

Design and implementation of multi-parameter measurement and control system for pig house environment based on single-chip microcomputer

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ABSTRACT: With the rapid development of the current single-chip microcomputer technology and sensor technology, environmental measurement and control can be realized. Through the combination of a single-chip microcomputer with a variety of sensors and feedback facilities such as buzzers, the pig house environment can automatically measure environmental parameters and hazards Alarm and other functions. It can facilitate large-scale breeding of meat pigs.

Keywords: microcontroller, sensor, automatic measurement, danger alarm introduce

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I. INTRODUCTION

This product is called pig house environment multi-parameter measurement and control system, which adopts Labview2016, keil4, protues8 software program writing, hardware system includes MQ-7, MQ-2, dht11, at89c51, LCD1602, etc., the system mainly uses a variety of sensors to monitor the light, temperature and humidity of the pig house and make intelligent adjustments.

As an earlier and larger development in animal husbandry, pig breeding has played a positive role in China's agricultural development. With the continuous development of the economy and the continuous improvement of people's living standards, the market demand for pork is also growing steadily. It accounts for a large proportion of the daily food consumption structure of Chinese residents. Therefore, this system was developed to assist the breeding management of pigs.

The system real-time smoke light, air temperature and humidity monitoring, if the detection threshold is reached, it will automatically alarm and take emergency measures, that is, it can independently complete the monitoring and regulation of multiple parameters of the pig house environment.

The system is designed to monitor and adjust the environment of the pig house in multiple directions, which can effectively prevent the breeding of pathogens in the pig house due to environmental problems, which can cause large-scale diseases in the pig herd, and finally lead to a large number of deaths in the pig herd. Therefore, this system has a certain degree of help in the growth and health of the pig herd. It can effectively reduce the mortality rate of pigs and increase the economic benefits of pigs.

II. EXPERIMENTAL SETUP

The experimental device is mainly composed of three parts, the single-chip microcomputer, the sensor and the feedback device are shown in Fig.1, the sensor has a smoke light sensor, and the feedback device has LED light and buzzer alarm. Among them, the sensor will collect the information to the single-chip microcomputer, the single-chip microcomputer according to the collected information and the database of various parameter thresholds to compare, according to the judgment results to control the feedback device, such as LED flashing, buzzer alarm, etc., the user can also add a variety of feedback devices according to their own needs, such as automatically open the feeding switch, automatically open the antivirus switch and so on.

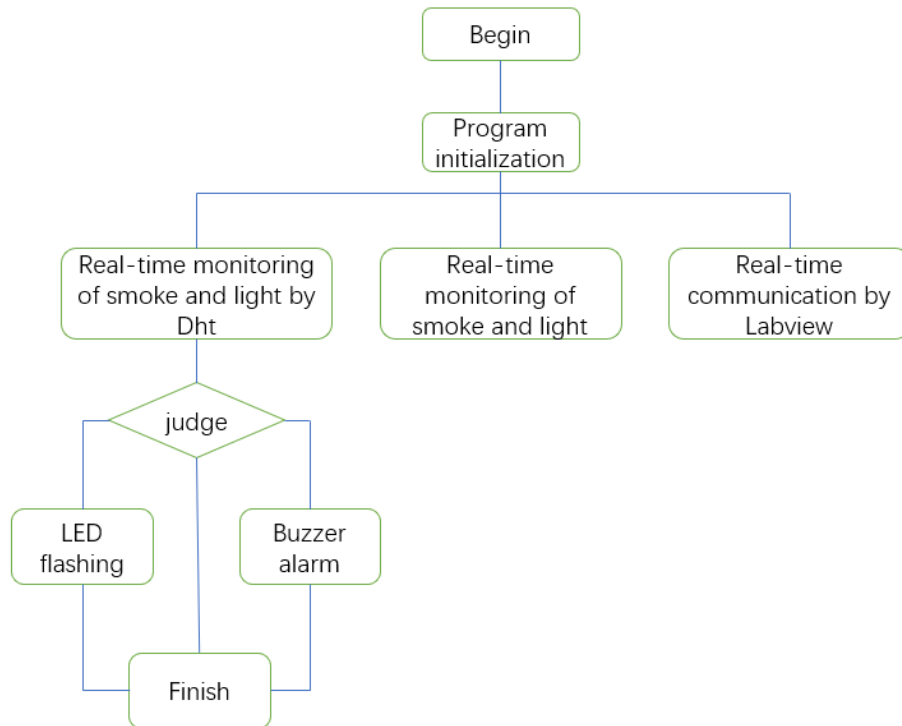


Fig. 1 System flowchart

First of all, the system starts to initialize, the system starts the smoke light sensor in real time to collect information, and then sends the collected information to the single-chip microcomputer, which displays the collected information in LabView in real time, and compares the collected information with various parameter thresholds set in advance, and makes LED light flashing and other operations according to the results.

