



Light Intensity Data Collector Based on 51 Single Chip Microcomputer

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Abstract. This design mainly includes a brief introduction of the system background and design significance, and then describes the overall scheme of the system, through the selection of devices to achieve the optimal device selection, circuit hardware design, and finally complete the system software writing part to complete the overall function of the system.

Keywords: Single chip microcomputer · Data processing · Sensor

1 Introduction

With the rapid development of sensor technology, the application of the digital circuit technology into every aspect of life, for some of the original nature environment parameters for digital detection, such as temperature, humidity, illumination and so on the natural environment digitize measurement, in primitive society, people usually use their estimates for these natural parameters some production work, such as economic crops, poultry breeding and so on. With the progress of the society, large-scale planting industry and breeding industry have flourished and developed. Relying on primitive environmental technology, they have been unable to keep pace with The Times. For example, how to use reasonable light intensity and light time to maximize economic benefits. The digital light intensity collector is designed for this problem.

Acquisition unit is mainly used in the design of digital light intensity planting and breeding center, modern economy for both industry is extremely strict to illumination, light in the center of the plant directly affects the production of cash crops, control of light intensity and time will greatly improve the economic benefit, aquaculture centre illumination application generally applied to hatch environment, different will directly affect the hatchability of illumination, so the design of the light intensity of the collector has a simple structure, application effect is ideal, will have a great economic and social benefits.

In this design, a light sensor is used to detect the illumination of the environment. The collected data is read by a single chip microcomputer and displayed through the display screen. The parameter setting of limit value is completed by pressing the button. The main research contents are as follows:

- 1) Completed the circuit design and software program design of the light sensor, and collected the data to the single chip microcomputer;
- 2) Complete the circuit design of analog-to-digital conversion, software programming, and convert analog to digital;
- 3) Complete the circuit design and software program design of the display, and display the data of single chip microcomputer;
- 4) Light supplement function;
- 5) It can set parameters by pressing the button.

2 System Design

The equipment mainly relies on the single-chip microcomputer for overall coordination and calculation. The single-chip microcomputer is responsible for sensor information data acquisition, control output, data calculation and other functions, and realizes the overall function through peripheral auxiliary circuit, sensor and other devices. The overall block diagram of the device is shown in Fig. 1 below.

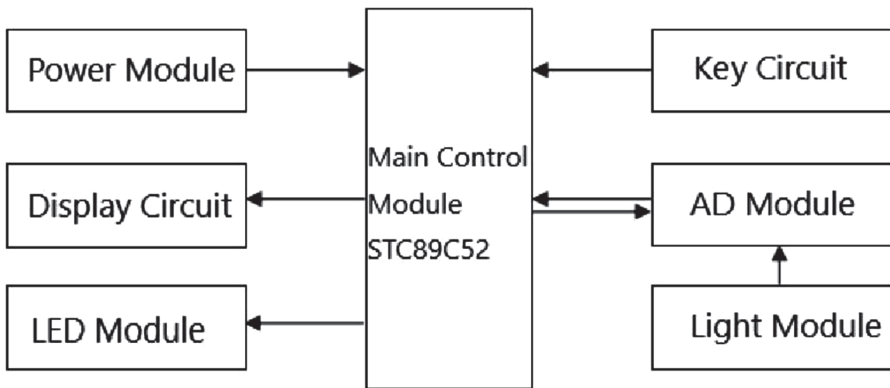


Fig. 1. Diagram of the equipment

PIC MICROcontroller is produced by an American company. From low to high end, there are many models to choose from, including conventional 8-bit microcontroller, 16-bit microcontroller and 32-bit microcontroller with higher performance. PIC microcontroller is mainly used in industrial control equipment applications, industrial applications of microcontroller performance is also required, the temperature range is relatively broad, can adapt to high and low temperature applications.

STC series MCU is a kind of domestic MCU, STC MCU development data is very much, very suitable for relatively simple device control system, SCM debugging as long as the use of USB TTL module can be debugging, download the program.

3 System Software Design and Actualize

3.1 System Main Program

The Main function is the system of the Main program, the program is the Main opening each program executed in sequence, by performing the action of each program to achieve the anticipated goal of system, the programming here need a logical, know the specific implementation process system, gradually in the process to achieve the goal of every little function, concrete process of the Main program as shown in Fig. 2, initialized Main function, the last in the Main loop repeatedly execute a program.

