

Construction of Innovative Comprehensive Training Platform Based on Internet of Things Intelligent Hardware

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Abstract. The traditional training platform carries out experimental teaching for a specific course. The main content of experimental teaching is for each single knowledge point, not all experiments can be covered. Students can not rise from individual knowledge points to a systematic understanding of the course. This thesis addresses the problems of the traditional training platform and proposes that the construction of an innovative training platform based on Internet of Things intelligent hardware, which covering multi-specialty courses is proposed.

Keywords: Innovative training platform; intelligent hardware; Internet of Things.

1. Introduction

The innovative training platform based on Internet of Things intelligent hardware will focus on artificial intelligence technology, it covers the experimental teaching content of professional courses, such as the perception layer, network layer, computer, mathematical statistics, psychological cognition, automation and other disciplines[1]. On this basis it breaks down the boundaries between the profession and carries out comprehensive systematic experiments across specialized disciplines[2]. It helps students develop the ability to build systems by the flexibly apply their professional knowledge, which is based on the understanding and mastery of individual professional knowledge.

The training platform constructed in this project will be innovative on the basis of the original training system[3]. It increases the content such as artificial intelligence, Internet of Things perception, network interconnection, machine cognition and other new knowledge and new technologies. It highlights the mutual integration of virtual simulation, actual systems and the complementary features of software and hardware systems, it breaks down the barriers between programs and courses. This program also innovates the curriculum system from the perspective of industrial demand, and build a set of innovative training platform of combining artificial intelligence and Internet of Things. The program conforms to the direction of technological development and adapts to the needs of industrial talents[4].

During the construction of the platform, the teaching and experimental contents and experimental means will be further enriched and improved. Gradually reducing the content of traditional verification experiments and adding more design-oriented experiments and comprehensive experiments. In this process, it is emphasized that students can really understand the theoretical knowledge and can solve practical problems by applying the theoretical knowledge independently[5]. Moreover, the roles of the experimental sessions will not only be limited to assisting the teaching of theoretical courses, but also serve as an important carrier for cultivating students' practical ability. It paved the way for the study of specialized courses, graduation design and research work in the future.

The construction of innovative training platform based on Internet of Things intelligent hardware will take cultivating high-quality talents with innovative spirit and practical ability as the goal[6]. The construction takes transforming educational thoughts and updating of educational concepts as the guide. It takes the curriculum system and curriculum content as the core.

By leveraging various disciplines, overhauling the existing system, enhancing financial support, combining theoretical and practical approaches, there is a dedicated effort to establish a fundamental curriculum system for experimental teaching. This system not only seamlessly blends

theoretical concepts into practical applications but also integrates classroom instruction with extracurricular guidance. And it also has innovative experimental teaching environment and conditions. The platform will strive to be an excellent training platform for open basic and specialized courses[7].

2. Construction scheme

According to the composition system of the Internet of Things system, the entire innovative training platform is divided into three units[8]:the Internet of Things perception technology platform, the Internet of Things communication and information processing training platform, and Internet of Things comprehensive application and innovative development training platform. As shown in Fig 1.

