

Innovation and Reform of Integrated Electronic System Design Course in Application Oriented Universities under the Background of New Engineering

Hongdi Ke^{a*}, Hong Yue^b, and Jinxia Qiao^c

Department of Technology, Jilin Business and Technology College, Changchun 130507, China

^a 13661033@qq.com; ^b 550337446@qq.com; ^c 2301038143@qq.com

* The corresponding author

Keywords: Application Oriented University; Integrated Electronic System Design; Curriculum Reform.

Abstract: In this paper under the background of new engineering applied undergraduate colleges and universities the integrated electronic system design course teaching, teaching content, introducing new communications technology in the new engineering electronic information of applied undergraduate professional put forward new requirements, new direction, put forward under the background of new engineering applied undergraduate colleges and universities integrated electronic system design course training mode innovative concept, to innovate teaching mode and teaching method of the construction and reform.

1. Introduction

In 2017, the ministry of education issued a notice on new engineering research and practice in higher education of the ministry of education (hereinafter referred to as the "notice"), which pointed out that emerging industries in the future mainly focus on artificial intelligence, intelligent manufacturing, robotics, cloud computing, etc. Personnel training of emerging industries is the training of engineering talents in colleges and universities, especially electronic information talents. The new engineering course puts forward new requirements and new directions for the electronic information majors of application-oriented undergraduate courses. It is both a challenge and an opportunity.

The training and curriculum reform of applied undergraduate electronic information engineering majors focus on the new concept, new structure, new model, new quality and new system of engineering education reform. The new direction of engineering education in universities of new engineering requires that universities and colleges must break the traditional concept, combine the future development direction of emerging industries, re-position the direction of talent training, and reform and innovate the talent training mode of engineering education.

2. Problems Faced by the Integrated Electronic System Design Course in Application Oriented Universities.

College of electronic information engineering major has carried out in order to improve the students' project practice ability and comprehensive engineering quality as the main line, training for production line of engineering practice ability outstanding electronic information professionals, actively carry out the course, professional, and discipline, laboratory and practice base construction outside integration of comprehensive teaching reform.

Integrated electronic system design course is a required course of electronic information engineering specialty, and integration of professional knowledge, before the national college student electronic competition, service robot contest, contest of Internet + subjects such as race, course of electronic product development with multiple actual project as an example, enable students to master the key technology of electronic product development and development process, and learn to write a

paper. Through the training of the integrated electronic system design course, students can directly test whether their practice and innovation ability can reach the training goal of the major.

Due to communication technology and Internet of things, artificial intelligence, cloud computing and other electronic products development and use of the way has a huge impact. First of all, electronic products are no longer independent, they all add bluetooth or wifi functions, such as: running while watching video on the treadmill, a large number of mobile phone apps applied to life, remote control of TV and so on through the APP. You can even customize electronic products according to your own needs. Secondly, the development methods of electronic products are becoming more and more diversified. Arduino is an open source electronic prototype platform that is convenient, flexible and convenient to use. For beginners, easy to master, shorten the development cycle. Many non-electronic information engineering students, such as computer, communication, machinery, network and other majors, as long as the C language to learn some concepts of hardware, can also make electronic products within a week. Raspberry pie, orange pie and other processors are widely used for their powerful functions, simple operation, easy to learn and other advantages. This makes the integrated electronic system design course content from a single 51, AVR, MSP430 some kind of single-chip microcomputer or some kind of embedded chip for the processor, the transition to the development of multiple languages across multiple processor platforms. Again, convenient and personalized demand is increasing, the students of the same function of electronic product design idea and design focus is different, some focus on small easy to carry, some people like energy saving, low voltage, the evaluation criteria for electronic products also vary from person to person, the teacher, the director of the judge tends to kill the innovation consciousness of students.

So under the background of new technology, integrated electronic system design course are in urgent need of the training mode of innovative concept, from the course construction of the innovation of the teaching mode and teaching methods, course practice, practice mode construction reform, actively explore the "task driven, project oriented, open laboratories, independent learning" on the basis of curriculum pattern and "task driven, project orientation, work-study program, university-enterprise cooperation" on the basis of practice mode.

3. The Innovation Construction of Teaching Mode and Teaching Method.

Under the background of the new engineering applied undergraduate college of electronic information engineering students practical ability and innovation ability training is not achieved overnight, need long-term, sustained, training students' ability of difficulties to solve difficult is gradually, integrated electronic system design course is just a term of three months 56 hours of classroom teaching, far cannot achieve the ability of electronic product development. It is necessary to innovate the teaching mode and teaching method of the course.

3.1 Arouse the Students' Interest in Making Individual Electronic Products Autonomous Learning, Cooperative Learning arouse the students' interest in making individual electronic products autonomous learning, cooperative learning: founded institute of science and technology association, each term innovation week activities, facing all students, in the forefront of science and technology project, some part of the forefront of the electronic product display and comprehensive curriculum design of electronic systems, electronic products and students association for science and technology development of electronic product demonstration. Students explain their works, and make the production process and method of the works into electronic instructions and video format. These resources can be obtained by scanning the qr code. Make your own. If you encounter problems, you can contact the author or the instructor directly for help. The technology is widely integrated into the learning experience, the relationship between teaching and learning is more seamless, and the activities of teaching and learning are constantly interactive between students and between teachers and students.

3.2 Guided by Discipline Competition, Coordinated Supply of Teaching Resources, Optimized Curriculum Structure, Promoted the Reform of Integrated Electronic System Design Curriculum, and Divided the Content of Integrated Electronic System Design Curriculum into Three Levels: throughout the whole university.

