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# Applying Intelligent Transportation on Practice Teaching Reform for IOT Course

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***Abstract*—With the rapidly development of Internet of things technology, The practice teaching reform has been paid more and more attention for the courses of Internet of things. It has been become the focus that how to combine the Internet of things technology and practical application to establish practical teaching for undergraduate courses for the Internet of things specialize. This paper advise applying the practical application of intelligent transportation in the course of "Design and Application for Internet of Things" and proposed the "IOT + City Traffic" for the practice teaching. This will give a new idea for the practice teaching reform of Internet of things**

***Keywords-Internet of Things; Intelligent Transportation; Teaching Practice Reform***

## I. INTRODUCTION

At present, the major of Internet of things Undergraduate Practice Teaching in most colleges and universities is based on the experiment box for Internet of things engineering. This application is very useful for the simple professional basic course, but when it is used in the experimental teaching for junior professional courses, it is too limited and boring and it cannot help students to understand and grasp and think about some of the more creative high level application content. At present, in the IOT applications, the city traffic environment is the most closely things to the students, and many schools have been set up the intelligent transportation sandbox system to help students to understand and presentation. But there still has not been a mature and systematic practice teaching content. In this paper, combined with the "Internet of things system design and application" course, it studies the application of Internet of things practice teaching. Put forward the intelligent transportation system into the practice teaching of this course. Make students a thorough understanding of things related professional knowledge how to combine with the actual situation, produce a wide range of applications, so it is a very important significance for the IOT course to help students to understand the practical application of IOT.

## II. PRACTICAL TEACHING REFORM

With the progress of electronic information technology and the rapid development of global industrialization, the third revolution of information technology, such as Internet of things, will bring great changes to people's life. And the lack of talents in the Internet of things engineering technology is becoming increasingly prominent [1]. To this end, the state in March 28, 2011 approved the second batch of 27 colleges and universities Internet of things professional, the 33 colleges and universities expanded to 62 colleges and universities to open the Internet of things professional [2]. Facing the urgent situation, how to combine the actual situation of College Students' learning and cognitive law, change the past " the degree of survival" mode to "the ability to survive"[3]. In this moment, it is the emergent things that cultivate talents to adapt to the IOT technology of market demand in the aspect of the professional teaching reform and development of education.

It is known that IOT technology is a cross discipline. It is the integration of many disciplines, including not only the computer science and technology, but also the information and communication engineering, microelectronics, automation, and also relates to the detection instrument science and technology and other related professional subjects[4]. It is covered so many ranges that the things related to the Internet all can be incorporated into the object of the Internet of things industry. Application is not only related to all aspects of daily life, but also involves all aspects of the country's political, economic, military. It is a wide range that other disciplines and professions can not be compared.

In order to adapt to the development of the times, more and more colleges and universities have set up professional courses related to IOT. better design students and related social recognition network specialized courses and practice, How to design IOT professional teaching content and teaching syllabus and the related experimental design and practice for the industry background and different

application fields, which is innovating and can be recognized by the students and sociality ,will face a huge challenge.

Taking the practice teaching of "Design and Application for Internet Of Things System" as an example, this paper proposed a new method of combining Intelligent Transportation sand table system into horizontal and vertical division, which is applied to the practice teaching of the course. The horizontal division is decomposed into some different functional parts according to the system function and the vertical division is decomposed by the IOT three layers model which is application layer, network layer and sensor layer. That is making the practice teaching in different ways so as to the students grasp and master the varieties of system design methods on the IOT basis teaching theory. Figure 1 presents this way.

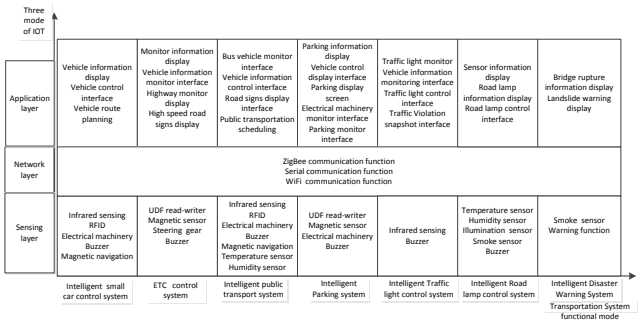


Figure 1. Vertical and horizontal combination mode

## III. THE PRACTICAL TEACHING MODE OF VERTICAL AND HORIZONTAL

The course of "Internet of things system design and application" is taught for the students grade three in the spring semester. It is a professional course, a total of 48 hours, 3 credits. Among them, the theoretical teaching content accounted for 32 hours, and the practice teaching content accounted for 16 hours. According to the professional courses of Internet of things, combined with the main technical characteristics of "intelligent transportation system", the practice teaching content of this course can be divided into two modes of horizontal and vertical practice teaching.

### *A. Transverse Division Model*

The practice teaching model of horizontal division mentioned in this paper is to divide the Intelligent Transportation sand table system into different systems according to the system function, as shown in figure 2. The system includes seven parts, intelligent parking control system, intelligent ETC control system, intelligent public transportation system, intelligent road lamp and traffic light control system, intelligent disaster warning system, Internet of things gateway system. The intelligent parking system includes intelligent vehicle UHF identification system, steering gear control system, billing control system, screen display system, parking guidance system and intelligent vehicle related control system. Intelligent ETC system includes intelligent vehicle UHF identification system, steering gear control system, billing control system, and screen display system. Intelligent bus system includes bus stop sign real-time display system, bus dispatching system, bus monitoring system and road screen warning system. Intelligent street lamp and traffic light system include street lamp control system, traffic flow control system, red and green signal control system, traffic violation snapshot system, bus priority control system. The intelligent vehicle control system includes path planning system, collision detection system, automatic tracing system and information reporting system. The gateway system includes real-time monitoring system, disaster warning system and communication control system.