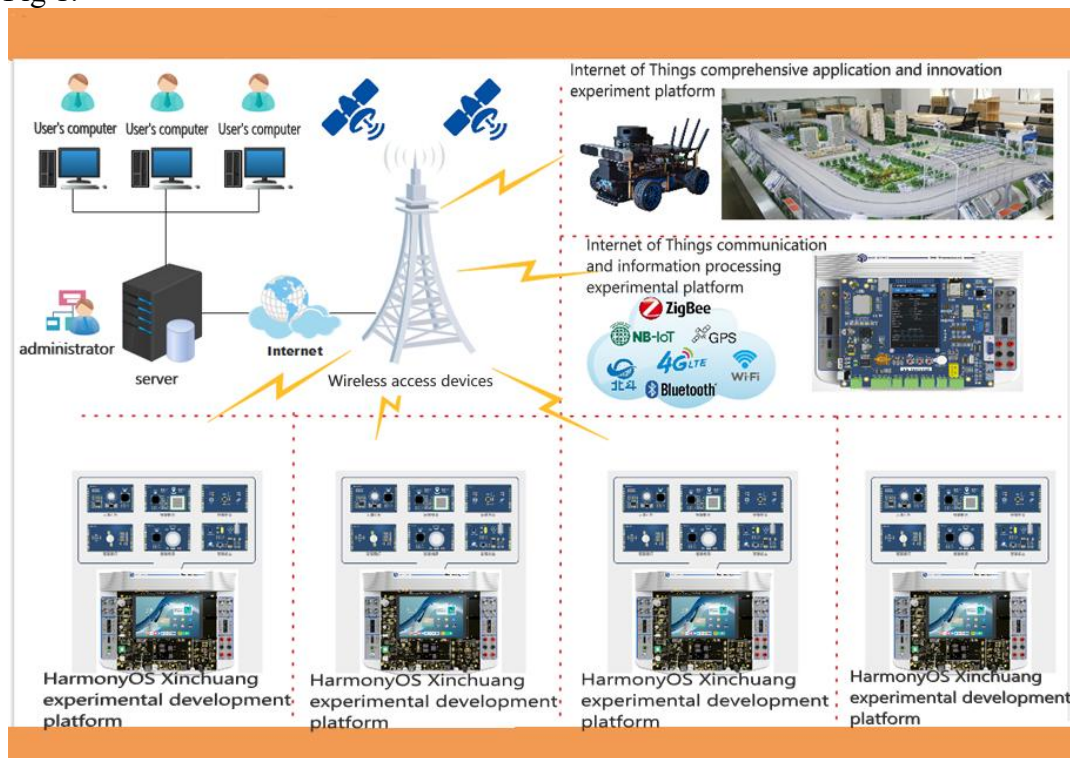


Fig. 1 Overall construction scheme of training platform

2.1 Internet of Things perception technology platform

The HarmonyOS XinChuang training development platform(as shown in Fig.2) is based on embedded technology, wireless sensor networks, Internet of Things networking, wireless communications, Internet of Things comprehensive application and other knowledge points. It utilizes a portable design and incorporates various components such as the STM32F431 processor, a 3.5-inch capacitive touch screen, and communication modules like WIFI, Bluetooth,Zigbee(optional). Additionally, It also supports a variety of sensors including but not limited to temperature, humidity, lighting, RFID, alcohol and smoke(optional). This platform is suitable for comprehensive design, innovative development, as well as promoting educational programs related to these technologies[9].



Fig. 2 HarmonyOS XinChuang training development platform

2.2 Internet of Things communication and information processing training platform

The Internet of Things communication technology training development platform serves as an experimental platform that primarily focuses on the principles and applications of common communication technologies for the Internet of Things, as shown in Figure 3. It covers mobile and wireless communication, embedded technology, sensor technology, embedded systems and mobile internet[10]. This platform is specifically designed for course experiments in electronic information and IoT majors, as well as the comprehensive design of Internet of Things application, mobile communication, wireless communication and mobile Internet. In addition, the product is based on the design idea of modularization and platform, where the modules can be combined together to complete comprehensive experiments, when taken off, it is a self-contained module with full functionality, which can complete various unit experiments and facilitate students in conducting innovative designs.

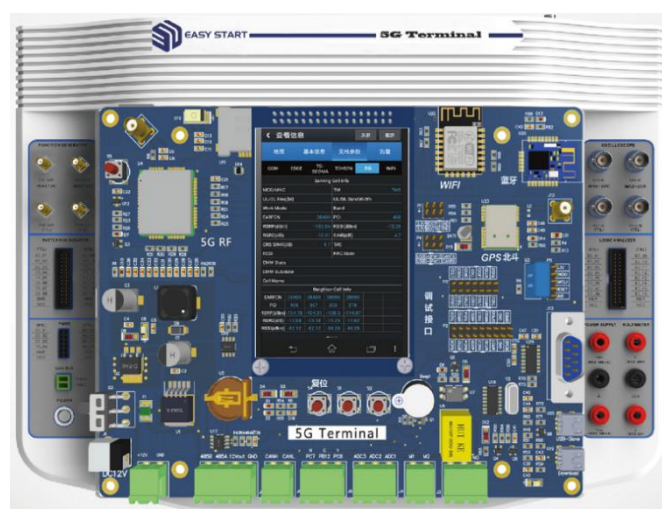


Fig. 3 Internet of Things communication technology training development platform

2.3 Internet of Things comprehensive application and innovative development training platform

The Internet of Things comprehensive application and innovation development training platform serves as the foundation for intelligent traffic sandbox and intelligent cars[11]. It revolves around the design principles of integrated IoT applications, practical engineering training, and project innovation. By utilizing various sensor modules, node modules, coordinator modules, gateways, communication modules, actuators, human-computer interaction modules, and other hardware resources provided by the intelligent transportation sand table, students can independently design and assemble a wide range of IoT application systems based on their own ideas. These systems encompass environmental monitoring, meteorological perception, intelligent transportation, and IoT based intelligent control systems. As shown in Fig4. This platform is well suited for courses in wireless sensor network development, IoT application system design, IoT software engineering, and related experiments for students majoring in the Internet of Things. Moreover, it is also beneficial for application oriented course projects, graduation designs, and extracurricular innovative undertakings[12].



Fig. 4 Training platform for integrated application and innovation development of Internet of Things

The intelligent four-wheel vehicle is designed with a flexible assembly method, and the whole is like a racing car, the rear wheel drive, and the front wheel steering machine steering. As shown in Fig5. In addition, it integrate various communication technologies, which can be used independently or combined with a traffic sandbox to construct an intelligent transportation system[13]. As a classic product of embedded application, the intelligent four-wheeled vehicle can be used not only to set up experiments of embedded direction and wireless communication, but also as a platform for student's comprehensive design and innovative design. Furthermore, it's a viable platform for students interested in inclusive and innovative design, redefining the once tedious experimental process into a three-dimensional and dynamic experience. The resultant piqued interest among pupils has been instrumental in improving the overall effectiveness of the experiment.



Fig. 5 Intelligent four-wheeled vehicle

3. Conclusions

The innovative training platform based on Internet of Things intelligent hardware which includes the basic knowledge of the Internet of Things, such as perception layer, network layer, communication protocols, gateways and so on. On this basis, it also integrates comprehensive and innovative practical training courses. And for senior students, it will help them connect their knowledge about the AI and IoT through a hands-on which cross-collaborative “AI+X” course.

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