded by RFID tag.

2.6. Data Analysis of Construction Machinery Design

(1) A detachable device for connecting two mechanical parts includes: a pin, which is detachably locked relative to the second part; a holder on the pin; and an elastically loaded tension member, which act together to prevent the pin from leaving its locked position. The movable device also includes at least two inclined surfaces whose overall shape is a protruding shape oriented along the axial direction of the pin, so that when the pin rotates, the retainer member moves along the inclined surface, and the pin moves between the pins. The locking position and unlocking position resist the force exerted on the pin along the longitudinal axial direction of the pin by the tensioning member. The test results show that when the stress of construction machinery parts (or materials) increases, the number of cycles of variable stress that the parts (or materials) can bear decreases until they are damaged, otherwise, the number of cycles of variable stress that the parts (or materials) can bear increases. When the stress is reduced to a certain value, the number of stress cycles can reach

"countless" without fatigue failure. the relationship curve (σ - N curve, or fatigue curve) between the stress and the number of stress cycles (also known as S-N curve) obtained from the test of a certain material. In the figure, σ R is the fatigue limit of the material, and σ - n is the limit stress when the number of stress cycles is n (finite life), which is called the conditional fatigue limit. It can be seen from the figure that the less cycles the material (part) bears the variable stress, the higher its ultimate stress. The experimental results show that the fatigue curve can be expressed as follows: σ - n = constant. Among them, M is the index related to material performance, stress state, etc., and its value can be found in the relevant manual. From the above relations, the relation between the conditional fatigue limit σ - N and the number of stress cycles n can be obtained as follows

$$\sigma_{rN} = \sqrt[m]{\frac{N_0}{N}} \times \sigma_r = K_N \sigma_r \tag{2}$$

(2)Accuracy reserve: in many cases, mechanical products (especially precision machinery and instruments) often can not guarantee the working quality due to the reduction of the accuracy of the working part. In order to maintain the good working performance of the machine and instrument for a long time, extend the service life and improve the use value, the necessary precision reserve must be considered in the precision design. Precision reserve expressed by precision reserve coefficient KT

$$K_T = \frac{T_F}{T_K} \tag{3}$$

In the formula, TF —— functional tolerance is the maximum variation allowed by a certain performance parameter of mechanical product determined by the use requirements; TK— manufacturing tolerance. Manufacturing tolerance is used to limit the errors in the process of processing, measurement, assembly, etc. The accuracy reserve coefficient KT shall be greater than 1, that is, the functional tolerance TF determined by the use requirements shall not be used to manufacture the tolerance TK, but also a part shall be reserved as the "use tolerance" to limit the change of mechanical product performance parameters due to wear, deformation and other reasons in the use process. Generally, KT = 1.5 ~ 2.For the hole and shaft combination with clearance fit, the precision reserve is mainly the wear reserve. At this time, TF is the clearance fit tolerance determined by the use requirements, which is called functional fit

$$T_{fF} = X_{\max F} - X_{\min F} \tag{4}$$

TK is the sum of hole and manufacturing tolerance. If assembly error is not considered, TK=TK=$T_H + T_S$ Precision reserve coefficient at this time

$$K_T = \frac{X_{\max F} - X_{\min F}}{T_H + T_S} \tag{5}$$

Fails.The difference between the two is wear reserve.It is expressed as follows:

$$\Delta f = X_{\max F} - X_{\max} \tag{6}$$

When checking the strength of loose bolts, the following formula shall be used:

$$\sigma = \frac{F}{\pi d_1^2 / 4} = \frac{4F}{\pi d_1^2} \tag{7}$$

When tight bolt connection is subject to transverse load, the following formula is used;

$$\frac{F_0 - F^-}{2} = \frac{1}{2} \times \frac{c_1}{c_1 + c_2} F = \frac{K_c F}{2} \tag{8}$$

(when subjected to the axial working load, the preload is replaced by the total axial tension of the bolt)

When checking the stress amplitude generated by the experiment, it is expressed as follows:

$$\sigma_a = \frac{2K_c F}{\pi d_1^2} \tag{9}$$

The equivalent dynamic load can be expressed as follows

$$P = f_p \times (XF_r + YF_a) \tag{10}$$

3. Experiments

3.1. Experiment Setup

(1) Experimental background

In this analysis, as indicated by the prerequisites of mechanical assembling, according to the viewpoint of diminishing ecological contamination, working on the wellbeing of hardware creation, working on the precision of observing and the normalization of mechanical assembling industry, the sensor choice, network transmission speed, checking framework collaboration plan and different parts of sensor discovery plot configuration are methodicallly completed, and individuals in the development apparatus producing framework are explicitly studiedDesign and execution of PC communication guideline [20].

