

The Design of Multi-function Household Wiring Board Based on Single Chip Microcomputer

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Abstract. In order to study the automatic control of multi - functional home wiring board, and can achieve real-time measurement of power consumption function, this paper uses the microcontroller to control the design of a human infrared inductive electronic multi-function home wiring board. It is mainly composed of 220V/380V universal power plug, measurement module, display module, control module, human sensor module, wireless transceiver device, self - power delay control circuit and self - locking circuit. The system can realize the function of measuring the power consumption, the automatic delay, the delay of the time, the automatic power down, the self - lock and so on.

Introduction

With the continuous progress of society, people's living standards continue to improve, each household appliances is more and more, to the electric car, small to televisions, refrigerators, and desk lamp. All kinds of electrical appliances to the people brought great convenience, but people were often confused about high electricity, and they don't know each electrical consumption of specific power, thus causing some unnecessary property loss; Meanwhile, it is often appears that people due to urgent extrudes out lead to leave for a long time forget to turn off the electrical power phenomenon in the use of electrical appliances in the process, resulting in many electricity waste and accident. In this paper, the design of multi - functional home wiring board based on single chip microcomputer, which achieved automatic control of the using of electrical appliances, and reaching a real-time measurement of the power consumption and other functions through the human body induction.

System overall structure design

The overall structure diagram is shown in Fig.1, which includes power module, measurement module, display module, microcontroller module, human body sensor module, wireless transceiver module, self - off power delay control module and self - locking circuit module.

The working principle of the system: the device can ensure the normal power supply, and the use of electrical work properly when persons stay in the room in the selected space. Once the person

leaves the selected space range, and the device can automatically close the power supply within a certain period of time. If it is need to using electrical appliances from the outside back, and just click the button of the device, which can be used normally; if you want to use electrical appliances, the first open a with the use of electrical appliances in parallel without self-locking switch and standby for other appliances, and then click the device button, finally opened with own electric power switch, then the use of electrical appliances will be able to work properly.

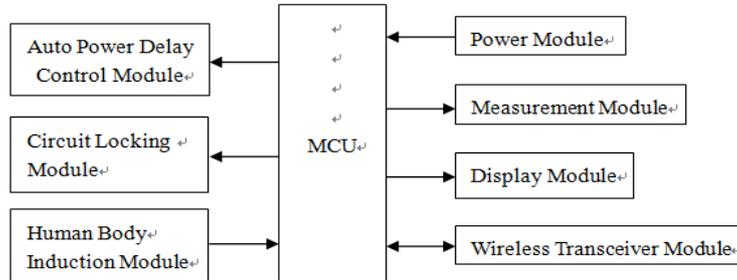


Fig.1 The overall structure diagram of system

The hardware circuit design of system

The circuit design of Power module

The power supply of the system design is non-isolated power supply. The non-isolated power supply refers to the input and load of the transformer is not isolated, and directly connected to the input and load end of the total, so the load is the risk of electric shock, the current use of the most is not isolated direct Buck power. It is to get the AC rectifier DC high voltage, and then directly with the (Buck) circuit for Buck and constant current control, the advantages of non-isolated power supply is low cost, simple, and high index. The power supply circuit is capable of providing approximately 60mA of the current.

The circuit design of wireless transceiver module

The wireless transceiver module is responsible for sending the collected water level data and receiving control commands from the monitoring center. The data output through the Dout transmission to the transmitter data receiving port DATA after the water level information encoding, and then the radio signals is transmitted through the external antenna (length 25cm). The oscillation resistor R31 is 1.2Ω , the module frequency stability is basically the same with the crystal, circuit is very stable and son on. The signal receiving and transmitting distance specific circuit is shown in Fig.2.

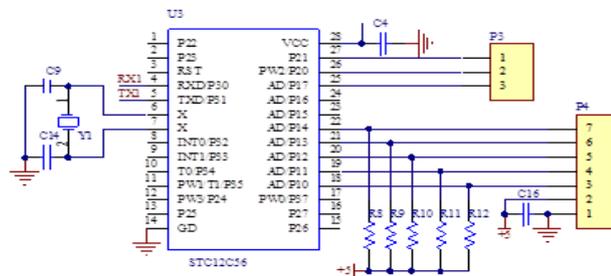


Fig.2 The circuit design of wireless module

The circuit design of delay module

The schematic diagram of the circuit is shown in Fig.3. When the external signal input, the first pass through the R1 and C1 with the ground wire, the other end into 2 of the 9803 foot operation is input. At this time, the timing detection circuit starts to count the internal clock cycle, the jump is high

(can be avoided by triggering). CDs is connected to the inner Schmitt trigger, daytime CDs low resistance, Schmidt inverting output is low, suppress output; dark sky, on the other hand, Schmidt inverting output is high. If the output of the signal is small 768 TB cycle, it will not be accepted by the system. 11, 10 pin output signal duration is 245760 TC cycle, if the signal is triggered by an external signal, the signal duration is calculated, until the end. 6 foot R, C determines the internal clock, 7 foot trigger time width is F/2. 8 pin R, C determines the internal timer cycle, frequency calculation and the same 6 feet. Adjust R, C can adjust the length of the output control time. The design time is 3 minutes. This circuit is connected to the 220V AC power supply, the trigger to control the L into the L and the. When the external signal input, 11 pin output high level, plus a resistor connected to the base of the transistor, then the transistor conduction, two-way thyristor conduction, L and L into the, or L into the L.

