Thinking on the Introduction of PROTEUS Simulation for Single-Chip Microcomputer Teaching

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Abstract

The course of single-chip microcomputer is the important course of electronic and information profession in colleges and universities and has the characteristics of strong practicality. This paper analyzes deficiency of teaching of the current single-chip microcomputer and put forward the introduction of Proteus simulation software into the single-chip microcomputer classroom teaching and practice teaching, in order to improve the teaching effect of single-chip microcomputer course, enhance the students' interest in learning, broaden the students' learning channels, so as to cultivate the students' innovative ability and practical skills and improve teaching quality of single-chip microcomputer.

Keywords

Single Chip Microcomputer, PROTEUS Simulate, Teaching Reform.

1. Introduction

In the current production and life, single-chip computer is widely used, is an important course of electronic, computer, automation and other professions, with a strong theoretical, applied and practical characteristics. In the job market, the single chip microcomputer application system design, debugging and maintenance jobs require a great deal of talents [1]. Therefore, it is necessary for the exploration and practice of teaching reform of SCM, make this course cultivate students to become real skilled talents of microcontroller application.

2. The shortcomings in the course of single-chip computer courses teaching

2.1 Pay high attention to theory and pay low attention to practice in lectures.

In the current classroom, the teacher mostly is to use the traditional teaching mode, namely tends to be the master of the classroom, the teacher let the students follow the teacher's thinking, students just are the audience, which lacks of interaction between teachers and students, students' learning enthusiasm and efficiency are generally low. For single chip microcomputer with more complex content, students feel boring in the learning process, combined with their own limited understanding and accept ability, this leads to the problems to the students in learning and teaching effect is not ideal.

2.2 The curriculum setup is not scientific.

SCM teaching theory in the class are mostly separated from the operation and practice, practice lesson is usually carried out after a period of time of theory course, which causes there is a lot of time interval, students tended to be blurred for the theoretical knowledge in practice. Such an arrangement can neither guarantee students to consolidate the theoretical knowledge, nor is favorable to its practical operating skills improvement, to little effect.

2.3 Practice equipment limits

Now most of the colleges and universities mostly use single-chip microcomputer in the single-chip computer practice teaching experiment box. The experiment box integrates single chip microcomputer, its application interface and commonly used of the controlled object. The hardware

design process is simple, high reliability. The students can concentrate on the system architecture and software development in the experiment, and will not result in the improper problem of hardware circuit structures, so as to deepen the students to control the experimental purpose. The experiment box has many advantages, but there is also a fatal flaw: the experimental apparatus have limited functionality, each device collocation fixed on the experiment equipment limits the thinking of students, make them unable to play the subjective initiative and creative thinking [2].

3. The introduction of PROTEUS simulation teaching reform

3.1 Necessity of teaching reform.

As a kind of practical strong engineering courses, single chip microcomputer's teaching mode should mainly be practical operation, which will inevitably involve the equipment investment. Because of the limitation of funds and laboratory, it cannot reach the purpose of paying equal attention to theory and practice. With the rapid development of computer technology, many areas have appeared simulation system, significantly promoted the development of science and technology in various fields. PROTEUS arises at this historic moment and rapid develops into simulation system, the teacher can use PROTEUS simulation teaching in classroom teaching and theory teaching as an important auxiliary means, in order to change the teaching mode that pay high attention to theory and pay low attention to practice, enhance the students' interest in learning and cultivate the students' innovation ability.

3.2 Knowledge of PROTEUS.

PROTEUS is multifunctional EDA researched and developed by British Labcenter company, design and simulation platform of analog circuits, digital circuits and analog hybrid circuit, even advanced design and simulation platform of single chip microcomputer system. It really realized from the schematic diagram and circuit design, circuit analysis and simulation, single-chip microcomputer code debugging and simulation, system testing and function verification on the computer to forming a complete design and simulation process of PCB.

PROTEUS design and simulation is a system with ARM7, 805 x, PIC, AVR and HC11 series single chip, \thousands of kinds of simulation model components, such as oscilloscope, logic analyzer and other totally over ten kinds of virtual instrument, there are all sorts of signal sources, ASF senior graphic simulation. PROTEUS also provides editing source program to generate the target code, debugging, and simulation environment developed with the third party. PROTEUS provides a complete virtual laboratory for application of single-chip microcomputer teaching and research and development. It is noted: since the PROTEUS simulation model is according to technical parameter file provided by the manufacturers, so the simulation is very close to reality, which makes it beyond the "virtual" and becomes the realistic teaching, research and development platform.

3.3 Teaching reform based on PROTEUS.

In class, the teacher can draw circuit principle diagram by Proteus software, and then use the keil software to input program and compile, and debug programs written for the simulation. By the teacher's operation in class, at the same time of learning theory of SCM, the students have a more clear and intuitive understanding, able to independently using simulation software after class, and write the related application program, which lets the student do it by themselves, find problems and solve problems. It improves the students' practical ability and understanding f SCM, so as to improve the efficiency of learning.

On the LABS, such as using single chip microcomputer to control DAC0809 D/A conversion, students have poor initiative and confidence and much device damage in the past, now students carry on the design and simulation respectively with PROTEUS first, each student has a very complete virtual laboratory, students are bold for circuit design, program design, debugging and modification in the PROTEUS ISIS window, not only will not damage the components and instruments, but also can see the results before installation of physical work, the student is bold, independent operation ability, initiative and creativity are played. The students install the actual circuit again on the basis of

this, the actual oscilloscope observation results are consistent with the simulation results, the success rate is very high. Therefore, PROTEUS simulation improves the student's practical single-chip system design and production capacity, the independent operation and the creation ability of students have improved significantly.

3.4 Limitations of PROTEUS simulation.

Although the single-chip microcontroller teaching reform is introduced in Proteus simulation software, obvious advantages, such as: without hardware circuit, it can have single chip microcomputer circuit of hardware and software development, testing and commissioning; Single chip microcomputer type supported is very much; Build LABS only needs to offer computer; Laboratory basically has no component loss, running cost reduced. But we must realize the software simulation has its limits, cannot only use the simulation experiment in the teaching, or students don't know the real components, otherwise will not use the actual instrument and meter, not troubleshoot and debug circuit fault. Actual product is physical development, simulation and actual still have certain differences, such as signal matching and preventing a flows through the load. So, the software simulation only can be used as auxiliary means of teaching, not only in the simulation stage.

4. Conclusion

In order to ensure the quality of course teaching, must pay equal attention to practice teaching and theories teaching, the emergence of PROTEUS simulation technology and the development is the inevitable result of the development of science and technology, introducing the PROTEUS simulation in single-chip computer courses teaching is an active exploration for the traditional single-chip computer teaching mode, it greatly simplifies the single-chip computer teaching process, improves the students' learning initiative, fits for the teaching aim of training students' engineering practice ability [3]. The rapid development of the single-chip microcomputer technology puts forward new goals and requirements to colleges and universities, only in coping with new technology, sweeping reforms to provide more professional talents for the society.

References

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