The Single-Chip Computer Application Technology Project Teaching Exploration

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ABSTRACT

MCU course plays an important role in the modern industrial control fields, it is a operational and practical very strong discipline, how to better learning this course, is the electrical class students and teachers are thinking about. In this paper, according to the characteristics of single chip microcomputer course, from the curriculum system, course content, teaching mode and assessment way to conduct research and so on are discussed, the construction of the teaching reform was proposed based on single chip microcomputer project ideas.

INTRODUCTION

SCM control technology is a product of modern industrial control development, in turn, SCM control technology and promote the development of modern industry. To meet the needs of modern industrial development, SCM control technology naturally into the university classroom. SCM course after years of development, it has become a professional electrical control various colleges and universities required course. But in the years of teaching effect, and many students are not well master microcontroller knowledge, at the time of graduation are basically back to the teacher, his own mind, leaving only a few simple concepts only. SCM teaching how to better enable students to academic specializing able to apply their knowledge, each teacher is seriously considering. Now from the course system, teaching content, teaching mode and assessment method research and so on are discussed based on the construction project of single-chip microcomputer teaching reform train of thought, for the general education peers to provide a new train of thought for reference.

One, single chip microcomputer to explore course teaching reform

(1) Perfect the course system

SCM is the compulsory course of electrical engineering, the development has
been more than 20 years, mainly through the teaching and practice, let the students master the single-chip microcomputer control technology, to improve students' professional ability in the field of electrical control. SCM is based on 51 series chips, by studying the function of each pin chip, the understanding of the principle of interface design of single chip microcomputer.

Finally realize the design of the project. This is a complete and thorough process, constitutes the complete course system. The important steps of teaching reform and single chip microcomputer project.

SCM course in content, mainly introduce the basic application of 51 single-chip microcomputer and on other related MCU simple knowledge at the same time. At the time of 51 series microcontroller is introduced, hardware is mainly introduced the function of each pin chip features simple analog circuits, chip, chip internal external clocking circuit and reset circuit, the minimum system, etc. Software programming are introduced basic commands, timer and interrupt system, and so on. And in view of the application software, with an example.

The main line, the interface design for the purpose of teaching first is an extension of the ram and ROM, make students master the division of address space. Secondly for the I/O extension, this paper introduces 82 c55 and 81 c55, etc., and introduces how to use a serial port to extend parallel I/O port. Finally introduce the man-machine dialogue interface, keyboard, display (led, LCD), BCD dial calendar, clock chip, etc.

To single-chip microcomputer application system design as the ultimate goal of curriculum, such as minimum system design, complex system design, system hardware and software debugging capabilities, with keilc51 and proteus simulation tools for the development and the "project teaching", reliability design, anti-interference design, power-fail protection and low power consumption, etc. For applied undergraduate teaching, should improve the teaching goal and the starting point, with the new development tools and simulation software, the students have the ability to "single-chip microcomputer application system design" as the ultimate goal of course.

(2) Introducing EDA technology, and constantly updating the teaching contents

In the MCU teaching, using proteus keil and on-line debugging, can bring to lab class. Assigned students extracurricular topic, students are required to use proteus simulation debugging. Using proteus for hardware design first, and then using c51 application design, can reduce cost, achieve the anytime and anywhere is in virtual laboratory and the family has a computer lab.

For the development of soc/sopc technology, can be embedded in the fpga IP soft core 51 single-chip microcomputer. The students learned the eda technology, the combination of knowledge, 51 single-chip microcomputer using fpga platform, can realize the soc system. These contents as sublimation and extension, but also can be appropriate to introduce to students.

For some of the new technology development and trend, can introduce appropriately in the classroom teaching, such as new models avr, PIC, msp430, stm32,
etc., as well as some new interface chip, some new bus such as spi, can open field of vision of students.

