

# Application of Sensor Technology in Electromechanical Automation System

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**Abstract:** Sensor technology is a core of electromechanical automation system. Among them, sensor is also the most important content of high-tech electronic technology in China, but the application level of sensor technology in China is relatively backward. Although sensor technology is constantly updated and strengthened, there are still some problems in the application of sensor technology. In this paper, the problem of easy being interfered and high energy consumption has been explained, and some corresponding solutions have been discussed.

**Keywords:** Sensor Technology; Application Status; Wearable Testing Equipment

## 1. Application status of sensor technology in electromechanical automation system

### 1.1 Sensor technology

The English word for sensor comes from the Latin Sense, which means “feeling”, “perception” and so on. It can be colloquial defined as “tools and instruments for information acquisition and conversion”. It can also be strictly described as “a detecting device that senses certain information and converts it in a certain manner into a signal form that needs to be expressed or that can be re-transformed”. In general, it is mainly at the front end of a detection system, mainly composed of sensing element, conversion element and basic conversion circuit. With the development of sensor, signal conditioning circuit can even be added to the sensor. Among them, the signal to be confirmed is mainly determined by the selection of sensing elements, and the detection signal with certain and the same relationship will be output after

receiving certain information. The conversion element converts the detected signal from the sensing element into an electrical signal suitable for transmission or measurement. Finally, the input converter circuit will process the electrical signal accordingly. The invention and use of sensors are an important link in the new technology revolution. Therefore, sensor technology is also known as one of the three pillars of information technology and an important technology connecting the physical world with the computer world.

### 1.2 Application status in China

With the continuous progress of science and technology, scientific and technological products are constantly innovative and intelligent, accounting for an increasing proportion of people’s lives. Therefore, in daily life and production, the demand for information detection and acquisition cannot be lost. The sensor can be connected to the mechanical and electrical system automation, intelligent bridge<sup>[1]</sup>, mechanical and electrical

automation system in the acquisition of external information, compilation or conversion functions are achieved through the sensor, so it can be said that the upper limit of sensor development determines the peak of the mechanical and electrical automation system. Sensor technology application in China in the mechanical and electrical automation system status quo is as follows: (1) Mechanical and electrical automation degree is low, many developed countries in the agricultural and mechanical automation industry application degree is quite high, and in contrast, due to the sensor technology development in our country is not enough, so the application level is low, which is mechanical and electrical automation system automation degree is low. (2) The accuracy of sensor technology to obtain information is not enough<sup>[2]</sup>. With the deepening of automation in electromechanical automation system, the precision requirements of sensor technology are also getting higher and higher. It is necessary to get the information and various sensor types varied and so, each kind of sensor technology is widely used in all kinds of mechanical and electrical automation system, such as fluid in the robot sensor, gas sensor, light sensor, take the human equivalent “vision”, “taste” and “touch” responsibility<sup>[3]</sup>. Compared with foreign technology, China’s technology level is relatively backward, and there are many shortcomings, which all needs the scientific research personnel in China to pay more attention.

## **2. Problems of sensor technology in detection application**

### **2.1 Vulnerable to interference in the application**

In sensor technology, information is transmitted in a fixed form, and in electromechanical automation system it is mainly transmitted in the form of current or voltage, so it may be affected by various factors inside and outside the system. These influences will have a bad effect on the information transmission, resulting in the decrease of the accuracy of the detection system. (1) When the detection system is in the induced electromagnetic field generated by some nearby devices or components, when the inductance of this part reaches a certain degree, it is very easy to cause an influence that cannot be ignored to the detection system. (2) When the mechanical device is

subjected to mechanical vibration and mechanical impact, resulting in the displacement or fluctuation of its constituent parts, the corresponding information transformation relationship in the system detection will be changed, and finally the displayed value will fluctuate irreversibly. (3) If the detection device is in a high humidity environment<sup>[4]</sup>, and the absolute insulation cannot be achieved, it will lead to changes in the transmission efficiency of the electrical components in the detection device. (4) In the detection device, resistance mainly plays a certain role of reducing voltage and limiting current, but it also has a certain thermal effect. As the temperature of resistance increases, resistance will change with it, so will the circuit current<sup>[4,5]</sup>.

### **2.2 Excessive energy consumption of wearable and portable sensor technologies**

Excessive energy consumption is wearable or portable devices and urgently need to be resolved. the major problem of the traditional power supply equipment gradually cannot meet the various requirements of test equipment, such as movement measurement system in the initial development and solve the problem of energy consumption, which becomes one of the most important steps. In nowadays, it has become a most worried problem, that the energy consumption is too large. People cannot abandon the motion detection applications, and wearable devices like smart bracelets required detection can achieve “endless” operation, which leads to adverse experience users have access to all the time too short<sup>[6-8]</sup>.

## **3. The countermeasures**

### **3.1 Photoelectric and relay isolation technology**

Corresponding to the presence of strong magnetic interference in the use environment, some shielding objects made of conductive or magnetic materials can be used. It can be chosen to wrap the parts outside the main route or wrap the main route to prevent the strong magnetic generated by those parts from affecting the equipment. Corresponding to the interference of mechanical impact, choose special shock washer, rubber foot, shock absorber spring can be chosen to absorb the energy of vibration, so as to reduce the vibration in the detection device. Humidity interference can be addressed by adding heating devices, regularly stripping moisture out of

the testing system, or by impregnating electronic components and printed circuits with paint or epoxy resin<sup>[9-10]</sup>.

### 3.2 Kernel sleep, briefly wake up to process data

If the battery size is simply increased to improve the power supply, a large part of the comfort of wearable detection devices will be sacrificed, causing users to have other bad experiences. (1) The new electrode materials can be developed to increase specific energy and thus enhance energy storage technology. (2) Energy can be obtained from the working environment to supplement the functional consumption of the wearable detection device. Just as humans can reduce energy loss in their bodies by sleeping, pedometer functions such as step detection and counting need to be run in the background, and the API has been modified to improve sensor management and prevent the trigger to wake up the main application processor, thus reducing some corresponding unnecessary energy consumption. From this, it can be inspired to deal with the corresponding method of excessive energy consumption. Developing a way to save the sensor data directly in the system while the CPU core is sleeping can be taken into consideration, so as to realize energy saving. When necessary, the CPU is awakened for a short time to process data that has been stored in a module, emit the corresponding processed data, and then go back to sleep. This feature is extremely attractive in

wearable and portable sensing technology.

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