Exploration on the Research Reform of the Principle of Single Chip Computer under the Background of Excellent Planning

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Abstract

The principle and application of single chip computer is a compulsory course of electronic information major in engineering colleges and universities. Experimental teaching is an important practical link. The text faces & Quota; Excellent Engineer Program & amp; Quota; With the aim of improving students 'engineering ability and innovation ability, this paper analyzes the shortcomings of the traditional single-chip microcomputer experimental teaching mode and teaching content, and puts forward the teaching mode driven by the application system. Through setting up the experiment project, training the students 'software and hardware design ability, promoting the improvement of the experimental teaching quality. Practice shows that students 'practical ability and engineering literacy have been improved after the reform.

Keywords

Practical teaching; SCM; Excellent Engineer Program.

1. Introduction

The Ministry of Education decided to implement the "Excellent Engineer Education Plan" in 2009. On June 23, 2010, the Ministry of Education held a launch meeting of the "Outstanding Engineer Education Training Program" in Tianjin. The purpose of the plan is to train outstanding engineers. Talent, to adhere to industry, to the world, to the future. For industry, it is necessary to actively adapt to the needs of industry, serve the new industrialization development with Chinese characteristics, and serve the sustainable development of the country's economy and society. Facing the world, it is necessary to serve the "going out" strategy to provide industry with a continuous stream of engineering and technical talents with international competitiveness to open up the international market. To face the future, we must have a strategic vision and a forward-looking consciousness, and train engineers who can meet the needs of future development, adapt to and guide the direction of future engineering and technology development. In contrast with this excellent plan, the single-chip microcomputer courses in applied undergraduate colleges and universities have many incommensurate areas in education guiding ideology, teaching content, and teaching methods, and they urgently need to be properly solved.

The development and popularization of single-chip microcomputer technology has greatly promoted the development of the electronics industry. It is an indispensable technology in the modern electronics industry, and mastering single-chip microcomputer technology is a basic skill for students of electromechanical, electronic, and computer majors. At present, many colleges and universities have set up single-chip microcomputer related courses, but there is a phenomenon of imitating research-oriented universities or "following the stream" in terms of teaching content and methods, resulting in graduates having neither the academic theory of research-oriented university graduates. There is also no practical ability for graduates of higher vocational colleges.

2. Reform content

The classroom theory teaching performs an example simulation demonstration: It is mainly carried out in the laboratory room. In the theoretical teaching of the classroom, the independent unit is used as the unit. The teacher first explains the relevant knowledge points involved in the unit,. Then lead to simple practical examples, For example, after explaining the knowledge points of the input and output I/O port, list the examples "How to use the I/O port to flash a light-emitting diode" As shown in Figure 5, students are also involved in understanding the commonly used electronic components and mastering their use methods as shown in Figure 6. At the same time, Keil µ Vision, a single-chip computer simulation debugging software, and Proteus, a single-chip hardware simulation software, are combined as shown in Figure 7.The single chip circuit that lists examples can be guided and programmed. Through dynamic debugging, the phenomena and results caused by different parameters can be simulated and demonstrated, and the abstract theoretical concepts and structures can be visualized and more easily understood and mastered by students. Make students better digest and absorb the knowledge points needed for this unit.

Step 1: Introduction of simple and practical examples

Example: LED LED control

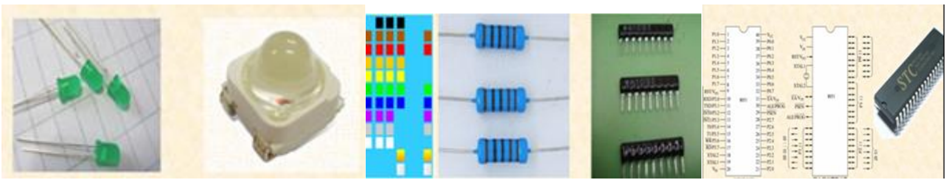
Teaching example content:

1. Light the first light emitting diode;
2. Light the first light emitting diode to flash at intervals of 1s;

After class thinking questions:

1. Light eight light emitting diodes;
2. Light eight light emitting tubes to blink at intervals of 1s;

Step 2: Guide to explain the knowledge of related microcontroller components



Basic knowledge of light emitting diodes   Current limiting resistor structure   MCS-51 monolithic

