The Reform and Practice of IOT System Capability Training in New Engineering Construction

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Abstract

as an important direction of today's information technology development, the Internet of Things has been widely used in business, government, finance, education and other fields. In recent years, the department of higher education of the ministry of education has put forward the construction of new engineering. Computer is the major with the largest number and the greatest influence in the construction of new engineering, and the major of Internet of Things is no exception. To explore the cultivation of IOT professional system ability in the construction of new engineering, promote the in-depth integration of high-tech and IOT professional knowledge, ability and quality requirements, explore the implementation path of IOT professional transformation and upgrading, and improve the overall quality and ability of students to adapt to the development of the new economy.

Keywords

New engineering construction; Internet of Things major; System capability; Reform; Practice.

1. Background

In order to adapt to and Quzhou, Zhejiang province, the Internet of Things the development of strategic emerging industries, improve the level of regional economy and social informatization, promote industrial structure adjustment and change the way of development, meet the region and the surrounding areas of the Internet of Things and the urgent need of applied talents, innovative technology, our school in 2014 to establish the "Internet of Things Engineering".

Supported by the interdisciplinary support of computer science and technology, information and communication engineering, control science and engineering, etc., this major closely focuses on the urgent demand for IOT engineering professionals for the socio-economic development of this province and this region. This major focuses on the application of Internet of Things technology in the fields of industry, agriculture, social management and public service; The teaching system and training mode based on theoretical knowledge, focusing on applied technology and aiming at innovation ability are emphasized. Efforts should be made to train high-quality applied engineering and technical personnel who master the engineering and technical knowledge of the Internet of Things systematically and can analyze, design, develop and manage the Internet of Things systems. The undergraduate major of IOT engineering is in line with the school's orientation and the talent demand in short supply in the local economic development. It is of great significance to improve the industry-oriented professional pattern of our school and promote the social and economic development of this region.

After four years of professional construction, the major of Internet of Things Engineering has now developed into an application-oriented undergraduate major with perfect curriculum system, reasonable teaching staff and advanced experimental conditions. This year, the first batch of

undergraduate students were ushered in. Both the online rate of postgraduate entrance examination and employment rate have reached a record high.

2. Reform objectives

New engineering can be understood as the innovation and progress of basic science, applied science, engineering science and engineering practice, the intersection and integration of different disciplines, and the formation of new engineering disciplines or fields, new paradigms and new engineering education and other comprehensive concepts.Among engineering majors, IT majors, the number of graduates and the number of students on campus account for about 30%, among which computer majors account for nearly half. Computer science is the most important and influential major in the construction of new engineering. Under the new situation of information technology development and application, computer professionals need to have more and deeper systematic design, implementation and application abilities than ever before. Systematic ability training is of great significance and influence on the level and quality of computer major students in the future theoretically and practically. In the education promotion of computer major of new engineering, system capability training is the first important content.

The reform goal is to upgrade the traditional Internet professional, strengthen the ability training of the new engineering IOT systems, promote new and high technology and Internet of professional knowledge, ability and quality requirements of depth fusion, explore the implementation of the transformation and upgrade of IOT professional path, improve students' overall quality and ability to adapt to the new economic development.

3. Main tasks

The main tasks of the project are:

1. Study and analyze the new requirements of knowledge, ability and quality proposed by the new economy for the cultivation of IOT professionals, and study the training methods, training programs, new knowledge framework and content for the systematic ability cultivation of IOT majors in new engineering; To study the evaluation standard of the system capability cultivation level of the Internet of Things major in new engineering;

2. The new course system and main contents of systematic ability cultivation classified and stratified corresponding to the above training programs,including the renewal of the existing curriculum content and the establishment of new curriculum;

3. The systematic ability cultivation classification and hierarchical practical teaching system corresponding to the above training program, including the practical links of each course and the comprehensive course design, etc.;

4. Organized the compilation and publication of a series of teaching materials for systematic ability cultivation, mainly focusing on the construction of teaching materials at two levels corresponding to the core of the new engineering curriculum system and professional development; Write and publish teaching research papers related to this project;

5. Through the platform of school-enterprise cooperation and joint research, enterprises release projects, provide requirements, provide practical environment and content to promote the cultivation of IOT professional system capability to achieve substantive results.

