Design of Cold Chain Traceability System Based on Internet of Things

Zhao-xi CHEN¹,*, Xi-ai CHEN¹, Dong-hong CHEN² and Ya-qiong FU¹

¹School of Mechanical and Electrical Engineering, China Jiliang University, Hangzhou, China, 310018
²Education Equipment Engineering Technology Research Center of Zhejiang Province, Wenzhou, China, 325105

*Corresponding author

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Abstract. A cold chain traceability system controlled via the Internet of Things technology was developed to investigate the details of the cold chain logistics process. This system includes the logistics environment detection part and the cloud data service part. By the cold chain traceability system, it is able to store the ambient temperature data, humidity data and geographic location data in the cold chain logistics process locally and transmit them through the GPRS to the cloud data service platform. The cold chain traceability system can not only provide managers with a convenient way of monitoring but also bring more intuitively obtain real-time and historical information.

Introduction

Cold chain can guarantee the quality of perishable food, reduce the loss of food in circulation and extend the food preservation time. Not only for consumers to provide high-quality food, but also for all aspects of cold chain manufacturers, suppliers and circulation enterprises to bring great benefits[1-4].

In recent years, the pharmaceutical industry, light industry, chemical industry, the electronics industry demand for low-temperature logistics have continued to grow[5,6]. This situation is conducive to pulling cold chain logistics market development. The demand will be developed and growing market demand is the driving force behind the development of goods and services[7,8].

The final quality of the cold chain logistics depends on the storage temperature, the flow time and the shelf life of the product itself. It is particularly notorious that the Internet of things is a bridge of communication between the objects and things, and the future of it on the impact of people's lives will be ubiquitous. Because development of the embedded technology and popularity of the concept of cold chain is closely linked, the embedded technology used in cold chain management is a trend[9,10]. This will help solve the cold chain logistics in the transport tracking and process supervision is not timely, inaccurate and other issues. The effect of strengthening cold chain management is obvious.

In this paper, a cold chain traceability system was developed. The system consists of MCU, the sensor module, cloud service platform and other parts, and upload data through the Internet of things. It has the characteristics of high feasibility and wide range of applications.

System Structure

This study is based on the embedded technology, to solve the current food and pharmaceutical industry in the cold chain transport problem. The cold chain traceability system includes two parts: environment variable collection and cloud storage. The system structure is shown in Figure 1.
Design of Environmental Detection

The real-time temperature and humidity data of the logistics environment will be collected by the relevant sensors. After MCU processes, the data will be stored in the local peripheral storage device. On the other hand, this system also uses GPRS to transmit data to the cloud server which has been built the MySQL database. At the same time, in order to view the temperature and humidity conditions and the trend of the curve, managers can use MFC application in terminal device. The system structure of environmental detection is shown in Figure 2.

Using of Cloud Data Services

In web pages written in PHP, the data in the database is called in the form of a list, and the latest information will be automatically displayed on the front of the manager. The manager can also query and delete the data in the database remotely. According to the GPRS base station data provided by mobile carriers, the effective GPS coordinates of the base station can be obtained, and the moving trajectory of the item and the corresponding item state will be displayed on the map simultaneously. Therefore, this part implemented the cloud server data synchronization update function and expansion of the network terminal data query function. The system structure of cloud data services is shown in Figure 3.
Summary
The cold chain traceability system designed for cold chain logistics needs, including various modules and servers. Under the control of MCU, the use of sensors, remote wireless monitoring, database management, GPRS base station positioning technology, making the whole system can be stable to monitor the cold chain logistics. Internet of Things technology has changed from a simple technology to a new economic form. The inspection equipment module is responsible for the transmission of environmental information in cold chain logistics. It links the geographic address information of the monitoring point to the temperature and humidity status information of the cold product. The Web monitoring module is used to display cold chain logistics information and query history data. And in order to improve supervisor mode, it helps managers to keep abreast of the overall situation through providing them with detailed cold chain logistics monitoring information.

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