

Research on the Reform of Sensors and Automatic Detection Technology Courses based on IOT Environment

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Abstract. Every modern project involved Internet of Things sensor almost inseparable from a wide variety of sensors. In the process of using information, the first step is to obtain accurate and reliable information and using sensors is the main means to obtain information in the field of nature and production. Sensor and automatic detecting technology are a professional foundation course of electrical engineering and automation specialty, it involves a wide range of fields, including optics, physics, electronics, machinery, materials disciplines, etc., and plays a leading role in the professional curriculum system. The course introduces "rain classroom" and the A+D Lab experimental instrument that capable of realizing wisdom experiment of Beijing Times Xingyun Technology Co., Ltd to conduct an experimental demonstration, letting students participate in the process of classroom teaching and self-operated experiment, through interaction with students and let students to use their own hands to operate the experiment, the students' interest and enthusiasm in class are increased, and the quality of classroom teaching is improved.

Keywords: Sensor, Internet of Things, Rain classroom, Wisdom experiment.

1. Foreword

The Internet of Things is also known as a sensor network, it is a network that realize intelligently identifies, locates, tracks, monitors, and manages that refers to through information sensing equipment such as radio frequency identification, infrared sensors, global positioning systems, laser scanners, etc., and according to the agreement connect any item to the Internet to exchange information and communication. Internet of Things is called the third wave of the development of the world information industry after computers and the Internet because it uses intelligent sense, recognition technology and ubiquitous computing, and convergence application widely existing on the Internet. IOT will be the next "important productivity" to promote the rapid development of the world, and it will be another trillion-level market after the communication network [1].

Every modern project involved in IOT sensors is almost inseparable from a wide variety of sensors. In the process of using information, the first thing to be solved is to obtain accurate and reliable information, and using sensors is the main way to obtain information in the natural and productive fields.

It can be obviously seen that the important role of sensor technology, so the teaching reform of the Sensor and Automatic Detection Technology course is of great significance. At present, in the course of "Sensor and Automatic Detection Technology", explore the use of the hybrid teaching mode combined with engineering education, and make rational use of the limited teaching resources of the current colleges and universities to achieve the teaching effect of improving students' comprehensive engineering quality. I strive to make this course a first-class course that fully integrates information technology with education and teaching.

2. The Exploration of Problem Solving Methods

2.1 Change Teaching Thinking and Improve Teaching Performance

Our current "Sensor and Automated Detection Technology" course is to explain several commonly used sensors. The content mainly includes the basic principle and structure of the sensor, the measurement circuit and the practical application, and there are 8 experiments in the process as an

example of engineering application explanation to enable students to have a deeper understanding and mastery of the course.

However, the existing experimental methods and contents are too simple. Therefore, in this curriculum reform, we focus on carrying out the research teaching concept all the way, and transfer “cramming knowledge education” to “research-based teaching mode”. In the process of teaching the course and engineering application, select the cases that are closely related to classroom teaching in the scientific research process and engineering application, and introduce the scientific research content and the latest scientific research results related to the key knowledge. Reform the teacher's single teaching style, and guide students to actively explore and master knowledge. Using multimedia database and other related resources, the case guidance, propose and guide students to conduct more in-depth research and study, and finally the students complete the self-learning content such as accessing literature and network resources, conducting class discussions, submitting summary reports or designing assignments. At the same time, I introduce the “Rain Classroom” to stimulate students' participation and interest in the classroom, improve the effectiveness of teachers' lectures, and ultimately improve students' master and application of knowledge. Moreover, the application of the company's "A+D Lab" experimental equipment, although increasing the difficulty of the experiment, but by allowing students to participate in the experimental teaching process, through the interaction with students and let students operate experiment by themselves, increased the interest and enthusiasm of students in class, Improving the quality of classroom teaching not only makes teachers more fulfilling, but also makes students more familiar with and master the specific application of sensors, and has a deeper grasp of knowledge [2].

2.2 Improve Curriculum Arrangement and Strengthen Classroom Interaction

First, introduce the video course before class. In the form of micro-video to demonstrate and explain the basic sensors application examples to students, so that students can start from reality and them stimulate them to think and learn.

