

# Research on the Training Mode of Application-oriented Talents of IOT Engineering under the Mode of Integration of Industry and Education

## --Taking Hezhou College as an Example

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### Abstract

Relying on school-enterprise cooperation, Huasheng Jing Shi-Intelligent Learning Workshop and ZTE ICT Industry and Education Integration Innovation and Entrepreneurship Base, we will explore and study the professional teaching practice mechanism of the Internet of Things engineering. Adhering to the "solid foundation, broad caliber, strong ability, heavy innovation" of talent training target positioning, Extensive cooperation with ZTE Corporation, According to the "Eight Common, the Trinity" requirements, In-depth professional construction, talent training and curriculum implementation; Guided by developing outstanding engineers, Participate in college students' electronic design and innovative training and actual combat, Actively build comprehensive, design, and research projects, Implementing open sharing, Improve the professional application and innovation ability of college students; Take the new engineering construction as an opportunity, Pay attention to the comprehensive coordination and system design of the concept innovation, system construction, industry, university, research and platform construction, We will promote the development of the local and regional Internet of Things technology industries.

### Keywords

Internet of Things engineering; Applied talents; Integration of industry and education; Teaching reform.

## 1. Introduction

With the advent of Internet of Things technology wave, the overall scale of IoT industry is constantly expanding, and the technological innovation brings the demand for talents. In the future, the Internet of Things industry will be a platform for active talents, and the Internet of Things industry needs the entrepreneurial talent with innovative consciousness and practical ability [1].

The talent training mode of integration of industry and education refers to the education mode of training professionals who not only master basic theoretical knowledge, but also have strong practical skills according to the cooperation of industry, university, research, scientific and technological development situation and educational skills [2-4]. The integration of industry and education is an important way for local colleges to improve the teaching quality and the level of students' practice and application [5]. In order to implement the Outline of the National Medium-and Long-Term Education Reform and Development Plan (2010-2020), Accelerate the construction process of building a modern vocational education system, Promote the transformation and development of local universities [6], In 2015, The Ministry of Education, the National Development and Reform Commission and the Ministry of Finance jointly issued the Guiding Opinions on Guiding the Transformation of Some Local Undergraduate Universities

to Application, It clearly puts forward the decision and deployment of local ordinary undergraduate universities to application, "The relevant universities should truly turn the idea of running schools to serving the local economic and social development, Transfer to school and enterprise cooperation in the integration of industry and education, Go to cultivating applied technical and skilled talents. " Under the guidance of this policy, the local colleges and universities began to transform and develop [7-8].

In recent years, although universities and academic organizations at home and abroad are actively exploring the reform of engineering professional training mode, the influence of the professional teaching system, and good practice innovation ability, leading to the increasing demand for information technology talents, and a large number of information graduates cannot find the right job contradiction between supply and demand, reflecting the problems in information professional training. Under the premise of school-enterprise cooperation, build the school-enterprise cooperation Internet of Things engineering professional practice teaching cultivation mechanism, fully integrate online and offline learning, oriented by market demand, adhere to the concept of "learning as centered", into enterprise elements, relying on ZTE ICT teaching platform and innovation and entrepreneurship base, build a "school-enterprise combination" double-teacher team, promote the construction of online open courses, improve the Internet of Things engineering professional applied talent training quality.

## 2. Internet of Things Engineering Talent Training Objectives

Internet of Things engineering professional applied talents training is mainly based on the Internet of Things professional foundation and application ability, to adapt to the needs of the Internet of things and Guangxi industry development, master sensors, RFID, sensor network, M2M, software and system integration, information services, information security technology, with certain Internet of Things system management and service ability, Internet of Things comprehensive application ability, can qualified for smart grid, intelligent transportation, smart city, intelligent agriculture and other fields of excellent applied talents.

Adhere to the "student center, output orientation, continuous improvement" school philosophy, adhering to the "solid foundation, wide caliber, strong ability, heavy innovation" talent training target, cultivate morality, intelligence, body, beauty, labor development, with mathematics and natural science, Internet of Things technology, computer technology, communication technology and other basic theory, basic knowledge, basic skills, with good humanistic quality, strong practical ability and innovative spirit, can in the field of Internet of Things from Internet application system design, development and maintenance of high-quality applied talents.

