

# Remote Information Interaction and Software based on Sensor Recognition

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## Abstract

Sensor network integrates sensor technology, embedded computing technology, distributed information processing technology and wireless communication technology, and can cooperate in field monitoring, sensing, collecting and processing the information of monitoring objects. wireless sensor network technology has the advantages of self-organization, rapid deployment, high fault tolerance and concealment. At present, sensor technology is frequently used in various fields, but there are many kinds of sensors. It is inefficient to combine the information measured by each sensor to obtain the accurate condition of the object being measured, and it is inconvenient to debug a single sensor, which cannot monitor data in real time. Therefore, in order to solve this problem, we use the self-developed app that can receive sensor information and interact with sensors. This app can transmit sensor data and process sensor data wirelessly, becoming a bridge to connect data between multiple sensors, improving work efficiency, and having more precise control over the measured object. If there is a problem in the sensor system, it can also be adjusted in real time through this app. Compared with traditional multisensor, we can view and adjust relevant information anytime and anywhere on the mobile phone through app, which is more convenient for us to conduct macro regulation and improve work efficiency.

## Keywords

Sensor Remote Control; Sensor Interaction; Wireless; App Resources.

## 1. Introduction

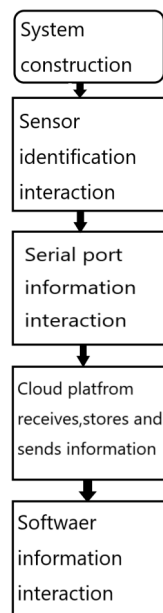
With the improvement of domestic industrial automation, informatization, and national defense modernization, the annual demand for sensors continues to grow, and the applications of sensors are more and more extensive, which have penetrated into various professional fields. But at present, domestic sensors are based on wired transmission or short distance wireless transmission, so in order to make our work more convenient and efficient, it is our research goal to truly realize wireless sensors [1]. that ignore distance. We want to develop an app, which is based on multiple wireless sensors and realizes data collection, transmission and analysis through wireless communication technology[2]. and computer. Finally, all the tested information can be reflected in the app and we can solve some problems encountered in the process in real time.

## 2. Design Objectives

At present, wireless sensor network has become a research hotspot in the world [3], and the current sensors on the market are mainly divided into vibration sensors, strain sensors, torque sensors, etc. [4] Various sensors are widely used, such as bridge health detection and monitoring, granary temperature and humidity monitoring, concrete pouring temperature monitoring, earthquake monitoring, etc. It can be seen that sensors play an important role in the current scientific and technological progress. However, the farthest effective

communication distance realized by its various wireless sensors is only about 300m. Therefore, the sensor that can realize long-distance transmission is an important direction of the current sensor development.

However, our sensor communication system integrates multiple types of sensors at the grassroots level, conducts multiple data measurements on the "intelligent" objects, and converts them into usable signals according to certain rules (mathematical function rules). It realizes information interaction with the built cloud platform through GPRS/3G/4G/NB IoT, etc [5]. Users can realize long-distance information transmission between multi-functional sensors and users through software and cloud platform information interaction to complete the overall function.



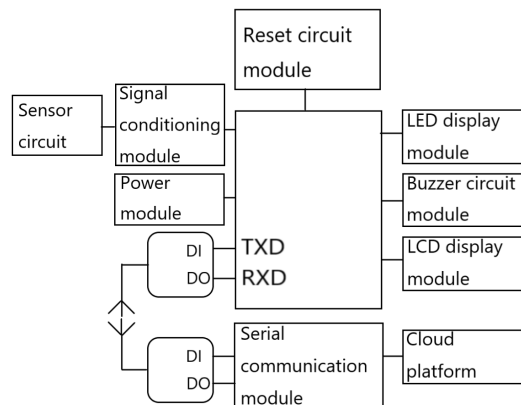
**Fig 1.** System framework diagram

### 3. Functional Design

With multi-sensor aggregation, targeted functional monitoring design can be realized according to the monitoring requirements of the measured object. Analog signals are collected by sensors, converted into electrical signals by conversion components, and then processed by measuring circuits to output available electrical signals. The electrical signals are sent to the cloud platform through serial ports, and the data is stored in the cloud platform after cloud computing. Users can realize remote monitoring through software and cloud platform information interaction.

