# Construction of Electronic Information Innovation Experiment Platform Based on Engineering Education Certification

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**Keywords:** Engineering education certification, Electronic information, Innovative experimental platform

**Abstract:** In order to deepen the innovation and entrepreneurship education in colleges and universities, this paper introduces the construction contents of the innovation experimental platform of electronic information, taking optoelectronic information science and engineering as an example. Electronic information engineering is a newly-built scientific research discipline in China. Through its specialized research, a large number of high-quality talents can be delivered to the motherland. This practice can not only promote the progress and development of China's science and technology, but also make suggestions for China's electronic information construction, establish laboratories, upgrade scientific research hardware, and train a group of excellent talents with strong practical ability. With the development of society, more and more attention has been paid to innovative talents, and the training of high-quality students has become a path that universities must choose. The rapid development of the electronic information industry has increased the demand for professional talents. In order to meet the needs of the industry In the current situation, an electronic information innovation laboratory has been created to implement scientific management methods, effectively utilize various resources, and realize the orderly and sustainable development of the innovation laboratory.

## 1. Introduction

Engineering education certification is an internationally accepted engineering education quality assurance system. Participating in engineering education certification is an important foundation for achieving international mutual recognition of engineering education and international mutual recognition of engineering qualifications, and it is also an inevitable choice for the development of China's engineering education globalization strategy [1]. The laboratory is the product of scientific development to a certain extent. With the advancement of Chinese subject knowledge, laboratories can not only help high-tech talents to accept scientific research results, but also conduct innovative technology experiments [2]. Electronic information industry is a new industry. From the current form, electronic information industry will only play a more and more important role in the global economy, life and national defense, which can be called prosperous and will always maintain rapid development [3]. At present, many colleges and universities have established electronic innovation laboratories to cultivate students' innovative ability and application ability, and formed their own management mode [4]. In order to effectively utilize and tap the resource conditions of electronic innovation laboratories, most schools give full play to the important role of electronic innovation laboratories in cultivating students' innovation ability. Electronic innovation laboratories adopt an open management model and extensively carry out various extracurricular scientific and technological activities and electronic Design competition and so on [5]. The innovative experimental platform is an important platform for cultivating students' knowledge innovation, research innovation, and technology development. The construction of a good innovative practice platform helps students to understand the basic professional knowledge deeply and improve their independent thinking and independent operation ability.

## 2. Laboratory Platform

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## 2.1 Software and Hardware Electronic Application Platform

In order to improve students' practical ability quickly, besides students' hard work, the laboratory hardware conditions must be well equipped. The demand of laboratory teaching plan is an important basis for laboratory equipment planning, personnel quota and laboratory construction investment. Therefore, the demand of laboratory teaching plan is the most basic and important work of laboratory construction project. For this innovative experiment in a college, the analysis of teaching plan needs to be confirmed as shown in Table 1.

Table 1 Requirements for Teaching Plan of Innovative Laboratory Construction Project

| Serial number | Experiment class name | Course category | Project type (comprehensive/design/verification/challenging) | Class hours | Expected beneficiary face person/year | Required equipment |
|---|---|---|---|---|---|---|
| 1 | Audio amplifier circuit production | Course experiment | Comprehensive | 7 | 510 | Oscilloscope, signal generator |
| 2 | RC circuit transient characteristics analysis | Course experiment | Verification | 5 | 510 | Oscilloscope, DC power supply, digital multimeter, signal generator |
| 3 | Instrumentation amplifier design | Course experiment | Design | 7 | 510 | Oscilloscope, digital multimeter, signal generator |
| 4 | Peripheral programming based on mbed | Course experiment | Design | 7 | 510 | Mbed, 7-segment digital tube, voltage control buzzer, breadboard, LED |
| 5 | Digital input and output design based on ARM Keil u IDE | Course experiment | Comprehensive | 5 | 510 | Mbed, NXP LPC 1768 microprocessor |
| 6 | Microprocessor programming development experiment | Course experiment | Comprehensive | 15 | 510 | Mbed, digital multimeter, oscilloscope |