## 3. Current Situation of Talent Training of Internet of Things Engineering

In recent years, colleges and abroad have actively explored and practiced in the talent training of IOT engineering. Due to the influence of single teaching hierarchy, lack of teaching platform and resources, and disconnection between teaching methods and society, they pay more attention to the accumulation of theoretical knowledge, and innovation, the talent output quality can not meet the development needs of the industry. The Internet of Things major is a typical comprehensive discipline major, involving multiple disciplines and technologies, and a huge knowledge system. How to reasonably choose courses and cultivate applied talents with innovative and entrepreneurial ability is a problem that is constantly updated with the development of the industry.

At present, the main problems existing in the training of Internet of Things engineering professionals include:

### **3.1. The Curriculum System Is Unreasonable**

The Internet of Things is a multidisciplinary major. The professional courses of Internet of Things engineering offered by most universities are only the superposition of the core courses of relevant majors. The courses are not closely connected, and the courses can not well support the technical needs of the development of the industry.

### **3.2. The Curriculum Teaching Mode Is Too Single**

The teaching mode with knowledge points as the core leads to the lack of effective connection between various courses, disconnection theory and practical engineering application, making it difficult for students to connect the courses they have learned and form an organic whole; Focusing on cultivating students' technical ability of the Internet of Things, ignoring the guidance of engineering cases, leading to the fragmentation of students' understanding of the Internet of Things industry, and the lack of multi-dimensional thinking.

### **3.3. The Teacher Structure Is Unreasonable**

At present, there are undergraduate graduates and master's students in Internet of Things, but few; most of the Internet of T engineering teachers in universities are computer, electronics, communication and automation, due to the limitation of professional background, teachers can not fully master the theoretical knowledge of Internet of T major, the most prominent thing is the serious lack of practical experience in the Internet of Things.

### **3.4. The Practical Teaching Is Not Perfect.**

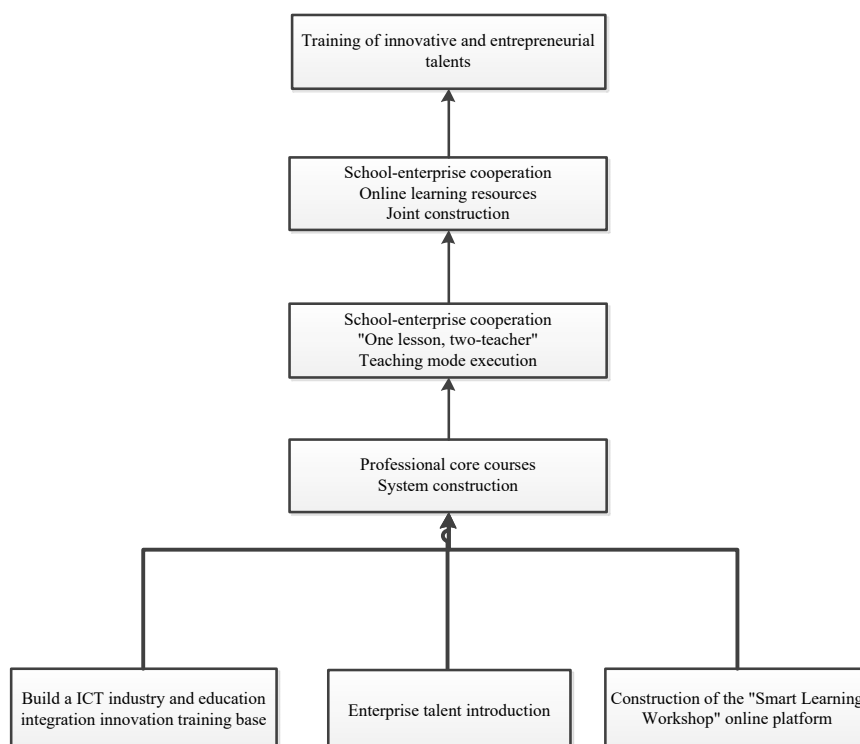
The traditional Internet of Things courses lack engineering practical links. Although there are cases of Internet of Things engineering in the textbook, they lack of actual engineering training and guidance, which leads to the lack of students' engineering application ability and innovation and creative ability.