Second, the classroom teaching method increases the “rain classroom”, which is a new type of wisdom teaching tool. All functions are based on PPT and WeChat, which is easy to operate. Through the intelligent terminal that connects teachers and students, the rain classroom gives a new experience to every segment of the course, and quickly and freely realizes the wisdom teaching in the era of big data. Through the rain classroom, you can achieve the following benefits.

2.2.1 In the Class, the Teacher-student Interaction Realized Innovation

Through the classroom barrage, it is easy to organize students to participate, discuss, and active class atmosphere.

Through anonymous feedback, the difficulties encountered in the learning process can be anonymously feedback to teachers to avoid students fail to master knowledge due to shyness and other reasons.

Through carry out time-limited in the classroom can collect real-time statistics on the status of students' mastery of knowledge.

Through PPT synchronization, students can focus on listening to and thinking about it, without having to take photos and copy key knowledge.

2.2.2 After Class, Mastery of the Classroom can be Easily Achieved

Teachers can push preview materials and give voice explanations at any time; built-in free teaching videos of famous school were provided, and students and teachers can learn at any time; finally, the teacher can push homework after the class. In short, after the class, it is convenient for students to realize preparation pre-lessons and review after-class, and teachers can supplement the after-school tutoring and after-school homework.

Through the course of rain classroom teaching, we can finally get the individual data report forms, so that information such as interactive homework in course teaching can be displayed through the data report forms, and the summary work can be apprehended at a glance.

2.3 Change the Experimental Method and Strengthen the Mastery Performance

According to the development of new engineering Internet and learning trends in IOT era, in order to study seamlessly connect theoretical and experimental courses at any time and place, we applied the “Lab of Electronics Intelligence” from Beijing Times Xingyun Technology Co., Ltd., which is the A+D Lab experimental instrument that can realize the wisdom experiment, and let the laboratory “follow” the students and realize student-centered. Through process-oriented and output-oriented approaches, to let Internet to “lead” the student learning process at any time.

When use intelligent experimental instruments, firstly, the teacher starts with the experimental project management, creates the teaching class and course, fills in the experimental requirements, preview and check and publish to students. Secondly, through the student entrance, students conduct experimental preparation and experimental simulation, build experiments, then obtain and edit the data, and finally sort out the experimental report and upload the experimental results through mobile phones. Then, by writing what they have learned and understood, summarize and submit the mastery status and feelings of this experiment to the teacher [3].

3. Assessment Method Supports Reform Requirements

With the change of the course teaching system, the assessment methods must be adjusted and improved accordingly. In the past, it mainly consisted of four parts: final exam, homework, attendance and experiment. The current assessment method, which combines the former teaching segments, consists of the following parts: ①The score of rain classroom platform and independent learning accounted for 30% of the total scores. The score of rain classroom platform included the students’ learning time on the network interface, discussion participation degree, information download, and homework upload and classroom online testing scores. ②The score of experimental assessment accounted for 20% of the total scores, and the confirmatory experimental assessment accounted for 10%. ③The score of final close-book examination accounted for 50% of the total scores.

In the new assessment method, the score of the examination has been adjusted from 70% to 50%. It strengthens students’ assessment of attendance, classroom attention, learning ability, the ability of accessing information, and the manual ability of engineering experiments in the process of independent learning. The proportion of design and comprehensive experiments was strengthened in the experiment evaluation. In addition, in the daily performance assessment, the evaluation mechanism of classroom notes + classroom questions + classroom interaction was introduced, which prevented students from “get some soy sauce” (be absent of mind) in the process of project completion, and realized mutual supervision among students.

4. Conclusion

Through the above-mentioned sensor and automatic detection technology course teaching reform measures and trials makes students master the basic knowledge of sensors more firmly. Students can choose the right sensor according to the development needs of IOT era, and design a reasonable circuit and meet design requirements. This point has been better reflected in the later objects production. Teachers keep pace with the times and update the teaching methods in time. Seamless integration is realized in the site using of sensors, which improves students’ practical engineering application ability.

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References

- [1]. Mo li, J, 2016. Teaching Reform of Sensor and Automatic Detection Technology Course. China Modern Education Equipmen.
- [2]. Nie Ling, J., 2019. Sensor and automatic detecting technology Discussion on Teaching Reform. Think Tank Era.
- [3]. Rain classroom & Lab of Electronics Intelligence manual.