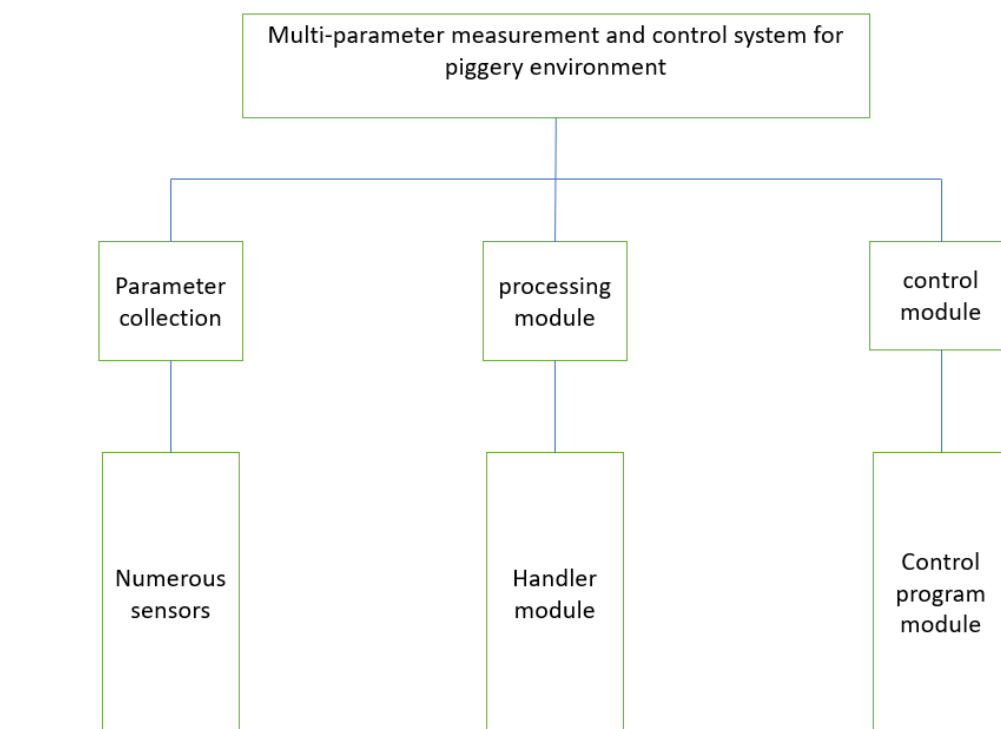


Fig. 2 Functional structure diagram

The multi-parameter measurement and control system of the pig house environment is composed of parameter collection, processing module and control module, as shown in Fig.2

Among them, parameter collection is composed of many sensors, the processing module is processed by the program on the development board, and the control module has an automatic processing module and an alarm module