## **4. Training Mechanism for Application-oriented Talents in the Internet of Things Engineering Major**

The application-oriented talent training mode is ability-centered, and the goal is to cultivate technical applied professionals. Application-oriented (technical) computer professionals have obvious engineering talents, and their training should follow the pace of international development of engineering education. The training of engineering education and applied technical talents requires all colleges and universities to have their own characteristics, and they must confirm the professional talent training plan and curriculum system according to the characteristics and training orientation of their own colleges and universities.

Relying on the "industry integration, school and enterprise cooperation" mode to break the traditional school as a closed, single teaching subject, industry talent training, establish an enterprise and university equal communication, docking channels, based on the regional economic characteristics, enterprise demand oriented professional curriculum system construction, pay attention to the cultivation of application and innovative technical personnel, build to "school subject, government led, industry guidance, enterprise participation, industry and education integration" new system. Among them, it is the premise to build the integration of industry and education, the construction of professional core curriculum system is the core, the "double-teacher" teacher team combining integration and construction is the key, and the online information teaching resources sharing through cross-curriculum link and big data analysis and application construction platform is the focus. At the same time, students are targeted organized to participate in various relevant competitions to promote learning through competition, comprehensively improve students' innovation and entrepreneurship ability,

deepen the connection between schools and enterprises, stimulate the improvement of learning, industry-university-research ability, and promote regional economic development. Under the background of industry and education integration, relying on the school-enterprise cooperation platform-ZTE ICT industry and education integration base and Huasheng's on-line course platform, integrate the teacher team structure with school-enterprise resources, promote the construction of online courses, and build a talent training mechanism with industry-university-research characteristics. The talent training mechanism of the Internet of Things is shown in Figure 1.