Fig. 1 Component involved in the instance

Step 3: Collaborative Simulation Demonstration

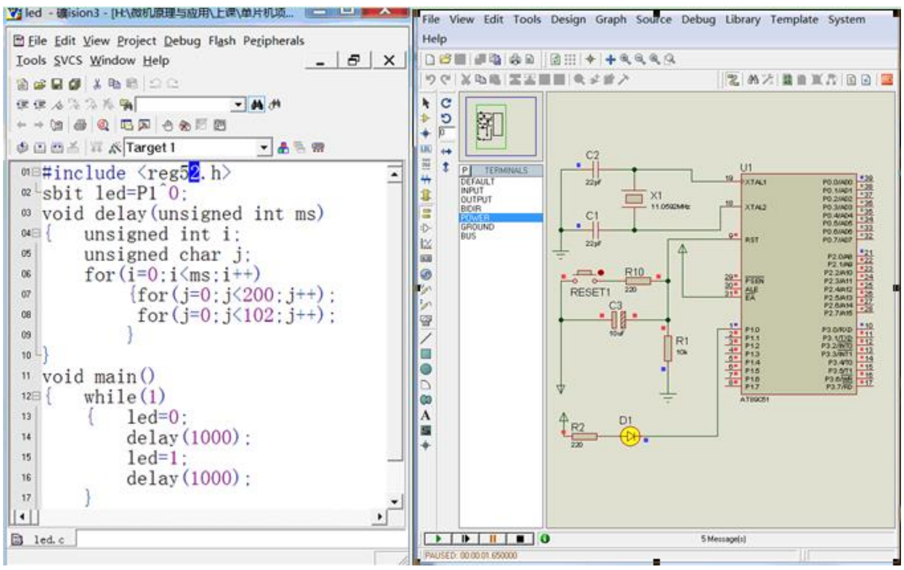


Fig. 2 Proteus Construction Virtual Hardware Circuit and Keil's C Language Programming

At the same time, further expand the examples and further propose new tasks,For example, how to light up eight LEDs, let students try to build their own circuits and debug them successfully on the basis of pre-digestion examples, and personally experience the entire process through students 'own hands, which also stimulates their interest in learning and enhances learning confidence. Change passive acceptance of knowledge into active acquisition of knowledge.

