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Smart signal design and implementation of the trash can

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Abstract: *With the development of my country's economy, people's domestic garbage is increasing. In order to reduce the huge impact of daily garbage on the environment, this article monitors the garbage through infrared, once the garbage is found to be full, the red signal lamp will be bright, the sound and light alarm, and the full information of the trash can through the Bluetooth module to the sanitation worker's on the phone. Finally, the assembly welding is completed, which improves reliability and stability, and reduces the workload of sanitation workers to a certain extent.*

Keywords: *infrared; trash can; Bluetooth module; full information*

1. Preface

At present, in the sustainable economic development of our country, the people's lives have been greatly improved. A lot of people's consumption of resources has also led to the increasing increase in garbage in the current urban life of the country. At present Continuous development attaches importance to higher and higher. The treatment of current garbage is the responsibility of everyone. As the world's largest country, China has a great impact on the results of garbage treatment, which has a great impact on my country and its world. The current treatment of garbage can only solve this problem from the source by each of us from ourselves. As the essential product of life for people's lives, the trash can is also a tool that is currently valued[1].

From the initial outdoor trash cans to pedal trash cans, to the current intelligent trash can, the improvement of the trash can symbolizes the continuous progress of our society and the progress of human civilization. The traditional trash bins are simple. It is only placed in garbage. The recognition rate is low, and the sanitation workers are tested regularly, but the amount of garbage control is not accurately controlled. The garbage transportation is not timely. Very complicated program. In order to solve the above problems, this article designs a smart trash can that can be understood by mobile phones in time. It can realize the timely cleaning of garbage, thereby improving the quality of people's living environment.

2. System design solution

2.1 Overall design plan

There are three modules in this overall plan, which are input, control and output modules. As shown in Figure 1.

The control module uses STM32F103C8T6 single -chip microcomputer as the central controller. As the "brain" of the entire system, its main role is to collect data from each part, and after analyzing and processing data, it will then control each part.

The input module consists of five parts: the first part of the infrared tube module, it is like the "eyes" of the system. The second part of the voice recognition, this module can receive voice instructions and judgment classification, open and close the barrel lid; the third part of the Bluetooth module, has a communication function to send users a full information reminder to the trash bin; It is an independent button, like a manual switch, with four mechanical switches, which can directly turn on the corresponding lid; the fifth part is the power supply circuit to provide energy for the equipment.

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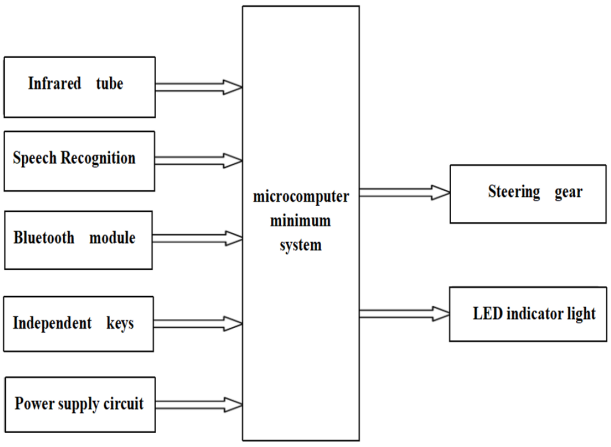

Figure 1: Garbage bin control structure box diagram

There are two parts of the output part: the first part of the steering gear module, which is the "hand" of the entire system. This module can realize the action of opening the lid of the corresponding trash can.

2.2 Main component selection

2.2.1 Main -control chip selection

Option 1: Select STM32 single film. The use of STM32 single -chip microcomputer has a lot of advantages: high cost performance and modular programming. This module can be used by users to use more serial ports, rich interface resources and relatively simple, can support wireless communication and other functions. The design sensitivity is higher[2].

Option 2: 51 microprocessors. This microprocessor has a simple structure, more input and output that can be used by users, simple and fast entry, and 8K flash memory[3].