(2) Experiment setup process

The benchmark group and exploratory gathering were set up in the analysis. The conventional mechanical checking framework was utilized in the benchmark group, and the human-PC cooperation mechanical observing framework was utilized in the trial group.Because these mishap conditions are by no means permitted to be tried in the genuine industrial facility manufacturing.Therefore, the recreation boundaries are utilized to gauge the real boundaries estimated from the sensor.In truth, the boundaries of some mishap conditions in mechanical creation plant must be acquired by reenactment program.

3.2. Experimental Steps

(1) Information precision of human-PC communication guideline in the mechanical assembling observing framework

The programmable water driven control (PHC) innovation utilized in development apparatus is better than the regular electronic water driven control technology.The key components of PHC innovation incorporate autonomous actuators, coordinated sensors and clever programming control, which move capacities from equipment to programming.

(2) Detection of nuclear reaction temperature 24 hours a day

Involving fake recognition as the benchmark group, and utilizing human-PC cooperation location, temperature as the fundamental perception boundary, to recognize the precision of the information.

(3) Convenience of using human-computer interaction detection

Involving manual recognition as the benchmark group, and contrasting the information got from human-PC connection location conspire, notice the exactness and cost of the information acquired by the two strategies.

(4) The plausibility of human-PC collaboration guideline plan in the real checking arrangement of recreation and reproduction hardware

According to the given human-computer interaction nuclear power monitoring scheme, the monitored parameters in the process of mechanical manufacturing are used to predict the feasibility of the scheme through the simulation database of manufacturing plant.The specific process is shown in Figure 2:

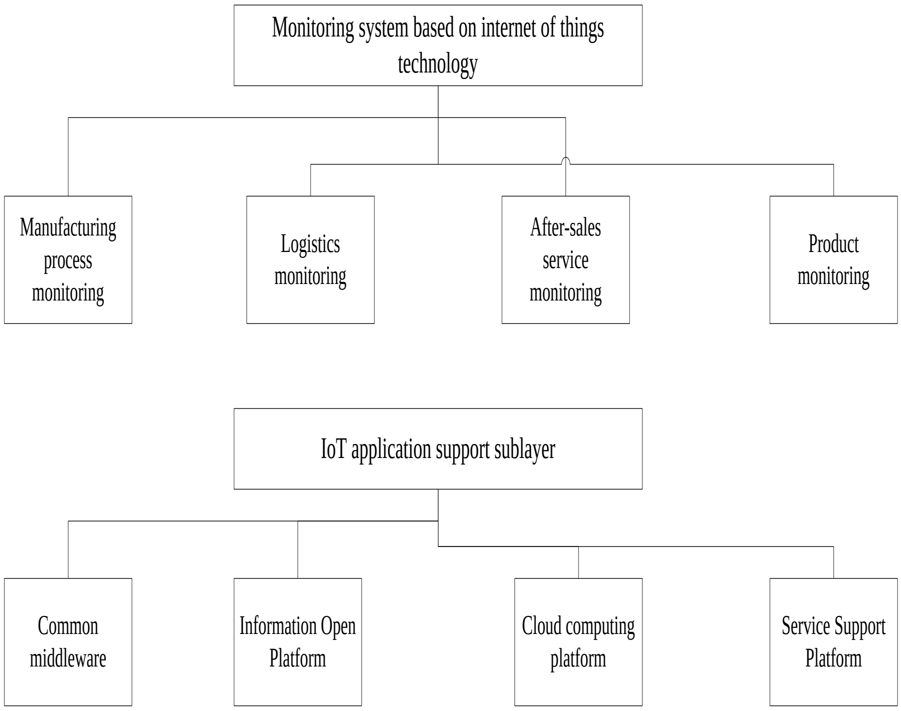

Figure 2. Design and implementation of human-machine interaction regulation in nuclear power monitoring system