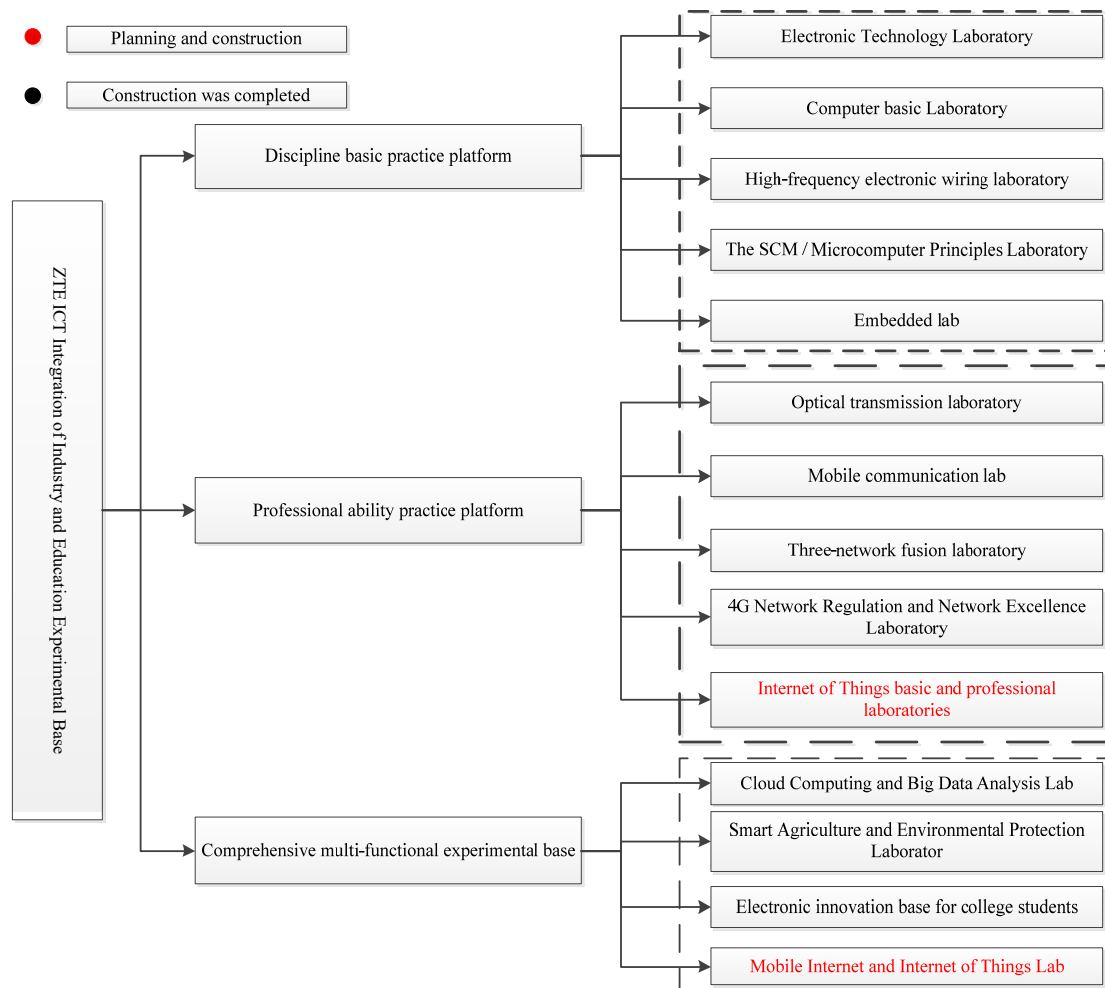


**Figure 1.** Application-oriented talent training mode of the Internet of Things

#### 4.1. Build ICT Multi-functional Experimental Base for ICT Integration of Industry and Education

In order to cultivate advanced application-oriented engineering wide-caliber technical talents with remarkable engineering practice ability, we will use school-enterprise cooperation resources to build a high-standard professional laboratory integrating "experience, experiment, operation and maintenance, innovation and entrepreneurship", and serve the Internet of Things engineering and other majors.

In accordance with the construction target positioning and the requirements of knowledge, ability and quality, and fully considering the principle of the combination of old and new, a technical system covering the physical layer, network layer and application layer is constructed on the basis of the existing school-enterprise cooperation platform. According to the training goal of application-oriented technical and skilled talents, with senior enterprise engineers as the lead, the focus is on the construction of cloud computing and big data analysis platform, mobile Internet and Internet of Things laboratories. The framework of ICT industry and education integration innovation base serving the Internet of Things major is shown in Figure 2.

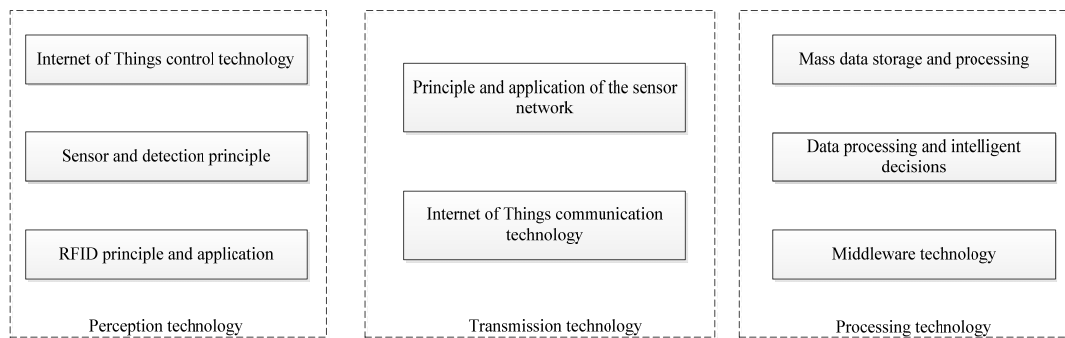


**Figure 2.** ICT industry and education integration innovation experimental base

### 4.2. Core Core of Professional Curriculum System Construction

The curriculum of Internet of Things engineering major needs to take into account the characteristics of relevant cross-majors, pay attention to the cross-integration of the curriculum system, and highlight the characteristics of Internet of Things engineering major. The establishment of the curriculum system should horizontally extend the cultivation of the basic and core capabilities of the professional knowledge of the Internet of Things engineering. According to the training objectives and positioning, the professional curriculum system of the Internet of Things is determined to pay attention to the cultivation of students' application and innovation ability with professional characteristics.

The curriculum of the core module of IOT engineering major should cover three levels of IOT technology. The main courses involved in the Internet of Things perception layer include sensor and detection technology, RFID principle and application, and IOT control technology, the Internet of Things communication technology, wireless sensing network, etc.; the main technologies involved in the Internet of Things application layer include big data and cloud computing and various development technologies based on Web or mobile end. The setting of the professional core courses is shown in Figure 3. Through the study of these three levels of related courses, students not only have a comprehensive understanding of the Internet of Things, but also can master the corresponding technologies at all levels to lay a good foundation for the work from the related fields of the Internet of Things.