(3) Teaching mode should be pay attention to cultivate students' practical and innovative ability

Because this course has a strong engineering practice, to improve the students' electronic design practice ability and innovation ability, to advanced teaching ideas and teaching mode.

To cultivate applied talents requirement, give full play to students' subjective initiative, tried "decorate + subject + + students self-study of teacher summarize" mode and "project teaching" mode of teaching. Traditional teaching mode USES the following trilogy: put forward the concept of explain the concept - independent application, this kind of teaching mode focuses on the learning of knowledge. For learners focusing on the application, can be used in a new trilogy: ask questions, problem solving, inductive analysis. Teachers teach engineering cases, the cases combined with practical application, required to exploit the proteus simulation software, simulation test in four years of teaching practice, received good teaching effect.

By case teaching mode can reduce the beginners in learning difficulties. Because in this teaching mode can cultivate the students' interest, become "let me learn" into "I want to learn", so as to cultivate the students' engineering practice and innovation ability.

(4) Reform course examination way

For a long time, always put the domestic examination as the only way to measure the quality of teaching. In the form of request for the test, not only difficult to investigate students analyze and solve problems, engineering practice and innovation, such as comprehensive ability, and can make students for single chip microcomputer as long as learning by rote. Therefore, we should adopt corresponding to the teaching evaluation form.

Reform on course examination mode, which USES the assessment of the following ways: work result 50%, basic experiment, 25% eda simulation big homework, 10% attendance and homework. This assessment method can improve the students' subjective initiative and the importance of practice, improve the students' rational knowledge, help students to build applications, the concept of the engineering practice and creative ability can be improved.

Second, the MCU course construction is proposed

According to the teaching of applied undergraduate colleges, and puts forward "emphasize foundation, strengthening practice, straightening out relations, strengthen the construction of" 16-character MCU course construction train of thought.

(1) Pay attention to the foundation

Basic principle, basic concept, basic method, pay attention to the cultivation of basic skills and training. In an age of single-chip microcomputer and embedded microcontroller processor emerge in endlessly, still is an object with 51 single-chip microcomputer and assembly language teaching of the single chip microcomputer
principle, increase the content of the microcontroller C language program design. The whole process of 51 MCU teaching covers in addition to the operating system of embedded application design the basic concepts and main content of learning for the students (arm) embedded system, eda technology, DSP technology, the sope technology subsequent courses so as to obtain the necessary foundation.

(2) To strengthen practice

Establish a "classroom teaching + project design" teaching system. Against the traditional teaching mode to "classroom teaching and experimental teaching", to further improve the practice teaching class, after learning the basic knowledge, to strengthen the training of the project design topic, to strengthen the curriculum design and teaching links such as science and technology innovation activities. Let the students in practice to grasp and understand the basic knowledge and application principle of MCU, MCU learning more colorful.

(3) The straightening out relations

Straighten out the following five relations - the undergraduate course colleges and universities and the relationship between the applied university, course group of internal relations, the relationship between classroom teaching and practice teaching, the teachers' teaching and students' learning, the relationship between the theory and the relationship between professional skills training. Sort out these relations, can the heart no beside the loan to carry out the teaching reform, determined to go on the right path, the applied university avenue more walk more smoothly.

(4) Strengthen the construction

Finally, strengthen construction—double the teachers troop construction, laboratory construction, practice teaching base, practice base construction, teaching material construction, exquisite course construction and the curriculum group construction. Based on single-chip computer practice teaching reform of project teaching, is a comprehensive teaching reform, must do a good job in all aspects of security promote the teaching reform of SCM work smoothly.

CONCLUSION

Single-chip computer courses teaching reform is inevitable stage in the development of education, with the production development, the social demand for applied talents has become more and more urgent. A theory is not enough light, only on the practicalities of operating skills to social production, docking so MCU based on project teaching reform is imperative.

This thesis topic is: Based on the research results of curriculum reform "SCM Application Technology" project teaching, the number of JXJG-15-25-8.

REFERENCES