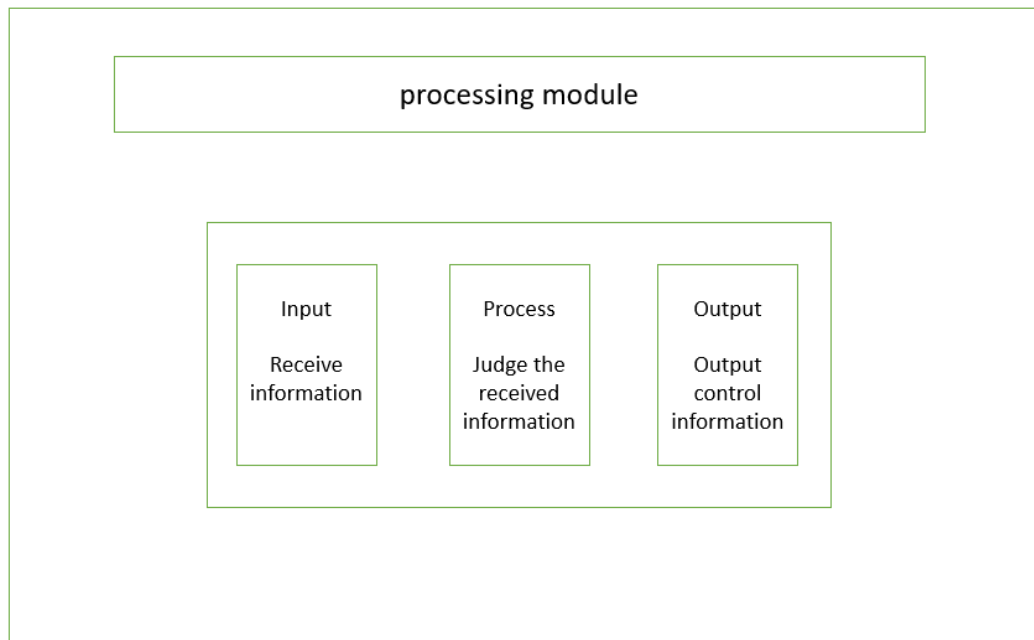


Fig. 3 Software composition diagram

The processing module is the core component of the software, which first collects data, including real-time information sent by many sensors, and then performs data processing analysis and judgment, and sends control information according to the results.

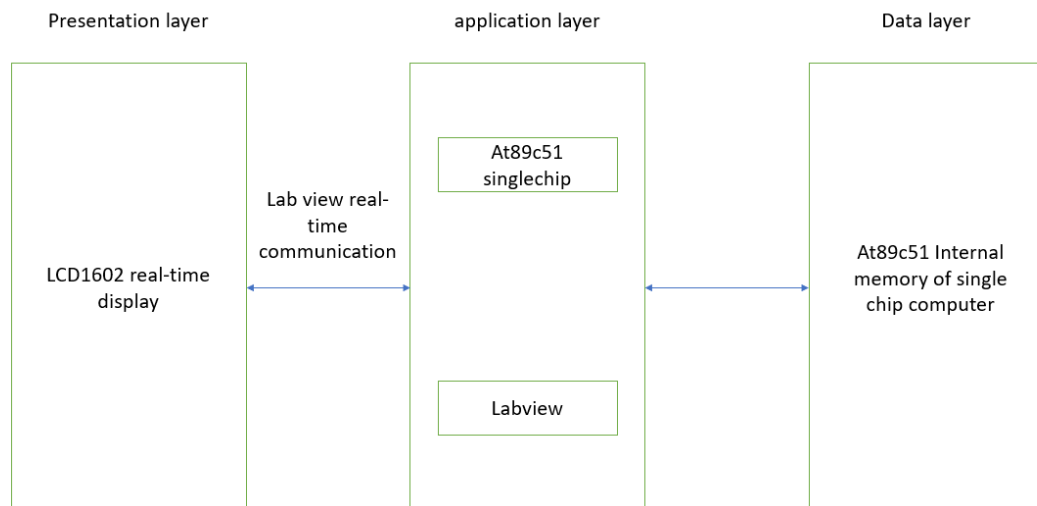


Fig. 4 System configuration diagram

The system configuration includes a presentation layer, an application layer, and a data layer, where the presentation layer is a real-time display of real-time data received from the smoke light intensity sensor via the LCD1602

The application layer includes microcontrollers and LabVIEW, which process the collected data while interacting with the internal memory.

REFERENCES

- [1]. XU Yang. Design and analysis of MEMS optical fiber pressure sensor detection circuit system[J].Science and Technology Innovation and Application,2020(16):90-91.)
- [2]. WANG Libiao, LI Chaofan. Design of intelligent indoor temperature control system based on 51 single-chip microcomputer[J].China Science and Technology Information,2020(11):88-89+13.)
- [3]. JIA Chao,CAIJie,XIONGZhaohui. Dynamic characteristics of temperature sensor under different heat transfer modes[J].Journal of Metrology,2020,41(05):563-566.)
- [4]. Zhang Luwen. Large-scale pig farm nursery pig breeding technology[M].Jilin,2016
- [5]. SHEN Yinshu,WUJingxue. Analysis of the development trend and motivation of large-scale pig breeding in China[J].Chinese Journal of Animal Husbandry,2011(22).