Step 4: Propose a new DIY mission

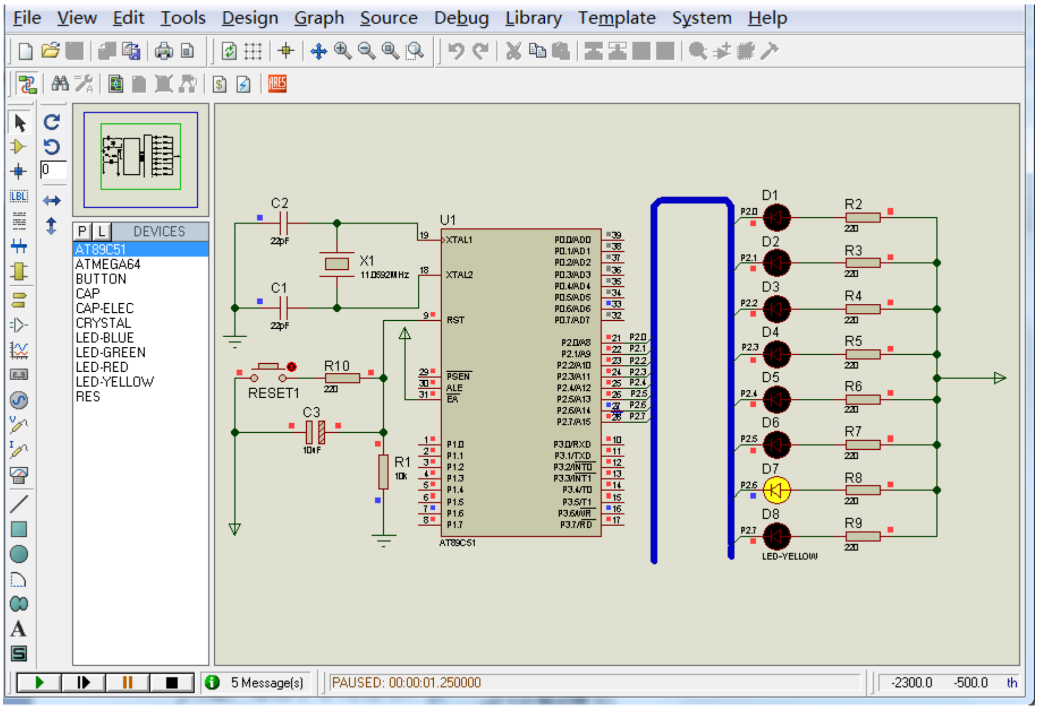


Fig. 3 New Mission Thinking Point

Practical circuit construction verification in classroom practice teaching: It is proposed to use practical examples of theoretical teaching as a unit, and some of the laboratory hardware equipment such as microchip chips, bread plates, hole panels, etc..Examples involve other peripheral electronic components, such as LEDs, resistors, buttons, capacitors, crystal vibrations, etc., which can be purchased by students themselves(to Taobao). By purchasing students, they can also understand the brand, type, and price of devices.The students can effectively exercise their own practical ability by setting up the experimental platform through the actual bread board in the classroom theory teaching. They can effectively link the theory with practice and raise the mastery of knowledge points to a new level.

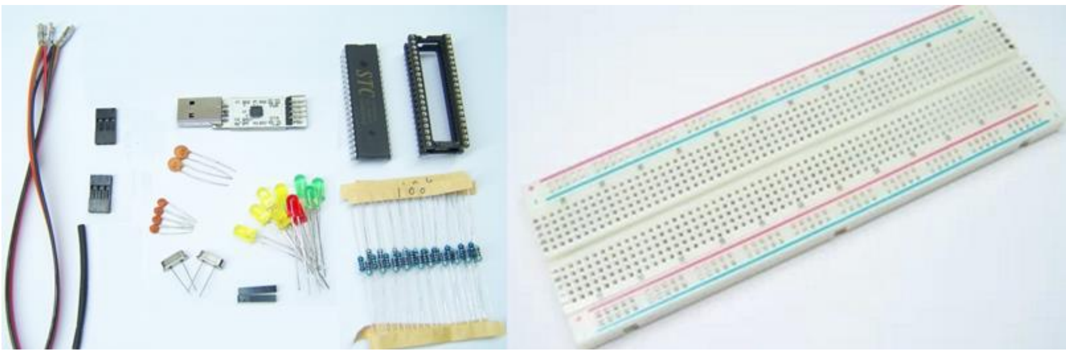


Fig. 4 Electronic components and bread boards for example

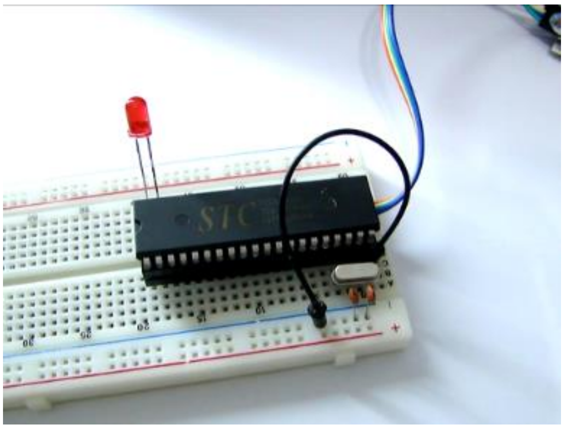


Fig. 5 Student DIY built an example circuit

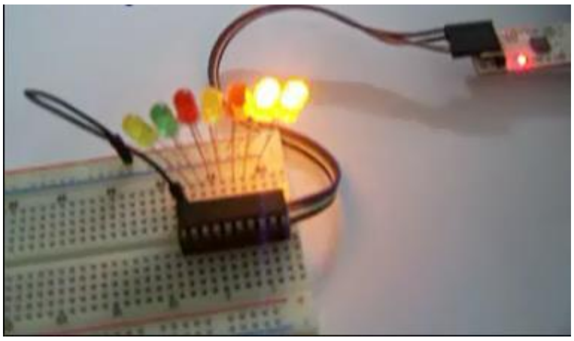


Fig. 6 Student DIY's new task thinking problem practical circuit

Integrated design link:The final chapter of the course teaching is the development of the single chip microcomputer, requiring students to complete a more systematic comprehensive design, mainly in the laboratory.The teacher divided the students into groups and designed the single-chip microcomputer at the system level.First, the teacher arranges the comprehensive design task requirements. After class, the students are allowed to select the group topics according to their own interests and the overall requirements of the task. After that, the teacher's overall control of the selection of the group and the formulation of the plan are shown in Figure 7.The integrated design environment energy efficiency effectively exercise students 'ability of comprehensive analysis and system-level single-chip microcomputer design, and comprehensively train students' practical application and hands-on ability.