The first level: in the face of university junior "computer +" professional students, around the Arduino design development as the core technology of robot contest, due to the Arduino starters, extremely easy to master, open robotics laboratory provides robot and multiple teaching video recording, from the construction of the Arduino development environment, basic sensor using examples, to the simple application of robots. Students who have participated in competitions in senior years of the association provide technical guidance. This method has been tried for several years and has won many prizes in robot competitions in recent years.

The second level: in the face of middle and senior college students majoring in electronic information engineering and majoring in "computer +", the national college students electronic design competition centered on the core technology of 51 processor and STM32 design and development. Form a competition team, take the title of the competition over the years as the case, and refer to the solutions over the years. After the selection of the electronic design competition on campus, the excellent team can refer to the provincial competition.

The third level: for senior college students majoring in electronic information engineering and majoring in "computer +", focusing on raspberry pie, orange pie and other processors, the APP production of electronic products as the core content, independent research and development of personalized electronic products, and participate in the innovation and entrepreneurship competition.

3.3 Introduce Networking into Product Development for Interdisciplinary Cooperation

Integrated electronic system design involves the communication technology, sensor technology, network technology and computer software technology, embedded system technology and so on many knowledge, the current electronic products network, access network, the way is given priority to with Bluetooth and Wi-Fi, through various mobile phone APP instead of a variety of remote control, both to save hardware cost, and avoid all kinds of remote control of chaos. Computer technology and Internet of things technology and other majors cooperate with electronics to optimize the production of electronic products.

3.4 The Thinking of Personalized Production is introduced into the Classroom

The current production process has changed from a single, repeated production line mode to a large-scale, personalized, automated intelligent manufacturing mode. Society is more in need of workers' ability to innovate. The BBC quoted Osborne, an academic from Oxford University, and other data systems about "the substitutability rate of artificial intelligence for future jobs" to make career prediction: Those who can not only through standardized training talents such as phone salesman will be a large number of alternative (alternative rate up to 99.0%), "strong, with high repeatability stylized" higher mental work such as accountants also will be a large number of alternative (alternative rate 97.6%), and only those who emphasize "innovation, communication and deep thinking" work such as software developers is the possibility of alternative low (alternative rate of only 8.0%). It can be seen that the important task of current education is to cultivate innovative talents.

Under the background of new engineering, personalized education, personalized production, small, flexible, portable, energy-saving and other personalized production concepts were introduced into the classroom.

3.5 Flipped Classroom Teaching

As personalization introduced the concept of integrated electronic system design course, each student's understanding of electronic products is different, so we will be part of the classroom to the students, grouping interpretation method of implementation of the project design principle, show the project implementation process and method of use, design feature, and answered questions from

teachers and classmates. The student-led class, with teachers guiding key technologies and providing hardware support, greatly stimulates students' enthusiasm for active learning. It's also part of the assessment.

4. Practice and Training Mode of Integrated Electronic System Design Course for Application Oriented Undergraduate Students under the Background of New Engineering Design.

Integrated electronic system design course provides the process of electronic product development in the laboratory stage. Share resources with enterprises to enable students to carry out productive practice and training in real enterprise environment, and actively explore the practice and training mode based on "task-driven, project-oriented and work-study".

5. Conclusion

This article through to new engineering applied undergraduate colleges and universities against the background of the integrated electronic system design existing in the teaching process of the urgent need to adapt to the new engineering applied undergraduate puts forward new requirements, electronic and information profession of integrated electronic system design course training mode innovation, put forward the innovative concept, content of courses and reform teaching method innovation.

Acknowledgements

The research conducted in this paper has been supported by the fund of Important Foundation of Jilin Provincial Education department.

References

- [1] zhao xiaoyu tian fangming. Application of task-driven learning method in curriculum reform of new engineering automatic control principle [J]. Journal of science in normal universities. Vol.38(2018).No.10,P69-71.
- [2] Information on http://www.moe.gov.cn/s78/A08/moe_745/201702/t20170223_297122.html.
- [3] Information on http://www.moe.gov.cn/s78/A08/A08_gggs/A08_sjhj/201702/t20170223_297158.html .
- [4] Information on http://www.moe.gov.cn/s78/A08/moe_745/201704/t20170412_302427.html.
- [5] Information on http://www.moe.edu.cn/jyb_xwfb/gzdt_gzdt/moe_1485/201706/t20170610_306699.html.
- [6] Qi qiang, liu shuang. Design of "optical-electromechanical integration" challenging experimental course under the background of new engineering [J].Experimental technology and management, Vol.35(2018).No.11,P217-220.
- [7] Wang jiao. Exploration and practice of teaching mode and evaluation of mechanical design in applied colleges and universities under the background of new engineering based on OBE [J].Vol.32 (2018).No.S2,P444-447.
- [8] Wang jianan, wang Yin, sun zhiyi. Application of project-based teaching in the course of automatic control principle [J]. Educational modernization 2, Vol.1(2017).No.10,P251-252.
- [9] Xu tao yan li Yin junfeng zhou bin. Research on the development mode and path of "artificial intelligence + new engineering" from the perspective of innovation and entrepreneurship education [J]. Journal of distance education, Vol.24(2018).No.1,P80-85.

[10] Wu aihua, hou yongfeng, Yang qiubo, et al., accelerate the development and construction of new engineering and take the initiative to adapt to and lead the new economy [J]. Research on higher engineering education, Vol.1 (2017).No.1,P2-8.