3.3. System Technical Support

Intelligent collection, storage and search of static construction machinery information of the Internet of things.The integration of building information model (BIM) with real-time data from Internet of things (IOT) devices provides a powerful example for applications to improve building and operational efficiency.Connect the real-time data flow in the fast-growing IOT sensor network to the high fidelity BIM model, which can provide many applications. Notwithstanding, the examination of Bim and IOT mix is still in its earliest stages, so understanding the ongoing circumstance of Bim and IOT gadget integration is essential And the system can automatically collect the static information of the whole machinery and its parts, such as design, manufacturing, sales, maintenance and recycling, and store the collected information in the storage device of the system.Users can search and obtain the required information according to their own needs [21-22].Intelligent real-time collection of the state information of the Internet of things construction machinery system the system can automatically collect the operation parameters of the construction machinery products and their parts, such as the temperature of the engine, the pressure of the oil in the oil tank, the oil temperature when the system is working, the power supply voltage when the system is working, the rotation speed when the engine is working, the real-time oil level of the fuel, etc.In recent years, the information collection of the geographic location of the intelligent Internet of things construction machinery products, the decentralized development of construction machinery operation, the real-time leasing system of construction machinery, the intelligent construction machinery product system can obtain the geographic information of the products in real time, and make adjustment and management of the system according to the geographical location.The system can query and trace the production details of the whole life cycle of the product, and realize the recycling and remanufacturing of the construction machinery system products.At the same time, prevent the parts and components in the construction machinery system from abnormal and illegal maintenance and illegal replacement to ensure the reliability and effectiveness of mechanical products.Intelligent Internet of things engineering machinery system engineering fault information collection and automatic intelligent processing, we utilize advanced, data innovation and different innovations to oversee handling assets; utilize computerized twin innovation to construct insightful handling creation line, utilize enormous information, Internet of things and different advances to picture handling information, acknowledge information interconnection, fabricate smart administration framework, and acknowledge intelligenceCan control.In request to understand the canny advancement of China's apparatus producing industry [23-24].According to the abnormal state information collected by the system, the system can automatically give early warning and alarm in real time, automatically and intelligently provide the maintenance personnel with a visual solution, and cooperate with the staff to complete the system fault intelligent processing.Intelligent remote monitoring function of the Internet of things construction machinery system this system provides remote monitoring function, real-time monitoring and statistics of the detailed information and product information of the production process of the system, through the interactive system with better user experience, complete the remote monitoring and control of the system, reduce the waste of unnecessary resources and workersThe maintenance pressure of staff, to achieve intelligent management [25].

4. Discussion

4.1. The Data of Remote On-site monitoring of Internet of Things is the Measurement and Analysis of On-site Monitoring

As shown in Table 1 and Figure 3 below, this article is based on the Internet of things remote field monitoring data to measure the field monitoring measurement, which is to monitor the stable state of the surrounding rock and the supporting system during the construction of the subway tunnel. Provide the basis for the parameter adjustment of the protective and secondary concrete lining, and sort out and analyze the measured data to get the information and feedback it to the design and construction in time, and further optimize the design and construction plan to achieve the purpose of safe, economic and rapid construction, so It is recommended to conduct on-site monitoring and measurement in this section. Suggested monitoring items include: support monitoring, horizontal headroom convergence monitoring, arch subsidence monitoring, ground settlement monitoring, displacement monitoring in surrounding rock, and corresponding monitoring during construction, etc.

