

# The Path to Cultivate Innovation and Entrepreneurship Ability of Students Majoring in IOT

Shang Zhang, Xiaoling Zhang  
Computer and Information Engineering College  
China Three Gorges University  
Yichang, Hubei Province, 443002, China  
Email: wetoo@163.com

**Abstract-**This article introduces some features of the teaching activity in the field of the IOT (Internet of Things) engineering, which leads to the necessity and methods of cultivating ability of innovation and entrepreneurship. The role of academic competition, entrepreneurial practice and tutors in cultivating capacity of innovation and entrepreneurship is discussed. Finally, it introduces the author's some work in this field.

**Keyword:** the Internet of Things Engineering, innovation entrepreneurship, ability cultivation

## I. INTRODUCTION

Under the background of "mass entrepreneurship and innovation" turning to be the implementation strategy of national economic development, the cultivation model of application-oriented undergraduate engineers is the essential embodied of higher education proactively adapting to the economy and social development. With the advancement of new-type industrialization and the development of science and technology, the application-oriented engineers who meet the needs of industrial development, especially high-quality talents with innovative thinking and entrepreneurial ability, have become more and more important support for the sustainable development of the economy and society and the promotion of the country's core competitiveness. To improve the creative and entrepreneurial ability and spirit of college students is of great significance to improve the quality of talent cultivation, to provide high-quality inter-disciplinary talents and innovative and entrepreneurial talents for the rapid development of country's economy and society.

The technology of IOT involves many subjects such as computer science and technology, communication engineering, electronic science and technology, automation and so on. The students of the IOT need to master the basic knowledge of mathematics, natural science, economics, management, engineering science and so on which are required to complete in this major, as well as computer, communication, electronic, sensing and other topics about knowledge, skills and methods related to the IOT. Therefore, the training process of innovation and entrepreneurship ability of this professional ability is rather complex and time-consuming. After a long period of practice, a way to cultivate innovative and entrepreneurial ability in the CTGU had been explored. Through organizing and guiding students to complete professional

learning, academic competition and entrepreneurial practice in a long time, good results have been achieved.

## II. METHODS OF CULTIVATING INNOVATIVE AND ENTREPRENEURIAL ABILITY

The cultivation of innovation and entrepreneurship ability is a long-term process, which requires continuously inculcating a feeling of innovation and entrepreneurship consciousness and a long term of complete project practice. This process can be divided into several stages: comprehensive training, academic competition and entrepreneurial practice. These three stages can be taken as different forms of an innovation and entrepreneurship project, including concept verification, prototype design and product implementation. Each stage has different emphasis and training. The members of the project team experience these three stages, and finally form a strong sentiment of innovation and entrepreneurship, a strong professional accomplishment and a rich experience of innovation and entrepreneurship. The stages of this process shown as follow (Figure 2-1):

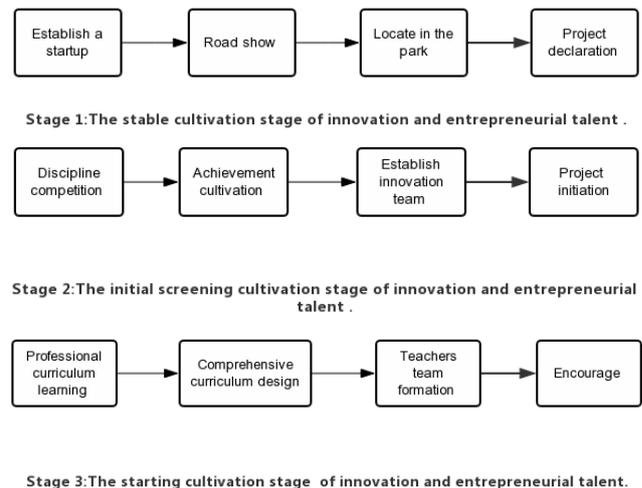


Figure 2-1 The Cultivation stages

### 1. Comprehensive Training

In the teaching process of the IOT engineering, the comprehensive training mainly completes the synthesis of three levels of the content of the perceptual layer, the network layer and the application layer, which is based on the practical application system and relied on the framework of the IOT system. The training the ability of

the professional talents in system design were focused on, software programming and system debugging, which including the selection of sensor / transmitter, signal acquisition and the processing methods, the networking technology of wireless sensor network (WSN), the design of the application layer of the (IOT), the selection of different domain executor and so on. The final result of the training is to complete the information collection, transmission, extraction and sorting of useful information, which is focusing on the WSN and the application layer.

Through the practical project training, it empowers the undergraduate students the practical ability to develop the integrated application of IOT. The students could complete the research, design, manufacture, operation and management of IOT system and devices, which also are the basic ability of doing scientific research in the field of IOT.

These talent students can complete the training of professional core competencies from understanding the needs of the task, making the system plan according to the demand, setting up the hardware configuration and calculating the optimal performance price ratio, and finally building a reliable software program with processing the ability of system debugging, results analysising.