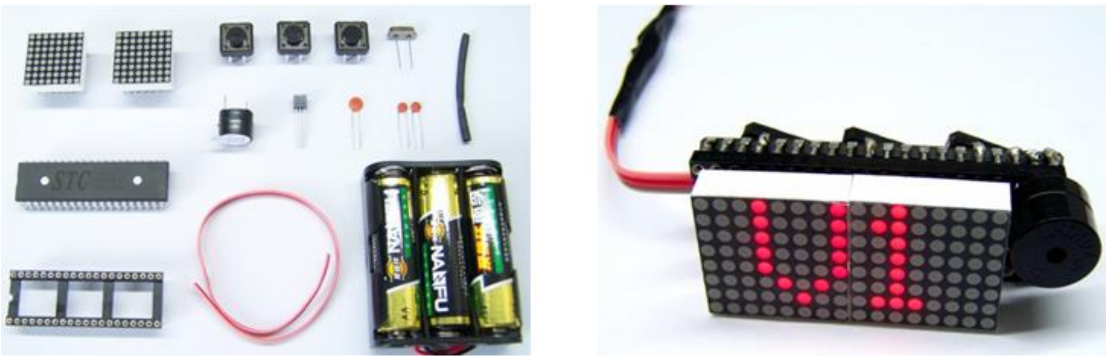


Fig. 7 Custom Personality LED Display

3. Examination methods

Focus on process:The principle of students 'assessment is to pay attention to students' operational ability, process learning, learning effectiveness, correct students 'learning attitude, and improve students' interest in learning. The method of calculating achievements is 60 % of the process assessment and 40 % of the theoretical knowledge assessment.

The basis for the process appraisal.Attendance and completion of operations; Collaboration and communication among team members; After the unit teaching is over, students complete the program design and hardware circuit construction of the example according to the teacher's requirements and submit relevant work documents.In order to evaluate the learning effect of students objectively, it is necessary to perform field scoring and demonstration defense for example, and objectively evaluate students 'actual hands, technical application ability, and language expression ability, as shown in Table 1.

Table 1 Process evaluation criteria

No.	Evaluation content	Evaluation score（%）
1	Attendance	10
2	Teamwork.	10
3	Job Document Content	20
4	Production site score	30
5	Demonstration defence	30

Theoretical knowledge assessment.The assessment of theoretical knowledge is mainly based on the knowledge points and application examples explained in the classroom. The final examination is mainly to assess the students 'knowledge, not to assess the students' ability to memorize and memorize, and to plan the content and type of questions to avoid students. Unnecessary cheating behavior. The students 'mastery of theoretical knowledge is assessed fairly through the test method, as shown in Table 2.

Table 2 Evaluation criteria for theoretical knowledge

No.	Evaluation content	Evaluation score（%）
1	Basic knowledge	30
2	Programmatic analysis capacity	30
3	Writing Programming Ability	20
4	Design hardware circuit capability	20

In view of the problems existing in the teaching of single chip computer, this project intends to make integrated teaching reform and practice for the teaching method of single chip computer teaching in the "plan of excellence".

The simulation demonstration of the classroom theory teaching in this course and the classroom practice teaching link are closely linked together, thus forming a kind of from the unit to the module, from the module to the system, from the design to the simulation, from the simulation to the experiment. From design to production, from simple to complex layers of advancement, a link of integrated practical teaching model.The practice activities will be extended from classrooms and laboratories to student dormitories, breaking through the time and space restrictions of experiments, fully mobilizing students 'enthusiasm for independent practice, and ensuring the flexibility and openness of practice content, thus effectively improving the effectiveness of students' practical learning.

4. Key issues to be addressed

①The application and cooperation of various advanced software in the teaching of monolithic theory and practice;

②The rationality and practicality of the selection of the unit examples involved in the course, the planning and configuration of the hardware experimental system for practical teaching students, and the coordination of the design with the unit knowledge point examples;

③The problem of effective coordination between monolithic theory and practical teaching.

Acknowledgments

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