4. Reform Programme

With the establishment of large-scale data centers and the widespread use of personal mobile devices, the emphasis on "programmatic development ability" in computer talent training is also being transformed into the more important "systematic design ability". In order to cope with a variety of complex applications and write efficient programs, application developers must understand the underlying structure of different system platforms, master the technology and tools, and cultivate a holistic system view in the corresponding technical field. The ability to integrate software and

hardware design is the key. According to the accepted definition, a system is a combination of several interrelated, interacting and interdependent components, with a certain structure and function, and in a certain environment as an organic whole. System capability is the ability to design and develop system structure and achieve engineering goals based on determined system functions.

From the perspective of teaching, computer system development can be divided into three levels:

(1) Using mathematical and physical principles, design and develop computer operating systems, including the central processing unit (CPU), operating system and compilation system.

(2) Design and develop specialized systems in the field of computer, such as software development system, database system, network system, etc., by using the basic system principles of computer, which is called the system in the field of computer;

(3) Design and develop a variety of application systems, such as digital manufacturing system, unmanned driving system, wireless communication system and so on, using the principles of computer professional system, which is called computer application system.

The basic content of system capability cultivation is to master the interface, operation coordination of various software/hardware parts within the system, as well as the logical association of various parts within the system, understand the external characteristics presented by the system and human-computer interaction mode, and emphasize the comprehensive method of realizing system functions from the perspective of system structure. System capability has prominent engineering characteristics and is the basic ability to solve complex engineering problems. With the ability of system, the application and innovation ability of computer will be strengthened and improved.

5. Cultivation requirements

5.1 Quality requirements

(1) Ideological and moral qualities: with legal awareness and professional ethics cultivation, firm ideals and beliefs, noble moral sentiment and social responsibility, and good quality, safety, service and environmental protection awareness in engineering practice.

(2) Cultural quality: good humanistic quality and feelings.

(3) Professional quality: have the spirit of cooperation and teamwork; Have the attitude and consciousness of pursuing innovation; Have certain entrepreneurial consciousness; Have certain engineering consciousness and benefit consciousness; Have the consciousness of independent learning and lifelong learning; Have a certain global vision and sustainable development concept.

(4) Physical and mental quality: good psychological quality and physical quality.

5.2 Capacity requirements

(1) Learning ability: able to read foreign literature and have the ability to communicate and communicate in a foreign language; Have the ability to acquire the latest scientific and technological knowledge and information at home and abroad, and have the ability to use computer and information network to assist the planning, design, calculation and control of the Internet of Things; Have a correct understanding of lifelong learning, and have the ability to constantly learn and adapt to development.

(2) Analysis and problem solving ability, scientific thinking method and the integrated use of master the knowledge, methods and technical analysis and the ability to solve the problem of complicated IOT project, which has certain scientific research ability to IOT field, Internet of Things related to software and hardware product development ability, the Internet of Things system analysis, design, set up and maintenance and management ability.

(3) Innovation ability: have the consciousness of innovation, the ability to apply relevant theories, methods and key technologies of the Internet of Things, combine the Internet of Things technology with professional systems of the industry, and complete new application solutions of the Internet of Things.

(4) Engineering management ability: understand relevant technical standards, have the technical application skills of Internet of Things data collection, transmission, analysis and processing, and have the organization and management ability of Internet of Things Engineering projects.

(5) Ability of cooperation and communication: have certain ability of expression, independent work, interpersonal communication and teamwork; Have a certain international vision and cross-cultural communication, competition and cooperation ability.

5.3 Knowledge structure requirements

(1) General knowledge: knowledge of humanities and social sciences, law and environment, society and public security, etc., including common sense or basic knowledge of literature, foreign languages, philosophy, politics, sociology, management, economics, psychology and other aspects.

(2) Knowledge of natural science: basic knowledge of mathematics and physics required for professional engineering work.

