

Research on Internet of Things Engineering Practice Education of NewLand Teaching Platform

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Abstract: Internet of Things Engineering Education is the most important part of the whole professional training system of Internet of Things engineering. Innovative and effective practical education is very important for training Internet of Things talents to meet the development of new industries of Internet of Things. This paper first analyzes the main problems existing in the current practical education of the Internet of Things project. Then, taking the practical education of the Internet of Things project jointly carried out with New World as an example, relying on the Internet of Things project application training system 2.0 NLE-JS2000 independently developed by New World enterprises, it can meet the urgent needs of the industry and directly introduce the high and new technologies of enterprises into the applied undergraduate education, which provides detailed information for the practical education of colleges and universities and the skill demand direction of enterprises.

1. Research Background

The Ministry of Education approved the setting up of the Internet of Things engineering major in 2010. Up to now, 150 undergraduate colleges and universities across the country have set up the major, and the scale of running the school is expected to continue to expand. Internet of Things Engineering is a wide-caliber information specialty integrating computer, control, electronics, communications and other disciplines. It not only covers a wide range of theoretical knowledge, but also is closely related to engineering practice. The students trained in this specialty should not only have a solid theoretical foundation, but also have strong engineering practice and innovation ability. For this new major, many colleges and universities have the problem of "wearing new shoes and going the old way" in the process of construction. In particular, they do not pay enough attention to practical teaching, lack systematic thinking and design, and have not formed a scientific and perfect teaching system in many aspects such as experimental course setting, teaching content, practice platform, teacher training and management system. Therefore, it is an important topic worthy of our study to actively explore the construction of a new practical teaching mode for innovative talents in the Internet of Things specialty in combination with the current running practice of the Internet of Things engineering specialty in colleges and universities.

Enterprises are in urgent need of basic requirements for high-end skilled talents. Nowadays, more and more people realize that whether enterprises can win in today's fierce social competition depends on whether they have high-quality innovative talents, which means that enterprises need high-quality human resources. However, there is no effective communication between universities and enterprises, and the supply and demand of human resources do not match each other. At present, many schools and enterprises have carried out school-enterprise cooperation projects. However, due to some common problems in school-enterprise cooperation, school-enterprise cooperation has not been widely carried out or its effect is insufficient, and the effect of enterprises to tap outstanding talents from school-enterprise cooperation is insufficient.

2. Problems in Internet of Things Engineering's Practical Education

2.1 Lower proportion of practical teaching

Internet of Things professionals need to be proficient in many information technologies such as computers, communications, networks and sensors, and the organic integration and mastery of these professional technologies need to be realized in practice teaching. At present, the proportion of hours in the practical teaching of most Internet of Things majors is relatively low, usually less than 30 %, some even only about 20 %, and in actual operation, there are still phenomena of shortening the practical hours and deleting the practical teaching contents. Many basic experiments are mainly confirmatory and demonstrative experiments, with much stylized content and few guiding links. This single acceptance type of practical teaching mode of "doing experiments according to books, leaving books and knowing nothing" ignores students' subjective status and individual needs, fails to enhance students' participation consciousness, and to a large extent hinders the cultivation of students' innovative thinking and practical ability.

2.2 Practice Base Needs Strengthening Urgently

The training of professionals in the Internet of Things must face the engineering reality and closely meet the development needs of the Internet of Things industry. In the process of professional training, the training of engineering practical ability should be based on engineering projects and take engineering technology as the main line, so that the training of engineering practical ability runs through the whole process of practical teaching. However, for a long time, the initiative of school-enterprise cooperation is not in the hands of colleges and universities. It depends more on the cooperative attitude of enterprises. There is generally a lack of effective communication mechanism between schools and enterprises. Many school-enterprise cooperation only stays at the level of students visiting the production site. There are few opportunities for students to really go deep into enterprises and practice. At this stage, the school and the enterprise have not found common interests and failed to establish a mutually beneficial and win-win cooperation model. To cultivate students' engineering literacy and innovation ability, they can only fall into the predicament of a superficial attempt. Therefore, building a complete and stable school-enterprise practice platform has become the weakest and most difficult link in the practice teaching of Internet of Things.

2.3 Lack of Teachers' Engineering Experience

Internet of Things focuses on training students' engineering practice ability, engineering design ability and engineering innovation ability. However, influenced by traditional ideas, many teachers in engineering colleges and universities basically go from school to school with little engineering background and practical experience. Teachers often only understand theory, lack a comprehensive understanding of the actual situation of enterprises, and have no in-depth contact with real engineering problems. Due to the limitations of experience, teachers can only teach pure theoretical knowledge in classroom teaching. The teaching contents and teaching methods are too old to provide students with "engineering demonstration" or "engineering guidance". It is difficult to ensure that students' engineering awareness and accomplishment are effectively improved in actual teaching.

