Design of intelligent data collector based on embedded technology

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Abstract: Embedded system is a development trend of computer technology, which is a low-power, specialized computer technology. Embedded system is widely used in industrial production and daily life, which is a very cheap computer system. Data collection is a kind of commercial behavior, which can provide basis for product decision-making, management and control. Therefore, data acquisition through embedded system will reduce the cost of the whole system, which can also guarantee the expansibility and flexibility of the whole system according to specific needs. Therefore, the intelligent collector based on embedded technology is an important application. Firstly, this paper analyzes the importance of intelligent collector based on embedded technology. Then, this paper puts forward the main technology of system development. Finally, an example is given.

1. Introduction

Modern computer technology has developed into a comprehensive discipline of various disciplines, including microelectronics technology, information technology, computer technology, it, etc. With the rapid development of society, we have entered the post PC era. However, the embedded system is a typical representative of the post PC era, which has been widely used in industrial production and daily life, such as Mars probe, "yurabbit" lunar rover, handheld devices, microwave ovens, set-top boxes, network router switches, etc. Embedded system is an intelligent electronic system with a computer core, which is a low-power, specialized computer technology. Embedded system is an important branch of the development of modern computer technology. It is playing a leading role in the era of intelligent modern electronic system.

2. Important technology of data collector in embedded system

Embedded system data collector has become a main branch, which has its own professional important technical requirements, as shown in Figure 1.

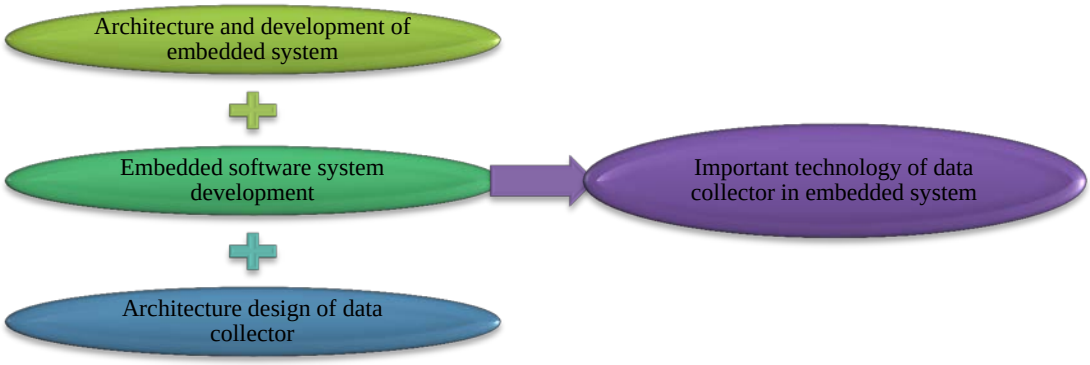

Figure 1: Important technology of data collector in embedded system

2.1 Architecture and development of embedded system

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Embedded system is mainly composed of four parts, including embedded processor, embedded peripheral equipment, embedded operating system and embedded application software. Embedded system can monitor, control and manage the host system, which is the main purpose of embedded system. The architecture of the embedded system is shown in Figure 2.