(3) Subject basic knowledge: solid basic theories and knowledge of electronics, computer, automation, communication and other related disciplines.

(4) Professional knowledge: master the basic theory and basic knowledge in the field of Internet of Things technology, including Internet of perception and identification of the basic theory and basic technology, Internet information acquisition and processing technology, the Internet of Things technology, system structure, data transmission and security IOT system hardware, software design and development method, and the Internet of Things application system construction of the basic theory, technology development and system integration methods, and in one area of emphasis.

(5) Engineering and management knowledge: basic knowledge of project implementation and management; Understand the national science and technology policies in the Internet of Things, as well as the laws and regulations on intellectual property rights, network security and other aspects, and understand the basic requirements of engineering technology ethics; Grasp the basic thinking method and research method of IOT science and technology, understand the application prospect, latest progress and development trend of IOT technology.(6) instrumental knowledge: master the basic methods of literature retrieval, data query and using modern information technology to obtain relevant information.

6. Cultivation measures

This major aims to cultivate application-oriented talents with solid theoretical foundation, strong practical ability, wide range of career choice, and strong sense of innovation. In order to achieve the objectives of professional training, the following measures are mainly taken:

1. Make a talent training plan that is compatible with the training objectives and specifications, improve the construction of the curriculum system, strengthen the classroom teaching reform, and build a whole-staff ideological and political education system; Strengthen the proportion of comprehensive quality courses, so that the credit of general education courses accounts for 47.4% of the total credit; The basic course accounts for 32.8% of the total credits; Professional courses account for 19.8% of the total credits, elective courses account for 40.5% of the total credits, and stratified and classified teaching courses account for 41.4% of the total credits.

2. We will strengthen the construction of teaching staff and improve the quality of teaching. It advocates that teachers strive to be guides for students to temper character, learn knowledge, innovate thinking and devote themselves to the motherland. By actively introducing academic leaders, professors and PHDS, teachers are encouraged to carry out on-the-job education and improvement, and "double-qualified" teachers are actively cultivated to ensure the overall improvement of teaching quality.

3. We should attach importance to the teaching of practical links, strengthen the practical cognition of the application site, and pay attention to the cultivation of students' practical skills. Practical

teaching credits account for 30.5% of the total credits, so that students can adapt to social needs as soon as possible.

4. We should strengthen the construction of specialized laboratories, build some open laboratories, improve the laboratory standards and systems, and meet the needs of students' practical ability training.

5. Strengthen the construction of the style of teaching and learning, give full play to the supervision function of the teaching supervision group, advocate the rigorous study and the standard training of being a teacher, guide students to be diligent and eager to learn, and aim high.

6. To implement the tutorial system, guide students to speak of ideal, ambition, science, so that they have a good professional ethics and team spirit, a healthy mental and physical quality and a strong sense of innovation.

7. Professional features

1. Pay attention to the guidance of specific learning objectives: in the course of "introduction to IOT engineering", application field cognitive teaching is introduced to help students establish perceptual knowledge of technical objects, application objects and system objects, improve students' interest in learning and subjective initiative, and help students set up tangible learning objectives and knowledge seeking ideals.

2. Cultivate the systematism disciplines background: strengthen the industrial and agricultural sector in each teaching link and the system of social management and public services related technology of automation, informationization and intelligent development process, law and thought of and influence, and help students to understand the Internet of Things Engineering deep and wide range of subject background and knowledge system.

3. Focus on the cultivation of engineering ability and innovation ability: practice-oriented course experiment, engineering training and course design, engineering design links throughout the teaching; To guide and encourage students to carry out various forms of innovative practice.

8. Effect of reform

1. Develop a set of ability training programs for the Internet of Things major system of new engineering;

2. According to the above training program, a set of new course system for systematic ability training should be classified and stratified;

3. One set of practical teaching platform corresponding to the systematic ability cultivation classification and stratification corresponding to the above training scheme;

4. Published one textbook corresponding to the core and professional development of the new engineering curriculum system;

5. Wrote and published 3 teaching and research papers related to this project.

Acknowledgments

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