### III. DISCIPLINE COMPETITION

After the comprehensive training stage, the undergraduates get better technical basis. However, due to the limitations of the training course (class time), the training of this stage is lack of extension and expansion. The early stage of training are lack of continuous improvement which can not produce significant results. As the next stage of comprehensive training, academic competition will deepen the cultivation of students' innovative and entrepreneurial ability. Academic competition is an extracurricular scientific and technical practice that gives a multidimensional investigation on the comprehensive quality and ability of students. Through the competition, the students' creative thinking are aroused, the students' awareness of team work is trained. At the same time, the teachers also can jump out the campus to understand the real needs of the IOT society through competition, and then test their scientific research results through this kind of activities. At the same time, the competition is an effective way to stimulate the students' interest, and the successful work of it can be taken further as the teaching content of IOT courses, and also can be the foundation of the entrepreneurship.

In particular, the way of IOT competition has the following characteristics:

(1) The organizers of the competition are including the leading enterprises of the industry, the topic of competition which could reflect the latest technical tendency, and provide the newest IOT development boards and software tools for the participants. The students will be able to be brought into contact with the latest information of the industry. It also encourages the instructors to update curriculum and teaching activities to new levels.

(2) The competition urges the students to think creatively and practicing in teamwork, especially the

comprehensive ability of technical document writing, propaganda video shooting, and presentation for the products, which are difficult to achieve in the conventional class.

By mentoring the students to participate in the competition, teachers are promoted in the aspects of creative thinking, hands-on ability, enterprising spirit and team consciousness, who will realize that both shortcomings and advanced teaching ideas in the training of students in time, which lead to the reformation on education of IOT and the continuous promotion to provide service for students more directly and effectively. The results of the competition can also become intellectual property such as software products and patents, laying the foundation for the subsequent stage of entrepreneurship.

### IV. ENTREPRENEURIAL PRACTICE

Academic competitions usually produce high-quality achievements, but after the competition, it is a matter to consider whether these works are put on the shelf or to be perfected into real products which have commercial value. At the same time, the academic competition is also phased. Many students are short of time planning to participate in the academic competition. They build their works in a hurry until the competition is coming. The time of the work is not enough, the quality of the work is not high and the exercise effect is poor. In combination with the training of the professional skills, especially the training of entrepreneurial ability, we can consider to promoting these disciplines and teams to carry out the entrepreneurial practice, including participating in various entrepreneurial competitions and wind cast road show.

The ambitious team can also learn to run a real entrepreneurial company, applying the government funding, and enter the incubator park to operate in accordance with the business model. This requires students and teachers to jump out of the technical field of the profession to pay attention to the market commercialization. Through the understanding of the market, the goal of training in campus is clearer.

On the other hand, it is also necessary to integrate the practice of entrepreneurship into the training model of the undergraduates, and combine the characteristics of IOT to form a professional basic curriculum around the goal of entrepreneurship. This needs to create a strong entrepreneurship cultural atmosphere for campus, and actively build various innovation and entrepreneurship platforms inside and outside campus about innovation and entrepreneurship education, practice, hatching and Commercial project docking.

### V. CONCLUSION

In recent years, the staff of IOT engineering in CTGU has recently encouraged and supported teachers to participate in the guidance of various academic competitions. At the same time, the topic of competition is taken as a comprehensive training topic. After a comprehensive training and competition, a project has been perfected in accordance with the market commercial requirements. The competition are "National college

student intelligent interconnection innovation competition" for the university students majoring in electronic information, "National University IOT design competition" for the IOT, as well as "Internet + entrepreneurship competition" based on entrepreneurship. Some excellent teams also turned to run the companies. Through these practical activities, the creative thinking ability and practical application ability of the undergraduates are enhanced, and a strong support for the training of innovative engineering talents is provided.

#### ACKNOWLEDGEMENTS

This paper is supported by the CTGU Teaching Research Project "J2016017".

#### REFERENCE

- [1] Peng Yuanju et. Exploration of Applied Undergraduate Talents Training Mode Based on innovation and entrepreneurship education. *Innovation and entrepreneurship education*, 2016 (05): page 86-88.
- [2] Wu Shaobo, Su Zhong and Zhou Jin He. Rely on competition to promote the teaching and practice of the Internet of things Engineering *Computer education*, 2012 (21):page 29-32.
- [3] Ma Guang Bo and Li Jingping, Discuss the construction of teaching staff for innovation and entrepreneurship education in newly established universities. *New western (theoretical version)*, 2016 (09): page 111-112.
- [4] Ge Ming and Cui Guanghua, Based on the undergraduate innovation and entrepreneurship training project exploring the cultivation method of undergraduate research ability. *Technology vision*, 2015 (22): page 20 and 24.
- [5] Liu Jun, Rely on the innovation and entrepreneurship training platform for undergraduates, explores and practices undergraduate tutorial system. *Technology vision*, 2015 (22):page 29 and 22.
- [6] Yu Feng Yuan. Research on undergraduate tutorial system guided by innovation and entrepreneurship. *Journal of Huangshan University*, 2016 (06): page 111-114.