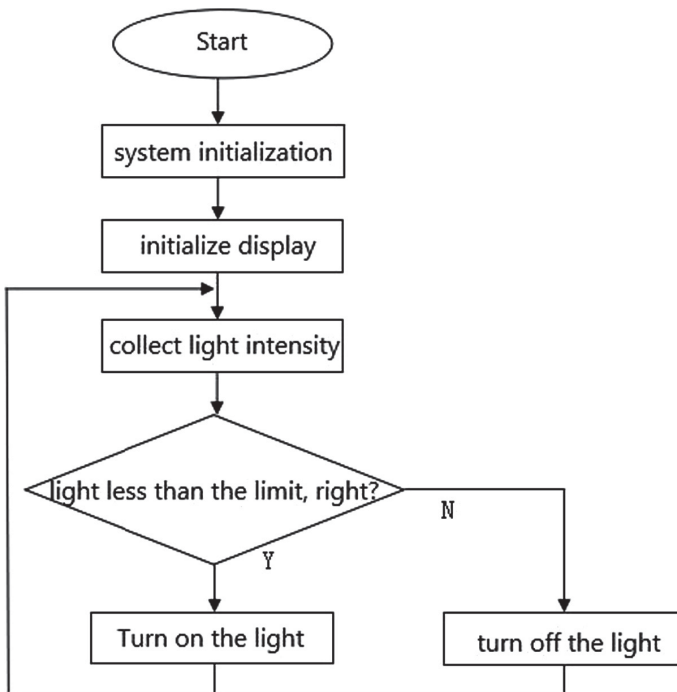


Fig. 2. Main program flow chart

3.2 Liquid Crystal Display Subroutine

LCD as human-computer interaction interface main equipment parameters input and data display on the LCD display flow chart shown in Fig. 3 after electric initialized LCD display program will be set up, mainly including the pin and the design of the data register, and then according to the write command function and write data function of the overall parameters and data display.

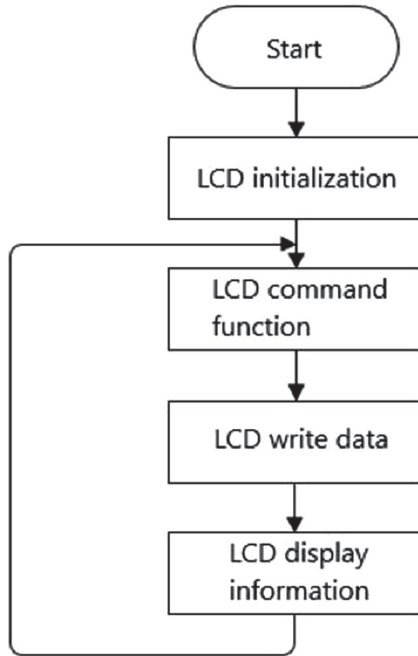


Fig. 3. LCD display flowchart

4 System Debugging

4.1 Hardware Debug

The most effective way to test the hardware of the equipment is to use a multimeter for overall testing. The welding of the equipment is not particularly clear, so it is not very intuitive when compared with the schematic diagram, so the multimeter is used for line measurement. Test, the first test is the power supply, VCC and GND short circuit. The test results are as follows Fig. 4.



Fig. 4. VCC and GND measurement results

The measurement found that the WELDING between VCC and GND was normal, proving that there was no problem with the source of the system. Then test the circuit conduction in turn, and test whether the two circuits are open according to the schematic diagram, as shown in Fig. 5, the buzzer beeps.



Fig. 5. Connected line measurement results

When testing the connecting line, it was found that the crystal vibration welding was not firmly welded, resulting in a state of circuit break, as shown in Fig. 6.

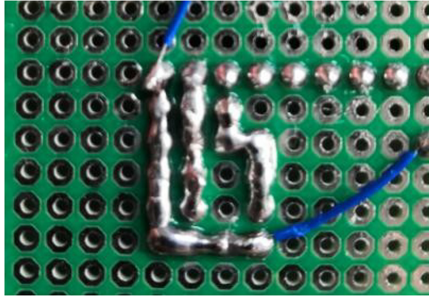


Fig. 6. Crystal resonance circuit

After correction, the solder of crystal vibration should be added to the correction welding of the system, as shown in Fig. 7.

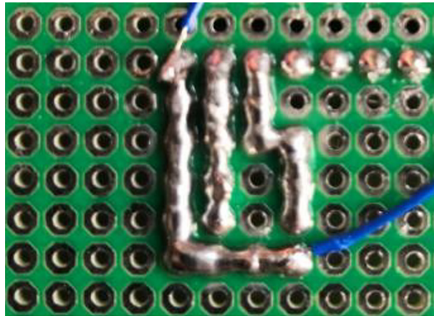


Fig. 7. Problem solving picture

Complete the overall test search of the system, the electrical test results of the equipment are normal, and the overall test effect of the system is shown in Fig. 8.



Fig. 8. Normal operation diagram of equipment

5 Conclusions

After the completion of the system, there will be many deficiencies in the system. At this time, the equipment can only be repeatedly debugged, the lick block is perfected in the whole program, the logic is rewritten, and the logic is restricted. Finally, a satisfactory device is completed by this means.

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