The hardware equipment of the laboratory is related to the level of the experiment. If the relevant hardware does not match the current experiment, then the experiment loses its proper meaning. Especially the professional content of electronic information engineering, it has extremely high requirements for students' hands-on ability [6]. Arduino is not only the most popular open source hardware in the world, but also an excellent hardware development platform, and it is also the trend of hardware development. The Arduino platform usually has a central processor module, equipped with some basic functions such as storage, Bluetooth, USB interface, bus, analog and digital input and output interfaces.According to functional requirements, gyroscopes, accelerometers, temperature and humidity pressure sensors, etc. can be used, which greatly facilitates Arduino developers. They can pay more attention to the realization of creative ideas without sticking to the compilation of basic functions, so that they can put more energy into the functional design they want to do. FPGA (FieldProgrambleGateArray) platform is a programmable logic chip that completes general functions, that is, it can be programmed to realize certain logic processing functions. FPGA development needs to be processed from top-level design, module layering, logic implementation, software and hardware debugging, etc. On the basis of mastering the use of FPGA,

you can perform deeper digital signal processing algorithms, such as communication, image processing, navigation and positioning, etc. Algorithm development.

Labview (Laboratory Virtual Instrument Engineering Workbench) is a programming environment developed by the National Instrument Company of the United States based on virtual instruments. Virtual instruments combine computers and instruments closely to realize the functions of various instruments on the basis of common computer hardware and operating system. Labview software contains a wealth of toolkits in the field of test and measurement, such as signal processing module, control and simulation module, machine vision module, etc. It has excellent functions in data acquisition and control, electronic test and measurement, wireless design and test, etc. The graphic program of Labview shortens the speed of prototype development, facilitates the future software maintenance, and greatly improves the working efficiency. Python is an easy to learn and quite useful programming language. Compared with other languages, its code is easy to read, and a Shell program can input and run the program. Some features of Python are very effective in assisting the learning process. Python language has many important features, such as object-oriented features; few keywords, concise code; easy to transplant in different operating systems; wide application and other features. These features make the Python language very popular among program developers and students. 3D printing, also known as rapid prototyping, is a three-dimensional model of an object to be printed on a computer, and a 3D printer can print layer by layer to generate a three-dimensional object. 3D printing is conducive to the production of single pieces and a small number of molds and parts in students' practice, and it is also easy to process some models with complex shapes and different postures. The laser engraving machine is a device that uses laser to process and engrave the materials to be engraved.Unlike manual engraving, the laser engraving machine requires high operating skills and craftsmanship. It can engrave materials through the design of Autocad, Coreldraw, Photoshop and other software, and the operation is easier and faster.

## 3. Laboratory Construction Can Promote the Development and Progress of the Discipline

### 3.1 Laboratory Construction

Education and teaching philosophy influences the direction and development process of experimental area construction. Therefore, the establishment of advanced and forward-looking educational concepts is the prerequisite for the construction of experimental areas. The purpose of electronic information experimental area is to ensure the theoretical teaching level, students' practical ability and the combination with market demand, and its educational philosophy is to properly handle the relationship among the three aspects and obtain greater practical results as much as possible. The effect of the professional construction of the innovative experimental zone is directly related to the success or failure of the entire experimental zone. This is because the major is the basic unit for the training of various specialized talents in colleges and universities. The status of professional education directly affects the quality of talent training in colleges and universities. It can reflect the overall picture of a college and reflect the value orientation of current educational development [8]. In the development of electronic information engineering in China, the construction of laboratory can not only strengthen students' practical ability, but also improve the overall quality of education. In particular, the establishment of electronic information engineering laboratory should have higher scientific research ability than other universities, enhance students' resources and widen the overall teaching level among universities. Regarding laboratory construction, it conforms to the development of the times and science and technology. In this way, the development of my country's disciplines and teaching progress can be promoted. In order to realize the effective implementation and supervision of the laboratory system, an innovation laboratory management team must be established to ensure the opening hours of the innovation laboratory and the daily management of students. The specific management organization is shown in Figure 1.