### 4. Realization and Application of Remote Information Interaction and Software based on Sensor Recognition

The working principle of the sensor information acquisition and transmission system includes three steps [6]: 1:After the sensing layer collects the analog signals of industrial equipment, it uses the signal frequency modulation technology to convert the signals; 2:Digital conversion of analog signals is carried out through the A/D conversion interface of the microcontroller; 3: The wireless signal transmission module forwards the digital signal to the background database for corresponding processing The system mainly includes sensor circuit module, signal frequency modulation module, power supply module, digital display module, RESET module, wireless signal processing module and alarm module.

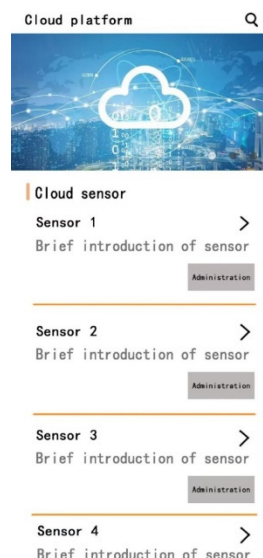


**Fig 2.** System hardware circuit design diagram

The working principle of the signal frequency modulation module is to use the signal amplification, signal buffering and signal filtering functions to convert the data information acquired by the sensor into the digital signal recognized by the system for system identification [7].

Cloud platform is a supercomputing mode based on virtualization technology, which provides infrastructure, platform, software and other services in the form of network. The whole large-scale and scalable computing, storage, data, applications and other distributed computing resources work together [8].

The system framework of the sensor information transmission and processing platform is based on the SOA specification and encapsulates each service according to the OSGi standard. The functions of the sensor information transmission and processing platform are divided into five layers: the basic layer, the development layer, the core service layer, the application layer, and the portal layer. The services at all levels are built on OSGi. These services ensure that the entire cloud platform can provide users with convenient and fast services. The entire platform can be built on multiple cluster servers, namely Main Server and Nebula App Server. The server can be planned and adjusted according to the amount of data transmitted, and a unified API interface is opened to integrate data, which can improve reliability and provide users with more service interfaces. This platform can be installed through the local HaaS/PaaS platform of. After the platform is built, users do not need to understand the internal work details of the cloud, nor do they need the relevant expertise of the cloud service platform to operate it [9].



**Fig 3.** Cloud platform construction display diagram

APP software development modes mainly include two categories: Native APP (native development mode) and Web APP (web page development mode), and Hybrid APP (hybrid development mode) derived from these two categories [10].

	Native APP	Web APP	Hybrid APP
Pattern composition	ECS data, APP application client	HTML5 cloud website, APP application client	Integrate Native and Web
development language	Native language objectC, Java, net	Web Page Language HTML+JS	Web page or native language
Backward compatability	bad	good	good
advantage	Poor user interaction experience, terminal devices can be called	Cross platform development, low cost; Easy to install	Better user experience and lower development and maintenance costs
inferiority	High development and maintenance costs; Local installation package required	Poor user interaction experience; Unable to call terminal device	Many development frameworks are hard to choose
market prospect	High frequency application, good prospect, but obvious "long tail" effect	Poor user experience and worrying market prospect	At the initial stage, but the market prospect is good, and developers prefer

**Fig 4.** Comparison of three software design methods

In contrast, we choose the enterprise level APP application software development mode. This development mode can fully call various resources of mobile terminals by using various interfaces of iOS, and at the same time, it embeds the architecture of UI Web View, which can quickly release updates. In the development, in order to improve the computing speed, most tasks are handled by the server. The API of the application program interface is developed as a universal interface to realize interaction, and transform the tedious database operation statements into a simple process of "sending HTTP POST or GET requests" and "parsing the returned XML". Because its hybrid application has the advantages of both native APP and Web APP. It not only has the advantages of cross platform low-cost development, but also has the advantages of good interaction experience and calling intelligent terminal devices. It can also help us better promote and improve the user experience.

When the sensor recognizes the information, the digital signal can be transmitted to the cloud platform through the serial port after the information is converted through the signal frequency modulation module. Through the information interaction with the cloud platform, the software can realize the remote information interaction function based on sensors.

## 5. Conclusion

Under the influence of the era technology, the remote information interaction and software based on sensor recognition are combined with modern multi technology innovation, so that users can realize remote monitoring and control of the measured object only through mobile phone software. The problem of sensor monitoring distance and resource consumption is solved. It provides effective help for users.

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