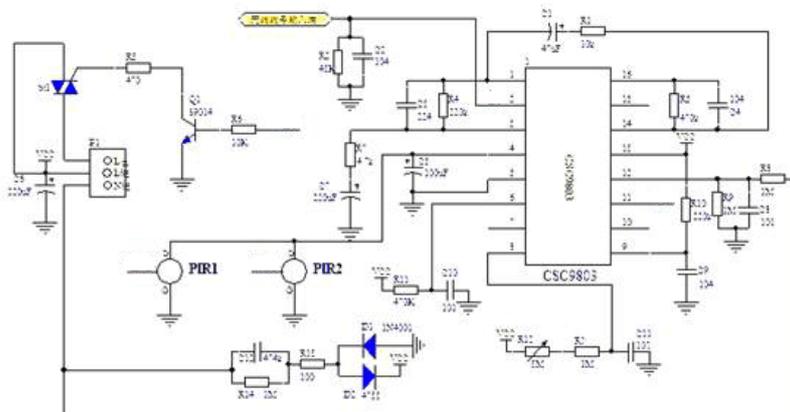


Fig.3 The principium circuit for prolonging time basing on BISS0001

The signal processing circuit of pyroelectric infrared sensor based on Bissoo001 chip

Infrared human body induction by PIR implementation, when the human body enters the sensing area of the PIR, PIR will human infrared thermal and environmental temperature converted into electrical signal, through coded radio reception and transmission device of conveyor to node B, then the R8, C8 composed of frequency selective circuit input to the BISS0001. In the BISS0001 internal through the two stage operational amplifier will be input sensor signal amplification, filtering. Through the design of the operational amplifier, the external components of the operational amplifier can be changed to change the magnification of the operational amplifier and the quality of the output waveform.

Vo is an output control signal, according to different application can Vo pick photoelectric coupler input end of high power switch control, through the Vo control subsequent circuit output "on" signal and "off" signal. In this design, Vo is used to control the G pole of the bidirectional thyristor, which can control the conduction and closing of the bidirectional thyristor.

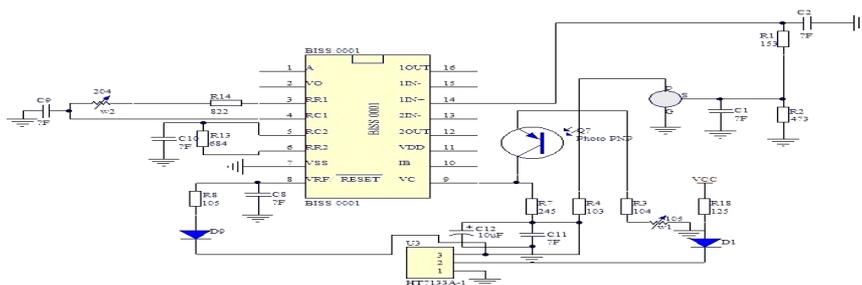


Fig4 The principium circuit for dealing with the PIR signal

System software design

When the system is in use, according to the needs of people need to open the use of electrical appliances by a manual button control system working state, when the button AN is pressed, and the people in the area of induction (maximum induction distance is 8 meters), the circuit is the human body and the infrared difference between the environment, control output "open" signal; when people leave the area after the circuit output signal.

It can be adjusted automatically shut down with the delay time of electrical appliances in this circuit, that is, from the people left to use electrical appliances to close the length of this period of time, specific, which can choose the output of "off" signal delay time of 30 seconds to 10 minutes.

Summary

This paper focuses on the use of electrical appliances in the work of the voltage, current, power and energy consumption were detected, and the use of the energy produced according to human activities by infrared sensing technology, the human body induction module intermittently sends a signal to the delay circuit through the radio transceiver, causing a delay circuit timely reset and constantly re timing, thus let the use of electrical appliances in some activities can be in the open state; when the people leave the effective scope of activities, after the selected time, which can automatically cut off the power supply, the use of electrical appliances is closed, the effective realization of the majority of users can accurately understand the electrical power and automatic on-off power the purpose of.

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