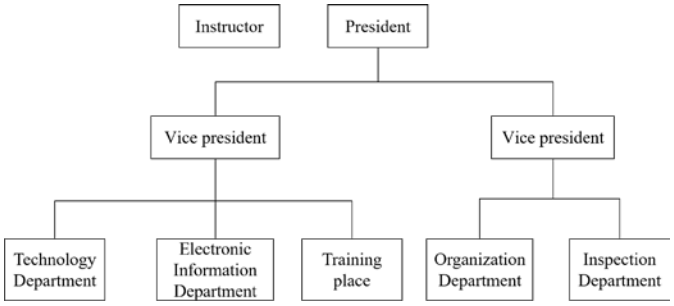


Fig.1 Diagram of Innovation Laboratory Management Organization

### 3.2 Ensure the Sustainable Development of Innovative Laboratory

The effect of specialty construction in innovative experimental area is directly related to the success or failure of the whole experimental area construction. This is because specialty is the basic unit of training various specialized talents in colleges and universities, and the status of professional education directly affects the quality of talent training in colleges and universities, which can reflect the whole picture of a university and reflect the value orientation of today's educational development. Innovative laboratory construction projects involve many links, and the relationship between each link needs to be clear and clear. The specific implementation path is shown in Figure 2.

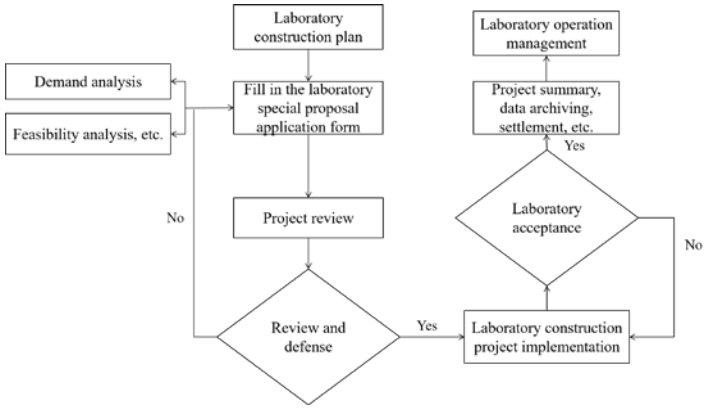


Fig.2 Construction Process of Innovative Laboratory Construction Project

In the engineering education certification standard, it is pointed out in the index item of “graduation requirements” that students are required to have the ability to design, develop and solve solutions, and have the ability to apply professional knowledge to solve complex engineering problems. The practice link is an important part of cultivating students' practical ability, experimental practice ability and innovative consciousness. In order to promote students' practical ability and innovative ability, students are encouraged to enter the laboratory to do experiments by themselves. However, professional teachers need to guide them. By combining theory with practice, students can avoid the damage of mechanical equipment caused by brutal manipulation and improve the use of the laboratory. Strengthen the management and guidance of students entering the laboratory, form a good operating mechanism, and stick to it. At the same time, we should also guide students in the direction of employment based on the needs of the society and industry, so that students in the innovation laboratory can find ideal jobs .

## 4. Conclusions

There are still many shortcomings in the construction of electronic and information engineering laboratories in China, which need a lot of funds. At the same time, in the management process, the use of the laboratory is affected by the imperfect hardware facilities and imperfect management mechanism. Through its construction and completion, it can help students develop their creative talents, let students complete the exploration of professional technology through experiments, and use practice to complete the assumption of scientific research. The construction of electronic

information engineering laboratory is also very important, which is not only an inevitable trend of development, but also a necessary condition for the development of disciplines. The construction of innovative platform is conducive to the independent design and realization of electronic hardware design, software programming and peripheral processing design for students majoring in optoelectronic information science and engineering. It provides a guarantee for students to participate in innovative projects of college students, and also lays a practical foundation for students' innovation and entrepreneurship. The Electronic Innovation Laboratory is an important student organization in this department. It plays a major role in cultivating students' practical and innovative abilities. Only by scientifically managing the laboratory and students can the expected goals be achieved. I believe that under a reasonable management mechanism, Under the full opening of the innovation laboratory, under the diligent guidance of the instructor, it will surely inspire students' enthusiasm for learning, tap their innovative consciousness, and improve their comprehensive quality. The experimental area has achieved certain results in terms of professional construction and talent training effects, so that the students of electronic information major have been improved in theoretical knowledge, practical skills, innovative spirit, innovative consciousness, innovative ability and entrepreneurial ability. After graduation, students continue to study or work in electronic information-related enterprises and institutions to lay a solid foundation.

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