Table 1. Relationship between buried depth and precipitation

Depth burial	Precipitation
1	3
2	6
3	9
4	12
5	15

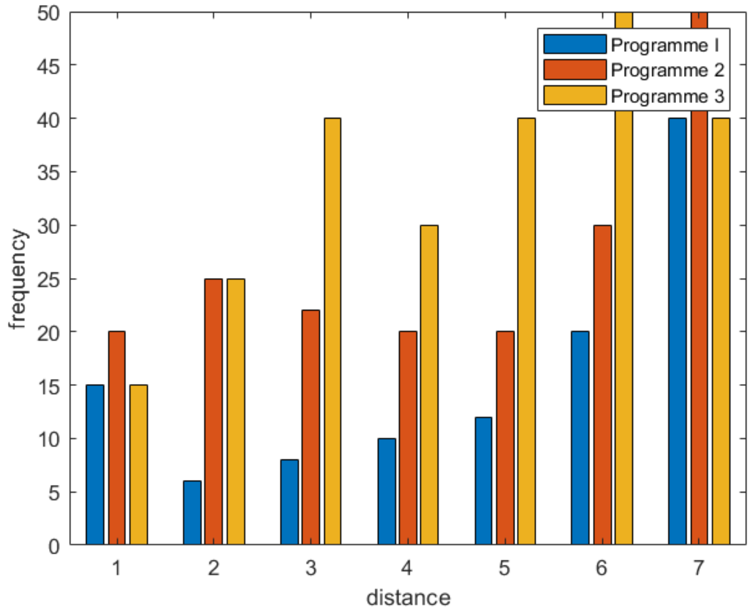

Figure 3. Structure of the monitoring system

As shown in Table 2 and Figure 4 below, we can intuitively find that the construction machinery design in this paper is based on the Internet of Things remote monitoring system. Due to the real-time requirements, the data acquisition module uses the excellent performance of the sensor system, which leads to the relative The performance of the sensor used in the cutting-edge data acquisition module has decreased, but it still has a good recognition rate among similar algorithms. It is notable that the information procurement module embraces the presentation correlation of sensors, and the information distinguishing proof module with high radio recurrence ID rate and enormous number of boundaries will have better ID results. Notwithstanding, the expansion in the quantity of radio recurrence recognizable proof layers and the expansion in the quantity of boundaries have brought more computations. It is actually the case that this organization model doesn't have a state of the art acknowledgment rate, however to the detriment of a specific exactness, less boundaries and quicker

The computation speed has turned into a central point in the checking and recognizable proof framework.

Table 2. Test results of several algorithms on UCF-101 library

Algorithm	Accuracy
C3D	82.3%
Next-Flow	72.2%
Flow Net Baseline	62.0%
Ours	71.9%
Number	10

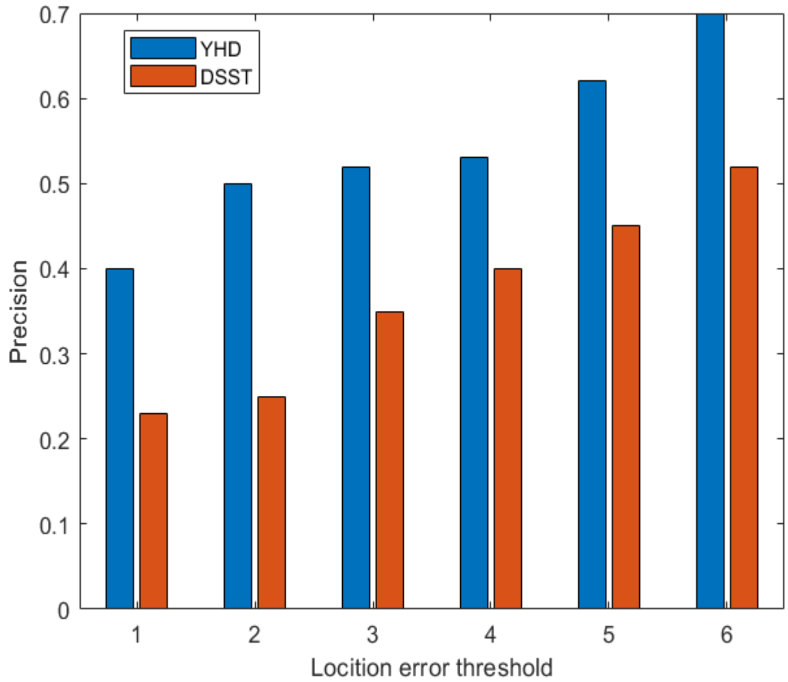

Figure 4. Test results of several algorithms on UCF-101 library

4.2. Data Analysis Function Based on Internet of Things Remote Monitoring System

The GPS system will accumulate a large amount of historical data during daily use. These data are the most original and real first-hand data from the equipment. They are rare materials for quality management and technical personnel. A powerful data analysis function, in addition to a simple data list, also includes curve statistical analysis and various download functions. Mainly to the vehicle's geographic location distribution, fault machinery statistics, working time, statistics and analysis of historical data information, real-time monitoring of vehicles, dynamic analysis, in-depth statistics. The experimental results are shown in Figure 5 below.

