

# Research on Intelligent transportation system course reform about vehicles related major

Wei Dan\*, Luo Yiping, Ren Hongjuan, Ma Qihua

Shanghai University of Engineering Science, Shanghai, 201620, China

## Abstract

*In this paper, according to the discipline characteristic of the course of intelligent transportation system, we discussed on the problems existing in the teaching of vehicles related majors. The reform methods of the course is discussed in two aspects of teaching content and teaching method. Points out that the teaching content should be closer to the vehicles related majors; Teaching methods focus on interactive teaching, and cases should be throughout the classroom teaching; The classroom teaching and extracurricular learning should be combined, and practical teaching should be strengthen. We need to mobilize students' enthusiasm and creativity, in improving the efficiency of teaching and strengthen students' research interest in intelligent transportation system.*

**Key words:** intelligent transportation system, vehicles related majors, teaching content, teaching method

## 1. Introduction

The course of intelligent transportation system is an interdisciplinary course, involving sensor, communication, computer, control and other disciplines[1]. At present, the development of automobiles is divided into three major development directions: lightweight, electrification and intelligence. Intelligent vehicle technology is one of the most important components of intelligent transportation system. According to the training objectives of the vehicle engineering, automobile service engineering and graduation requirements for students, the training can be based on scientific principles and scientific methods to study complex problems which including designing experiments, analyzing and interpreting data, and obtaining reasonable effective conclusion the automobile technology service the manufacture and so on work engineering application talented person request through the information synthesis. This course is of great significance to the achievement of students' training objectives and graduation requirements[2].

To be engaged in the work of intelligent transportation system needs to know more than one professional knowledge who is a compound professional talent. Many colleges and universities in China , have set up the course of intelligent transportation system for students majoring in transportation, vehicle engineering and other professional and junior college. Some colleges and universities even set up specialized courses to learn knowledge and technology related to intelligent transportation system, which plays a positive role in cultivating inter-disciplinary senior talents related to intelligent transportation system that are urgently needed by the society. The teaching contents of domestic universities that offer courses on intelligent transportation system are basically the same. Different universities have different teaching focuses according to their own situations. For example, tongji university's course on intelligent transportation system emphasizes on traffic intelligence, while wuhan university of technology's course on intelligent transportation system emphasizes on automobile intelligence[3,4]. At present, there are two main problems in the teaching contents and methods of the course of intelligent transportation system:

① **The content is broad and archaic.** The main content of the course of intelligent transportation system includes the concept, origin, development history, system framework, basic theory, key technologies, and the structure framework, working principle and basic functions of the representative service subsystem of intelligent transportation system. It involves many disciplines and covers a wide range of contents, involving various aspects of the field of transportation, without focusing on vehicle majors. In terms of teaching content, students majoring in automobile should pay more attention to the study of automobile intelligent technology, such as the content of vehicle auxiliary safety system, automatic driving system, etc., which is also the important technical support for the major of vehicle engineering. Therefore, combined with the discipline of the college of automotive engineering, the advanced vehicle information system (avis) in the course of intelligent transportation system (its) is deeply excavated. On the basis of the traditional course content of intelligent transportation, the course construction of relevant content of intelligent vehicle is added[5].

② **The teaching method is simple and old-fashioned.** The teaching is mainly based on systematic teaching by teachers, that is, teachers prepare lessons in advance, make courseware, and mainly use PPT to explain in class. Teachers can transfer abundant knowledge of intelligent transportation system to students in a relatively short period of time. The main problem is that the teaching methods are old-fashioned, which cannot mobilize students' learning enthusiasm. Therefore, attention should be paid to interactive teaching and cases should be added to classroom teaching. Combining classroom teaching with extracurricular learning, we should strengthen practical teaching to arouse students' learning enthusiasm[6].

### Reform of course content

The traditional course of *Intelligent transportation system* mainly introduces integrated traffic control system, advanced vehicle information system, vehicle operation control system, dynamic route guidance system, public transportation priority system, environmental protection management system and other aspects.

Combining the expertise of automotive disciplines, this paper deeply excavates the automobile intelligent technology in the advanced vehicle information system in the course of intelligent transportation system, on the basis of the content of traditional intelligent transportation course, it adds relevant content such as the safe driving of automobile and the intelligent technology of automobile. Communication technology, network technology and database technology in the course are basic courses in the computer course, so they are self-study contents after the reform. The chapters in the original course that are not required to meet the graduation requirements of vehicle engineering students are also self-study parts in the new course.

Table 1. Comparison between the original content of the course of intelligent transportation system and the teaching content after the reform.

Chapters	Original course content	Latest course content
Chapter 1	Overview of intelligent transportation systems	Overview of intelligent transportation systems
Chapter 2	The framework system of intelligent transportation system	Traffic information collection and processing technology
Chapter 3	Traffic information collection and processing technology	Intelligent transportation system integrated platform

Chapter 4	Communication technology	Traffic information service system
Chapter 5	Network technology	Urban intelligent traffic management system
Chapter 6	Intelligent transportation system integrated platform	Urban traffic signal control system
Chapter 7	Technology database and its application in intelligent transportation system	Traffic demand management system
Chapter 8	Traffic information service system	Advanced urban public transport system
Chapter 9	Urban intelligent traffic management system	Vehicle auxiliary control and automatic vehicle driving system
Chapter 10	Urban traffic signal control system	Intelligent visual sense of vehicle safety driving technology
Chapter 11	Traffic demand management system	Intelligent monitoring technology for dangerous driving
Chapter 12	Advanced urban public transport system	Intelligent monitoring technology of automobile power and transmission system
Chapter 13	Vehicle auxiliary control and automatic vehicle driving system	Intelligent assistant technology of automobile (intelligent control technology of lamp, door and wiper)
Chapter 14	Electronic billing system	Auto position response technology
Chapter 15	Emergency management system	Electronic billing system
Chapter 16	Road facilities management system	Emergency management system

Through the study of this course, students will have an overall understanding of the new technology and new knowledge of intelligent transportation system, have an in-depth understanding of automobile intelligent technology, and master some principles of automobile intelligent technology. In the future work, it is our duty to realize the modern automobile intelligentization, improve the operational efficiency of the transportation system, reduce traffic accidents and reduce environmental pollution, and find a place to use in the future development of intelligent transportation and the development of intelligent automobile technology.