The use scheme will make this design more sensitive and operate faster, and this design needs to use two serial ports. The STC89C52 single -chip microcomputer cannot implement the functional requirements of this design.

2.2.2 Electric module scheme selection

Option 1: Putty is used as a motor -driven method for this design. Step motor is a motor that can convert the electrical pulse signal into a rotation movement. The stepper motor has the characteristics of high accuracy, good stability, controlling speed, and mute operation. It is widely used in the fields of machine tools, automation equipment, printing machines, and medical equipment. It can realize different needs of users, and the control method is simpler[4].

Option 2: Use the steering gear as the motor drive method designed. The use of a motorcycle can achieve control and accurate control, but the controller is used to control the speed quickly, and it can be easily generated by the PWM signal control[5].

Although both step motors and steering gear can be achieved, the use of step motor to control its driving capacity is small. It has no sensor, and there will be deviations in the stop angle. Its control speed is fast and more accurate, so the choice of the two steering gear as the driver.

2.2.3 Selection of the power solution

The selection of the switching power supply plan is directly related to the reliability of all system software. The necessity of selection is obvious, and 2 plans are prepared in advance.

Option 1: Select the 12V insertion switch power supply, plus the switching power supply for integrated ICs used to reduce voltage, so that the stable 5V power supply we need at the end is relatively simple, but the design is mainly facing the design now facing the design. An problem that is not easy to solve is that the design of the power supply has the problem of heat dissipation. This problem may cause our equipment functions to be affected many, so that our final finished product effect cannot meet our previous design expectations.

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Option 2: Select 5V switching power supply to directly drive. In order to ensure a stable 5V, a power supply adapter can also be selected.

The second solution allows each module to have a relatively stable power circuit, so the second solution is used in terms of cost and stability.

3. Infrared tube module circuit

When the detected object is between the transmitter and the receiver and the light is blocked, the photoelectric switch has generated a switch signal. OUT ports as digital output pins, indicate whether to receive infrared rays, receive infrared rays, and output low level 0, indicating that the trash can is not full; the infrared rays are not received, and the output is high level 1, indicating that the trash can overflows[6]. The schematic diagram of infrared pipe module circuit is shown in Figure 2:

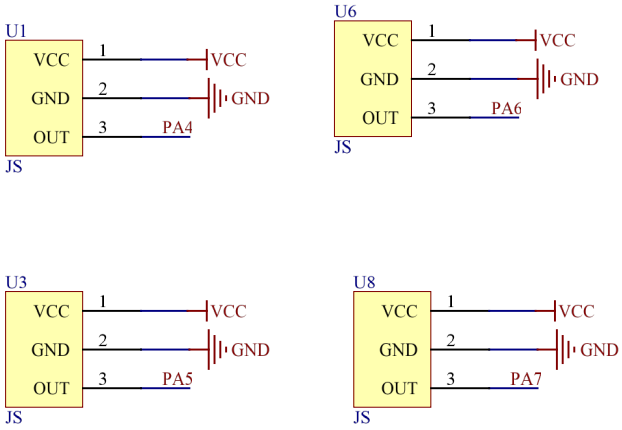

Figure 2: Principle diagram of infrared pipe module circuit

4. Bluetooth module circuit

This design connects the trash can controller with the mobile phone through the Bluetooth module. When the trash can is full, the staff who automatically send SMS to the trash can; the principle of working in the Bluetooth module is: Connect, when the trash can is detected, the signal is sent through the serial port, and then the signal is sent to the mobile phone to provide the staff[7]. The schematic diagram is shown in Figure 3:

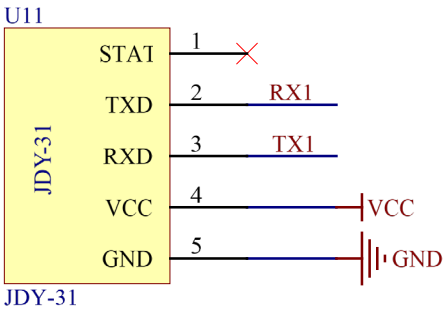

Figure 3: Bluetooth module circuit schematic diagram

5. Indicator light module circuit

This design uses 8 LED lights, which corresponds to different types of trash cans one by one. When the monitoring of this type of trash can is not full, the green indicator lights are lit and the trash can is full. The resistance of 1K in series with the LED light is a current[8]. The principle diagram of the module is shown in Figure 4:

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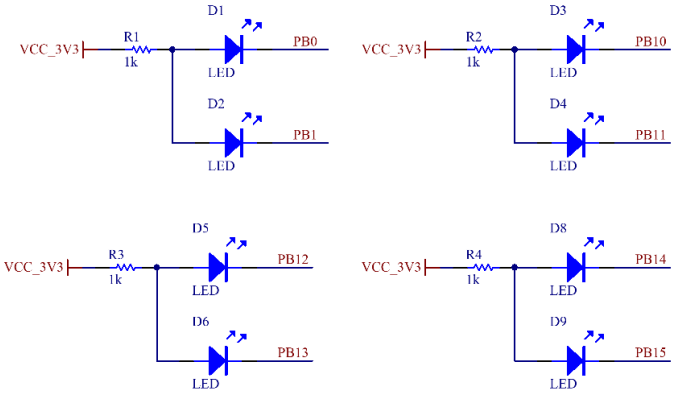

Figure 4: Alarm circuit schematic diagram

6. Test of the physical test of the trash bin status

When the trash bin is not full, the corresponding green indicator lights are on. The physical test is shown in Figure 5:

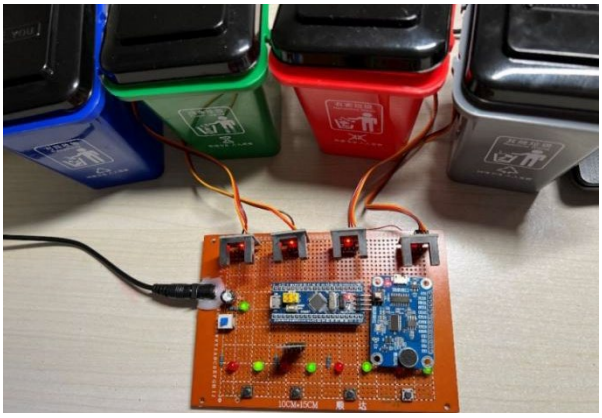

Figure 5: Detects that the trash can not be full of physical test diagrams

Detecting whether the trash can be filled with garbage through the infrared pairing of the trash can. When the trash can is full, the red indicator lights are lit, and the Bluetooth module automatically sends SMS on the sanitation workers' mobile phones. For example, the "recyclable trash can" is overflowing, and the infrared pairing tube is continuously blocked. The corresponding signal indicator lights on the red light. Clean up garbage in time. The physical test is shown in Figure 6:

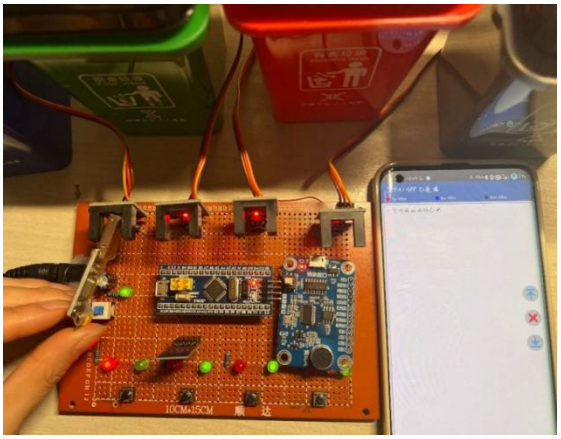

Figure 6: Detects that the trash can overflows the physical test diagram

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7. Conclusions

This article monitors garbage through infrared rays. Once the monitoring is full, the red signal light will be on, and the sound and light alarm will be performed. To a certain extent, it is of certain significance for reducing the workload of sanitation workers and their sanitation work management.

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