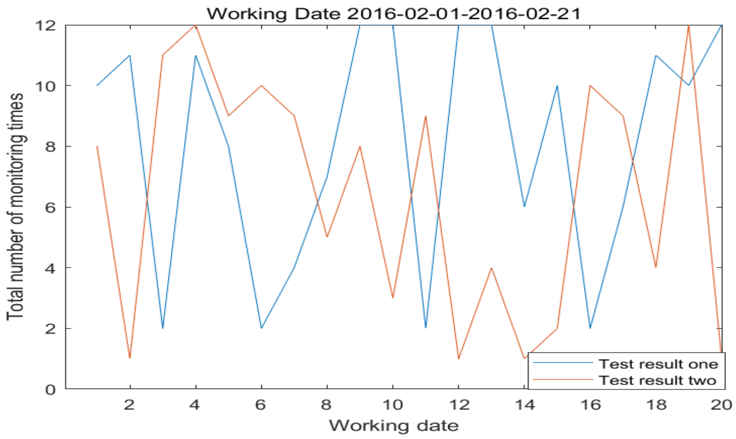

Figure 5. Statistical analysis page of device historical data

4.3. Communication Test Based on Internet of Things Remote Monitoring System

Because the system has adopted multiple effective measures to ensure the sending and receiving of data, GMS / GPRS wireless communication works well. After the monitoring center sends out a single reply and a timed reply command, the controlled vehicle can reply correctly, the content of the reply message is correct, and the response time does not exceed the specified standard.The monitoring center sends out regional limit settings, authorized user mobile phone settings, monitoring center settings, and short message service After the command set by the center, the remote monitoring subsystem of the Internet of Things can correctly reply, the content of the reply message is correct, and the response time does not exceed the specified standard.After the monitoring center issues the prohibition command, the controlled machine can stop running within the specified time and reply to confirm the information monitoring After the center issued the commands to lift the prohibition, lift the alarm, and lift the area restriction, the controlled vehicle can reply correctly, the content of the reply message is correct, and the reply time does not exceed the prescribed standard. The system communication test results are shown in Figure 6 below.

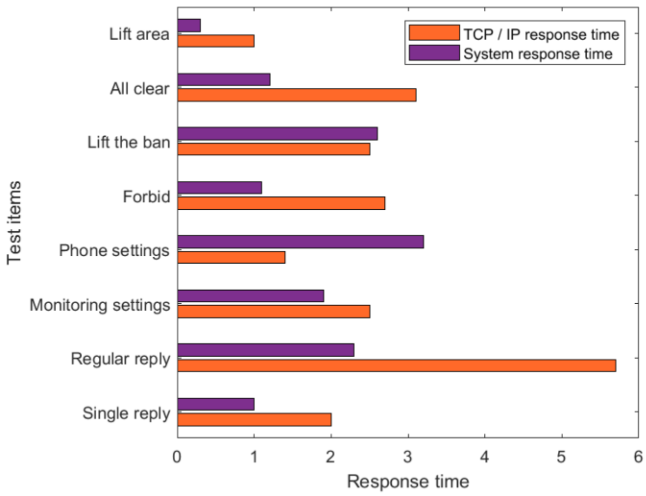

Figure 6. Communication test results

5. Conclusion

In recent years, with the development of cloud computing, big data and hardware technology, intelligent construction machinery system has become the application and research hotspot of Internet of things technology.The above phenomena show that the combination of Internet of things and construction machinery design is completely feasible. Through the combination of data and experimental structure, our construction machinery design will inevitably develop to a higher level in the future. Joined with the qualities of the Internet of things framework and mechanical designing framework, this paper investigates and portrays the use of Internet of things innovation in the field of insightful development apparatus observing, and momentarily plans the capacity module machine capacity of the framework. In view of the application prospect of mechanical engineering intelligent system, this paper expounds another development spring brought by the Internet of things to mechanical engineering.

The above research shows that manufacturing Internet of things technology is the hot spot in the field of advanced manufacturing. The author of this paper explores the application of Internet of things technology in the field of construction machinery monitoring, designs the function of the system, and designs the technical scheme for the realization of the system function, and then puts forward the architecture and architecture of the system.This research will establish the foundation for the development of construction machinery monitoring system based on the Internet of things technology.

The purpose of this article is to study several systems for monitoring the Internet of Things to achieve the purpose of full-cycle monitoring. The purpose of this article is to study the monitoring system based on the design of the construction machinery of the Internet of Things as the theme to achieve comprehensive and complete life cycle monitoring of construction machinery products and their manufacturing. It mainly analyzes the characteristics of current machinery manufacturing and its automation technology, discusses the application of machinery manufacturing and its automation technology in boiler manufacturing, and analyzes the development trend of machinery manufacturing and its automation. Experimental data show that combining the design of construction machinery with the Internet of Things, the monitoring system uses a PHC monitorable programming system and a PDRF system, which can realize the full cycle monitoring of the construction machinery design process. The experimental data show that the IoT system and the construction machinery engineering system can better complete the work, which has improved their work efficiency by about 20%. 80% of computer professional technicians have applied intelligent IoT technology to intelligent applications. In-depth exploration of the field of construction machinery monitoring.

Funding

This article is not supported by any foundation.

Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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