3. Construction of Internet of Things Engineering Practice Education on New World Teaching Platform

At the end of 2016, a college in Nanchang and the New World established an Internet of Things Engineering Laboratory jointly, which covers a number of Internet of Things applications such as logistics, home and medical. The laboratory has broken through the deficiency that the laboratory relies on the traditional experiment box to carry out basic experiments. It directly combines the Internet of Things technology with various industry applications, faces the engineering practice, and

highlights the comprehensiveness of the engineering practice education of the Internet of Things. Through the laboratory, students can not only have a vivid understanding of the latest application results of Internet of Things technology in various industries, but also can further expand their practice through various instance platforms, give full play to students' innovative practical ability to complete relevant innovative applications, and truly integrate their own practical results into the laboratory. According to the actual work and personnel training objectives, the " practical teaching system for internet of things engineering specialty" (as shown in fig. 1) is constructed and implemented. the system relies on three platforms of guarantee, operation and training, pays full attention to the intersection of subject knowledge and the cultivation of students' engineering characteristics, and promotes students' engineering literacy and innovation ability to the maximum extent.

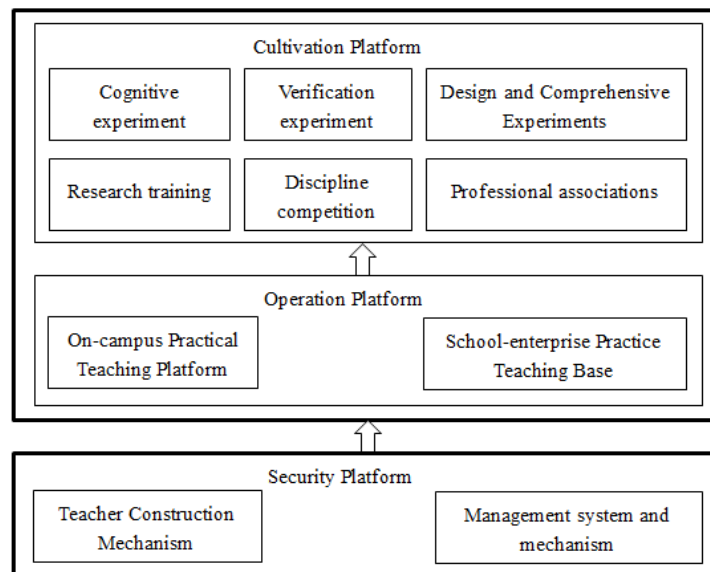


Fig. 1 Practical teaching system of internet of things engineering specialty

3.1 Establishing a Hierarchical and Progressive Experimental Curriculum System

As a new major, Internet of Things Engineering requires a gradual process for students to understand the Internet of Things system and the system of professional knowledge, and this major is highly comprehensive and cross - cutting. For this reason, the professional experimental course should follow the teaching rule of "from shallow to deep, step by step", and carry out the hierarchical practical teaching of cognitive experiment, verification experiment, design and comprehensive experiment, so as to form an organic system coordinated and infiltrated with theoretical teaching. On the premise of ensuring the principle verification required by theoretical courses, the proportion of analytical and exploratory experiments should be increased. Through the interactive teaching method of teachers' inspiration and guidance and students' active inquiry, students' comprehensive design ability and project research and development ability should be cultivated in the search.

3.2 Diversified extracurricular practice system

The combination of learning and doing is an effective means to overcome the separation of theoretical teaching and practical teaching. Diversified extracurricular practical activities are the concrete embodiment of the combination of learning and doing and are also an important supplement to classroom experimental teaching. The Internet of Things engineering major launched activities such as " innovative experimental program", " teacher research recruitment program" and " extracurricular scientific and technological works project" to attract students' attention and stimulate their enthusiasm for participation. In these research projects, students have planned to complete the preparation of research conditions, project design, scheme implementation, research report writing, achievement exchange and transformation of scientific research achievements. Through all - round, multi-channel and multi-level organization of scientific and technological

innovation activities, students' scientific literacy will be gradually trained, their professional development ability and engineering research implementation ability will be enhanced, and students will be prompted to know the latest research trends of Internet of Things specialty in time, which is conducive to choosing their own research direction in the next step.

3.3 Strengthening the Construction of Practical Teaching Platform

Internet of Things involves many fields such as electronics, computer, measurement and control, communication, etc. Students should not only master sensor, microprocessor, embedded and corresponding software technology, but also be familiar with new technologies such as radio communication, network security, high frequency circuit, wireless sensing, etc. For this reason, the experimental teaching in the school mainly relies on the existing laboratories, training bases and engineering training centers. On the basis of making full use of specialized laboratories such as embedded, electronic circuits, software engineering and network engineering, a new "Internet of Things Comprehensive Training Center" is built.

In a word, the open practice teaching system is an engineering systematic teaching mode that integrates curriculum system, innovative activities, teaching process, teaching platform and teaching staff. It is applied to the practice teaching of Internet of Things engineering specialty to construct an integrated training mechanism that integrates basic theory, experimental teaching and engineering practice. Through engineering practice training, students can go deep into engineering practice in all aspects and integrate into the whole process of engineering projects, instead of joining together simple and discrete practice links. Through systematic practical teaching, students' engineering ability, innovative spirit and professional quality have been further improved, thus better adapting to the needs of the development of information industry.

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