**Figure 3.** Core curriculum in the Internet of Things Engineering major

### 4.3. Implement the Teaching Mode of "One Lesson and Two Teachers" in School-Enterprise Cooperation

College teachers have high professional level, rich theoretical knowledge, but weak knowledge application ability and low practical operation level, while enterprise engineers have rich experience in engineering projects and strong practical ability. Relying on the mode of "integration of industry and education, school-enterprise cooperation", adopting the practical teaching mode of "one lesson and two teachers" of school-enterprise cooperation can effectively absorb the expertise of school and enterprise technical personnel, and improve the quality of Internet of Things engineering professional personnel training.

"One lesson double teacher" mechanism specific scheme for professional basic curriculum teaching and enterprise engineers, theoretical knowledge explanation of the teachers, practice experiment part led by enterprise engineers, teachers cooperate with enterprise engineers, in the whole process of course teaching into the enterprise elements, help students to the understanding of professional, engineering background, improve students' professional skills, at the same time teachers can use the training base site guidance to improve the practical guidance ability.

### 4.4. On-line Curriculum Resource Construction of "Smart Learning Factory" in School-enterprise Cooperation

Pay importance to the construction of online open course online resources, under the mode of school-enterprise cooperation and depth integration of industry and education, makes full use of enterprise teaching resources, which effectively makes up for the shortage of classroom teaching. With the use of the cloud platform resources of school-enterprise cooperation, establish an online open curriculum resource system on the world excellent learning platform, deepen the reform of the professional curriculum system, meet the needs of students' personalized development and diversified lifelong learning, and improve the quality of application-oriented talent training.

### 4.5. Implement the All-round Practice Teaching Mode of "Promoting Learning Through Competition and Promoting Reform Through Certificate"

As application-oriented, we organize and implement a variety of related competitions in the Internet of Things, at the same time, carry out professional certification and combine work and study, and comprehensively promote the reform of professional practice teaching. During the course of the IOT application competition training, Through conducting targeted and realistic professional knowledge teaching, design and operation training, practical ability drill assessment and other measures, To achieve the purpose of cultivating students' hands-on ability, Make students have good rational thinking and practical application ability competition and other competition [9], Introducing the International Internet of Things Qualification and the Training of Technology Talents of the National Internet of Things (IOTT), Promote practical teaching reform, Introducing the teaching courses and content of the International Internet of

Things certification into the process of training students, And carry out the systematic professional certification and talent training work, Comprehensively improve the practical ability and hands-on ability of students majoring in the Internet of Things, Make students achieve the intermediate professional qualification of the Internet of Things.

#### 4.6. Improve the Curriculum Teaching Quality Management Mechanism

(1) Implement the professional teaching quality monitoring mechanism. Fully mobilize the enthusiasm of teachers to carry out curriculum construction, promote the steady development of teaching work and the steady improvement of teaching quality. The school has established the two-level teaching quality guarantee system, and established the teaching work assessment system and the annual assessment system of teachers' teaching and evaluation work, included the evaluation results into the performance assessment content of teachers, and linked to the evaluation and promotion of professional title, to strengthen teachers' awareness of teaching quality.

(2) Establish the management quality standards. According to the orientation of the majors and talent training objectives of the Internet of Things, complete, standardized, scientific and reasonable teaching management quality standards have been formulated. Through routine teaching inspection and special inspection, according to the relevant teaching management rules and regulations, management, teaching construction, inspection and evaluation, timely find and properly solve problems, ensure the smooth operation of each link, constantly improve the teaching management level, improve the teaching quality.

(3) Improve the teaching quality monitoring system. Through the implementation of a series of measures such as information feedback, regular teaching inspection, teaching supervision and listening, student online evaluation, peer evaluation, middle and final student symposium, the problems and deficiencies in the teaching work are found and solved in time, and constantly improve the teaching quality monitoring system.

### 5. Conclusion

This paper analyzes the current situation of Internet engineering talent training mode, taking the teaching practice of Internet communication protocol as an example, relying on school-enterprise cooperation, ZTE ICT education integration innovation and entrepreneurship base, by building ICT teaching platform and integration innovation and entrepreneurship base, build a double team of "specialized combination", deepen the teaching quality assessment system, improve the quality of Internet of Things application talent training, and provide some reference and reference for the training of Internet engineering application talents.

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