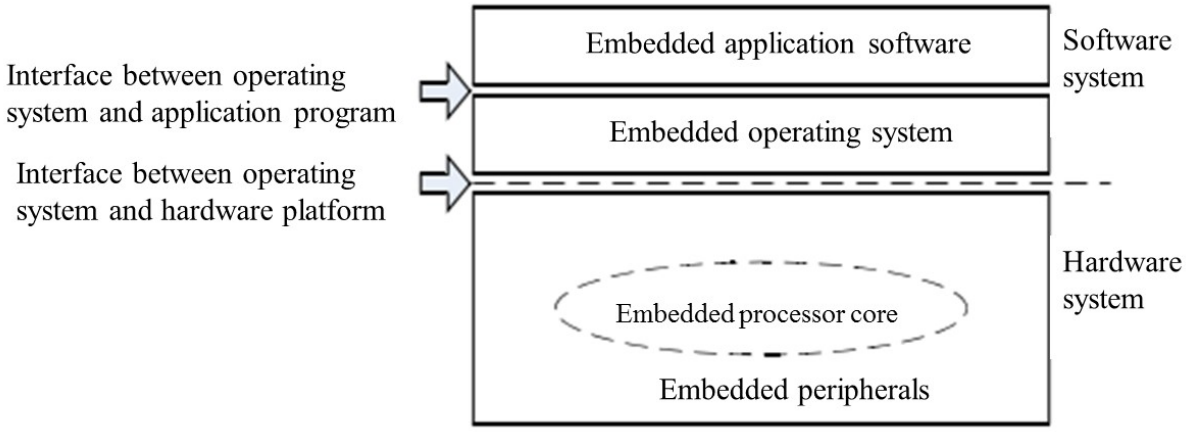

Figure 2: Embedded system architecture

2.2 Embedded software system development

Embedded software is a special program for specific embedded application system, including operating system and user application program. Embedded software has a huge market demand, which is the key to make in China to create in China. Embedded software generally has many advantages, such as small capacity, high efficiency, low price, high professionalism and so on. If we want to improve the execution speed and reliability, we can solidify the embedded software in the memory chip or microprocessor. The typical development process of embedded system is shown as the Figure 3.

2.3 Data collector architecture design

The whole data acquisition system is mainly composed of data collector, multiple sensors and remote monitoring center. The data collector is directly connected with several sensors, which needs to be indirectly connected with the remote monitoring center through the 3G / 4G function. According to the user configuration, the data collector can collect the data of each sensor separately. After processing, we can directly forward it to the remote monitoring center. In combination with industrial data acquisition applications, the data acquisition application system framework is shown in Figure 4.

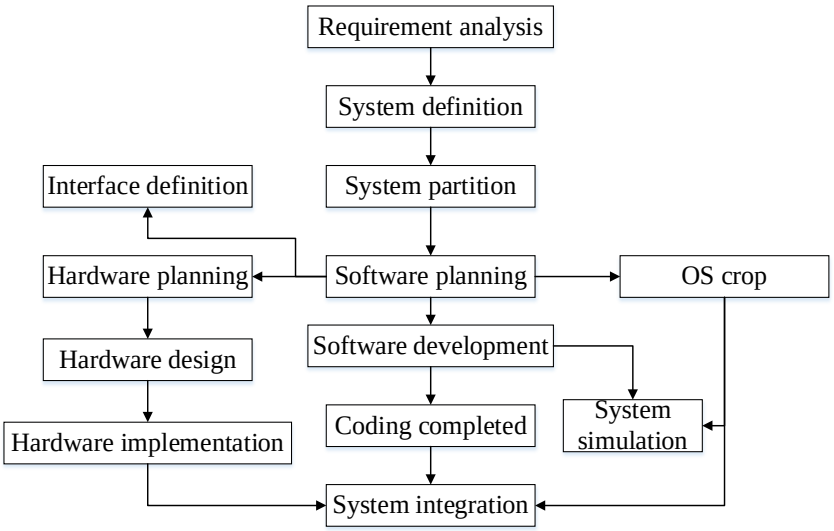

Figure 2: Typical development process of embedded system

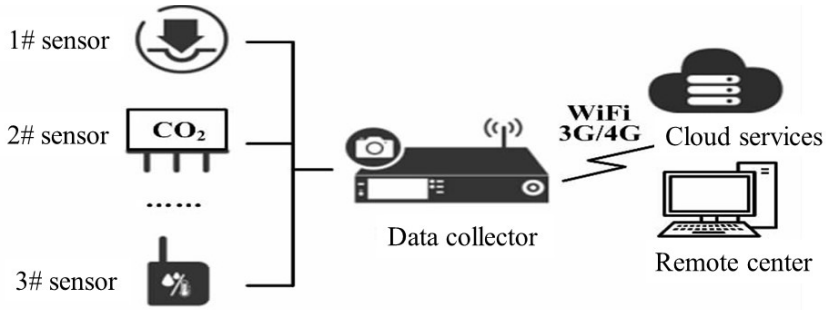

Figure 4: Framework of data collector system

3. Example of Climate Data Collector

3.1 ARM main collector

This paper chooses the software architecture of ARM main collector, which is mainly composed of three concurrent branches, as shown in Figure 5.

3.2 Test results

In this design, a climate data collector is designed with STM32 as the control core, which realizes the real-time monitoring of a variety of farmland meteorological elements, including temperature, humidity, wind speed, wind direction, rainfall, leaf temperature, total radiation and photosynthetic effective radiation The ARM collector processes and stores the collected data. Through GPRS device or serial port, the collector will upload data to the center software at a fixed frequency. The data acquisition results are shown in Figure 6.