## 2. Reform of teaching methods

### 3.1 *Emphasis on interactive teaching, cases throughout the whole classroom teaching*

The classroom teaching needs to activate the classroom atmosphere and the teaching process needs to

guide the student's thought, The discussion and interactive teaching methods are used to stimulate the enthusiasm and enthusiasm of students to listen to the class, causes the student not only to take the ear and the eye to come to class, moreover importantly is to take the brain to come to class. Before learning theoretical knowledge , it introduces a practical case , proposes relevant thinking questions , then explains theoretical knowledge , and then solves previous thinking questions by mastering theoretical knowledge , which will stimulate students ' interest in learning through cases . When explaining boring theoretical problems , cases can be introduced to enhance the understanding of boring theoretical knowledge , improve the classroom atmosphere , and strengthen the interaction between teachers and students . The main purpose of interactive teaching method is to activate classroom teaching , make teaching and learning combine and permeate each other , teachers and students inspire and promote each other , and finally achieve the goal of students ' independent learning . The key to implement such a teaching method is that teachers need to carefully design some problems that can stimulate and guide students ' thinking . In classroom teaching , students should be given a certain amount of thinking space to analyze and solve problems .

### ***3.2 Combine classroom teaching with extracurricular learning to strengthen practical teaching***

The goal of university teaching is to encourage students to “study in learning and learn in research” so that students are not satisfied with the knowledge in books, and further research and mastering what is not in books. Therefore, teachers should provide students with documents based on the content of the course and slightly higher than the teaching content of the course or access to the literature in the process of teaching. In order to broaden the horizons of students, not only meet the needs of students at different levels, but also cultivate Students' ability to collect and organize research materials and the ability to read literature. Strengthen practical teaching, for example, it can carry out group development of intelligent transportation system related projects. The plan is to combine the Freescale Smart Car Competition and the Intelligent Transportation Technology Competition. According to the requirements of the competition, the students are guided to conduct practical operations in groups and guide each group to complete one. The intelligent transportation design project enables students to not only learn a wealth of theoretical knowledge, but also have the ability to practice. At the same time, we have established friendly cooperative relations with excellent enterprises in the intelligent transportation industry. We can obtain examples of the actual work of enterprises in teaching, and establish a business-study relationship with the enterprises for the juniors and seniors who study this course. To enable students to gain practical knowledge in internships or cooperation with intelligent transportation companies.

## **3. Conclusion**

The Intelligent Transportation System course is a multidisciplinary cross-curricular course. There are many problems in teaching, such as wide and old teaching methods, single teaching methods and old-fashioned methods. This paper explores the reform methods of the course in terms of teaching content and teaching methods. In terms of teaching content, vehicle subject expertise, in-depth mining of intelligent vehicle technology in advanced vehicle information systems in intelligent transportation system courses, in traditional intelligent transportation courses On the basis of content, we will increase the safety of car

driving, automotive intelligent technology and other related content. In the teaching method, the author puts emphasis on interactive teaching, so that the case runs through the whole classroom teaching; the combination of classroom teaching and extracurricular learning, strengthens practical teaching, allows students to actively participate in the course, cultivate students' interest in the course, and achieve the course assessment. Process, cultivate students' ability to analyze problems and solve problems in academic research, students can truly understand intelligent transportation, in order to achieve the expected teaching effect.

## Acknowledgement

Supported by the course construction project of *Intelligent Transportation System* of Shanghai University of Engineering and Technology (No.: k201706002).

## References

- [1] Cai Yingfeng, Wang Hai, Chen Xiaobo, "Reform and Thinking on the Teaching of "Intelligent Transportation System" Course", The Science Education Article Cultures, 2015 (17), pp.58-59.
- [2] WANG Xiao-yuan, GE Wen-qing, LIU Li-ping, YU Cui-cui, ZHAO Jin-bao, "Research on Teaching Reform of the Intelligent Transportation Systems Course", Education Modernization, 2016, (09), pp.14-16.
- [3] E Wenjuan, XIAO Weizhou, WU Ge, WANG Zhiqiang, "Discussion on the Teaching Reform of Intelligent Transportation System", The Guide of Science & Education, 2017, 03, pp. 123-124.
- [4] Xie, Kang, "On the concept of information technology based on course reform", 2011 International Conference on Electrical and Control Engineering, 2011, pp. 6675-6677.
- [5] He Chao, Li Jia Qiang, Wang Yan Yan, "A new approach to teaching undergraduate course vehicle emissions and their control", Applied Mechanics and Materials, 2013, 256-259, pp. 2999-3002.
- [6] Conklin Joana, Englisher Larry, Shammout Khaled, "Transit customer response to intelligent transportation system technologies: Survey of Northern Virginia transit riders", Transportation Research Record, 2004, 1887, pp. 172-182.