Automatic washing machine proteus simulation and mechanical transmission design

Feifei Xin

Baoding 071003, college of energy, power and mechanical engineering, North China electric power university

3434391617 @qq.com

Corresponding author: Feifei Xin

Abstract

with the gradual improvement of China's economic level and scientific and technological level, people's living needs are also higher and higher.The traditional mode of hand washing clothes has long been eliminated by electric washing machines, but the progress of science and technology is far from this, China's education level and quality gradually improved, cultivated a large number of high-level electromechanical control talents, the level of automation in China covers all aspects.The concept of automatic washing machines was also applied.This paper will introduce the use of proteus for the simulation of automatic washing machine basic principle and working mode and mechanical transmission design, automatic washing machine can achieve automatic water, washing, dehydration, drainage, fault diagnosis, display alarm and other functions.

Keywords

Proteus;Transmission design;Program control: simulation.

1. Introduction

Automatic washing machine has been widely concerned by people, traditional washing machine can not meet people's life needs, the pursuit of higher quality of life standard has become the characteristics of this era. Fully automatic washing machine is applied, how to design a convenient and economical automatic washing machine has become a difficult problem for designers. Proteus simulation can solve the complex design process, all the design by using a software to do this, don't waste of raw materials, and can implement changes at any time and place, many libraries to choose from and use, no much difference with real environment, which is the advantage of the proteus simulation mechanical transmission design is also an important part of automatic washing machines, with control procedures, there is no good support and transmission accuracy of all design will lose its significance.

2. Protues simulation principle and automatic washing machine working mode

Introduction to proteus simulation interface: after downloading and installation, double-click to open the shortcut, enter the simulation interface, the bottom left corner of the execution, pause, stop button, once the simulation model and import control program, you can press the execution button, simulation is started, press the stop button, simulation stops the execution of the program. The top column is menu options, including file, view. system and other menu items.The left-most column shows the simulation model establishment of the selected components, press pick, and ask for the required components in the search bar. The blank part of the interface is the working area, and place the components and realize man-machine simulation observation interaction.

Library file is introduced: proteus software has a wealth of libraries, library file refers to the software itself with the components, popular, is in a file, there are some components that can be used when simulation personnel needs, library file is the foundation of simulation, can't afford to talk about the simulation without a library file, fully automatic washing machine using the main simulation devices

including AT80c51 single-chip microcomputer controller, led display light, buzzer alarm, double D flip-flop, ac/dc voltage source, the solid state relay, ac motor, buttons, knife switch, and plus auxiliary device and so on.

Introduction of the function of the components: AT89C51 is a controller, equivalent to the human brain, all the simulation process is controlled by it, there are 40 excuses, 32 I/O port line, including address port, data port, control port, etc., double-click the components, in the program selection subscript can import the program has been prepared. Double D flip-flop is used to trigger interrupts, including int0 and int1. When the double D flip-flop is in the triggering state, as long as the clock signal is effectively triggered, it can send the external interrupt signal to the interrupt request port of the single-chip microcomputer, and the single-chip microcomputer responds to the interrupt. Control buttons is to realize the digital signal input, for single chip microcomputer to identify and judgment, to perform part of the motor is fully automatic washing machine, have positive &negative, high and low speed, proteus simulation is to use the rotation of the motor to simulate the rotation of the washing machine, solid state relay is equivalent to a trusted switch power amplifier, the effective control of single-chip computer output signal through the power amplification of solid state relay control motor and reversing has start-stop control and high or low speed. Transformer is to achieve the change of the voltage, voltage stabilizer for the normal work of the system, provide a stable power supply, prevent system simulation is not stable, buzzer alarm device, when the system failure, will automatically alarm, prompt work abnormal, led display light is used for observation, such as is used for displaying work under what kind of work at the time, it is washing or dehydration, is a normal washing or strong washing and so on.

The full-automatic washing machine simulation work process introduction: first of all, according to perform startup procedure, waiting to press the start button, the program into normal washing, washing requirement to positive &negative, of reversal time is set to 20 seconds, when positive &negative switching, stop for 2 seconds and so on, washing five times, the program is running to this step, automatically enter a state of drainage, drainage switch when the drainage water level reaches a given after the water level is automatically entered into a state of dehydration, dehydration port opened, dehydration after the 30 seconds, the buzzer sounded, mark washing over. Water level control is artificial actuator to simulate water level switch press or open water arrived at a given level, to stop water or drainage, at the same time in the simulation model is set in the pause button, when press the pause button, the program stops running, waiting to be processed, it is to satisfy the malfunction is the realization of human intervention, troubleshooting, troubleshooting, just press the start button again will continue to execute a program.

Program design:, when you need to be good connection hardware circuit design of the software, in the proteus simulation, can use the c programming language, you can also use the assembly language, the simulation using assembly language, because there is a clear control 51 single-chip microcomputer ports, data port, the port address and so on, easy to implement and programming corresponding hardware pin, assembly language at the same time easy to understand, language instruction easy to understand, in the automatic washing machine control can completely meet the requirements of established, p0 mouth and p2 do address data port and port, both address and data port through peripheral 373 latch to distinguish.P3 port is used as the control port, p1 port is also used as the data port. Programming was put forward the distribution of the pin is set of assembly language programming, assembly language must be clear of the hardware and software requirements corresponding relation, especially the relations of distribution among the address and data bus, the program design adopts modular design, has the live program and subroutine, when in the implementation process of the main program needs to perform a subroutine, can use the call instruction calls the corresponding subroutine, program control purpose.

3. The transmission mechanism design

Transmission mechanism, transmission mechanism is the use of reducer and clutch, clutch is used to realize switching, dehydration and washing control mechanical transmission structure without operation requirements, speed reducer adopts planetary reduction mechanism, implement a certain ratio of reduction, the design is to realize dehydration double reduction, reduction gear, washing to the actuator input shaft of the motor with belt drive.

Transmission function: the transmission mechanism is the core part of the mechanical structure. The gear transmission has the advantages of compact structure, accurate transmission ratio and high mechanical strength. The gear transmission in the automatic washing machine can meet the requirements of washing.

4. Conclusion

Proteus simulation is the real model abstraction, the simulation model of direct dominated full-automatic washing machine design and manufacturing, at the same time, the reasonable design of transmission mechanism is also a fully automatic washing machine is light the basic guarantee of popular, hope this article can provide some theoretical basis for design and manufacturing of automatic washing machine, and provide basic theory for proteus simulation

References

[1] pu lianggui. The ninth edition of mechanical design.2013
[2] Lin Lin. The principle and application of the first edition of single-chip microcomputer (based on proteus and keilc).2011
[3] Wu ning. Principle and interface technology of microcomputer (4th edition).2016
[4] Yan shi. Foundation of digital electronic technology, 4th edition.1998
[5] jiang xin. Graduation thesis based on electro-mechanical system design of wave-wheeled automatic washing machine.2016