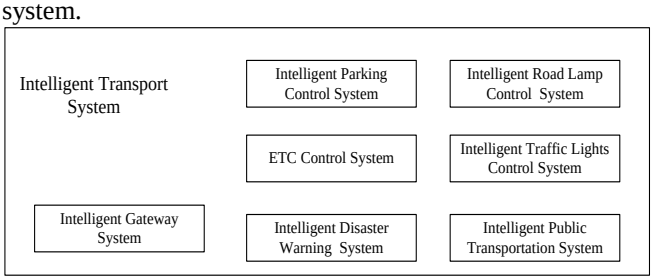


Figure 2. The seven function of intelligent transportation system

The intelligent car owned by our hospital is composed of STM32 chip, motor driver chip, infrared control, ZigBee chip and RFID read-write chip. The software development system is Keil software, as shown in figure 3.

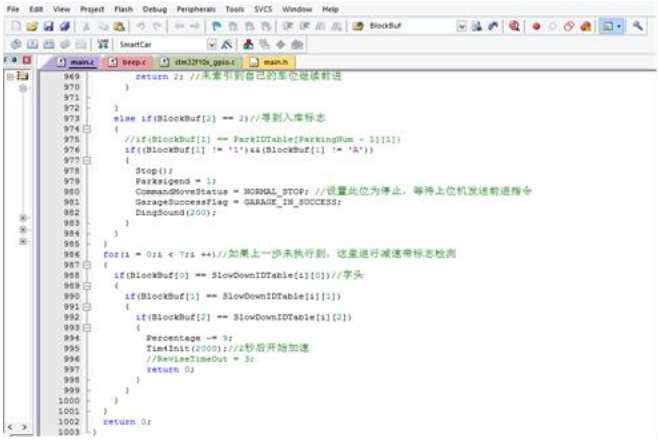

Figure 3. Keil software development system

Each of these systems is so large that the students can not be able to complete all parts of each system in the limited time. we can tell the students to find out his or her interesting things about the design and implementation of the software code corresponding to the experiment in the sand table.

### *B. Vertical Decomposition Model*

Vertical Decomposition Model is according to the IOT application layer, network layer, sensing layer three layer model as an example to set up practice teaching design and application of IOT technology. This can help the students to

understand the application of IOT technology. First of all, the Intelligent Transportation sand table system is subdivided into three parts. The first part mainly aims at the level of perception, the access method in the sandbox of each sensor node and the camera and RFID card reader, write cards, identification card as a method of teaching content, make students have the first-hand about the IOT first layer. The second part is the network communication layer. Through the development of ZigBee, Wifi network communication, master-slave, broadcast and other networking mode, students feel the wireless sensor network communication mode and practical application scheme. The third part is application layer. Through the interface development of the gateway or the upper computer to obtain information, students can understand how to customize the application requirements related to the user's needs. According to different application systems to develop different application interfaces, the data transmitted from the network layer is classified, and the data of different application requirements are displayed to the users. In the whole operation process, students can feel the writing method of each layer interface and the breakthrough of the key technology of related parts. The breakthrough of some key technologies embodies the creativity of students to a great extent. Because the colleges and universities have built the simulation experiment model of the intelligent transportation system using sand table, which can let the students do the relevant experiment content. Therefore, the "intelligent transportation system" as an example, the open practice teaching is not only feasible, but also make students network technology produced more and more interested in things, the more impressive, more easy to understand and master the application of networking technology in practical life.

## IV. REFORM OF ASSESSMENT METHOD FOR "INTELLIGENT TRANSPORTATION SYSTEM" PRACTICE COURSE

The traditional practice assessment method is usually submitted by the form of large assignments, according to the files that students submitted, teachers will give the score as the only marker. As the innovative practice teaching mode, in order to effectively organize students to participate in, the practice of assessment methods increases students as the marker involved in the assessment of teaching practice. The specific way is as follows: practice teaching is completed by team, each group of 3-4 students, each group selected one student as group leader. In the final completion of the practice teaching, we need to submit PPT lecture notes and demonstrate on the spot, and introduce the completion of this group. Each group according to the subject requirements and scoring standards on the spot to other groups score, the teacher also gives each group scores. Finally, according to the principle of getting rid of the highest score and minimum score, it is the final score of the practice course examination. Practice scores accounted for 30% of the final total score.

## V. CONCLUSIONS

With the widely application of IOT technology in various fields, this paper introduces how to practice intelligent traffic into professional IOT courses. It is making the intelligent traffic sand table as the center and exploring the new practical teaching professional IOT curriculum. The practical teaching mode of "Internet of things + Intelligent Transportation System" oriented to specific field application is designed, which increases the intuitive experimental teaching and practical teaching links. At the same time it can improve the students' practical ability step by step, stimulate students' interest, enrich the experiment, improve students' comprehensive application ability of Internet of things technology. Through the teaching practice, not only make the student know about IOT technology application in the intelligent transportation system, but also cultivate the ability of independent innovation and analyze and solve practical problems in the application of IOT technology. This method has been carried out in the third year undergraduate students majoring in IOT in China, and good results have been achieved.

## ACKNOWLEDGMENT

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