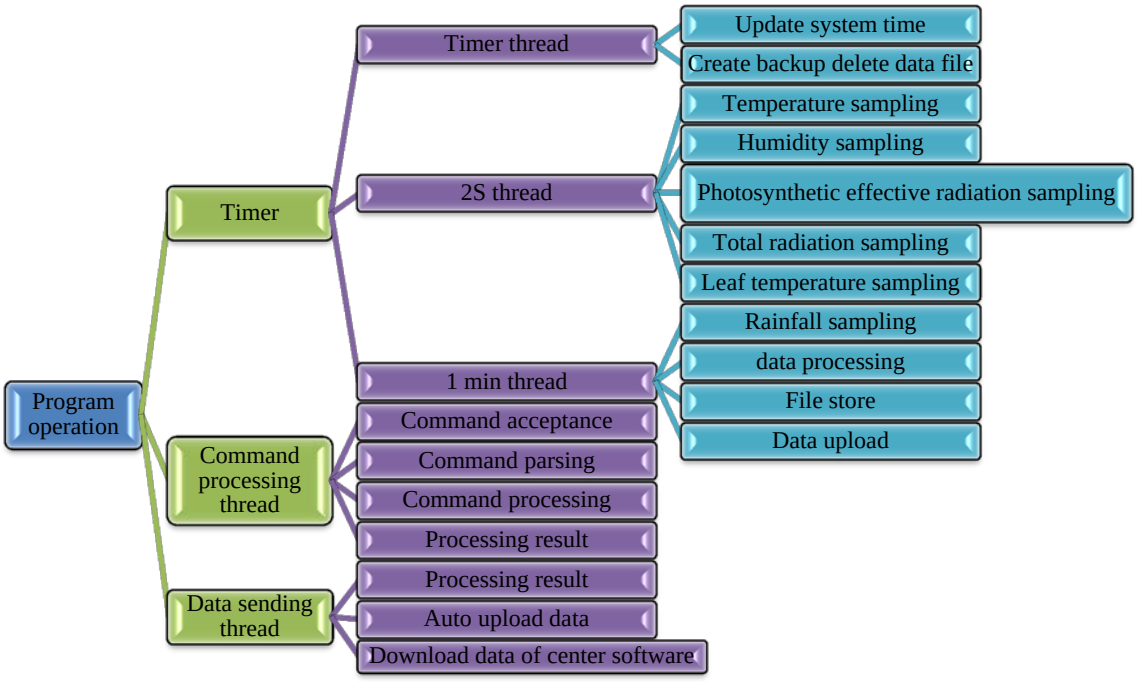

Figure 5: ARM main collector

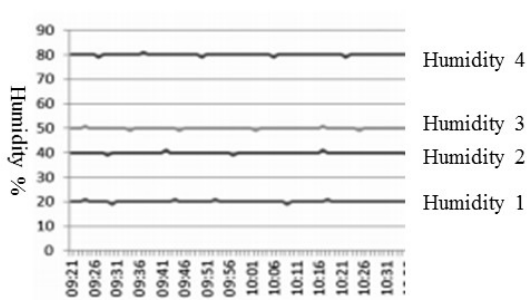

Figure 6.1: humidity change curve

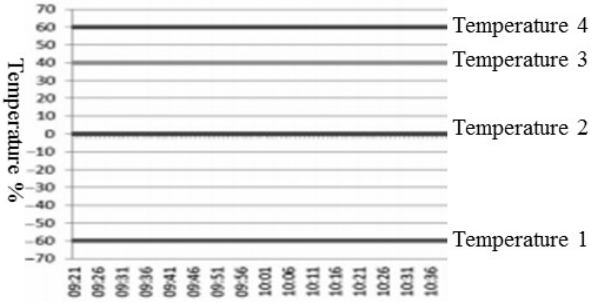

Figure 6.:2: temperature change curve

Conclusions

Embedded system is widely used in industrial production and daily life, which is a very cheap computer system. Data collection is a kind of commercial behavior, which can provide basis for product decision-making, management and control. In this design, a climate data collector is designed with STM32 as the control core, which realizes the real-time monitoring of a variety of farmland meteorological elements.

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