

Exploration New Mode of School-Enterprise Cooperation in IoT Industry Linked by Industrial Park

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Abstract

Internet of Things (IoT) industry is one of the key industries. But most of the small and medium-sized enterprises are still facing the problem of talents shortage. In order to support regional industry better, this paper puts forward a new mode of school-enterprise cooperation, which takes industrial park as a link. This cooperation mode is suitable for the development of IoT industry. Industrial park screens appropriate enterprise clusters and organize abutment of enterprise and school. Flexible and diverse cooperation between enterprises and school can be carried out to achieve win-win situation among three parties.

Keywords

School-Enterprise Cooperation, IoT, Industrial Park.

1. Current Situation of School-Enterprise Cooperation in Vocational Education

In order to support China's industrial development and provide different levels of talent reserves for different fields. With the continuous adjustment of economic structure and industrial upgrading, the demand for high-skilled talents is becoming more and more urgent, which highlights the importance of vocational education. However, under the present education system, there are always differences in identity between vocational education and general higher education, which can be verified from the willingness of college entrance examination, employment threshold, talent introduction policy and so on. With the prominence of the problem, China has paid more and more attention to vocational education in recent years. In the National Plan for the Implementation of Vocational Education Reform issued by the State Council in 2019, it is pointed out that vocational education and general education are equally important[1].

Vocational colleges aim at cultivating high-skilled talents suitable for the industry. In the process of talent cultivation, they are closely integrated with industry. Taking Suzhou Industrial Vocational and Technical College as an example, the College adheres to the integration of industry and education. College attaches great importance to school-enterprise cooperation and promotes the "100,000" project of school-enterprise cooperation. Close cooperative relations have been established with the top 500 enterprises in the world, such as Baide Science and Technology, Caterpillar, Johnson & Johnson Medical, and etc. What's more, college also establishes close cooperative relations with landmark enterprises like Chuangyuan Group, Hengtong Group, Newway CNC and etc. Communities of deep integration for production and teaching - "Enterprise College" are set up. Through different cooperation methods like order training, modern apprenticeship system, enterprise named class, innovation studio and etc,

students' vocational skill, employment and entrepreneurship ability can be improved significantly. This kind of training mode not only makes the training of students closer to the market demand, but also solves the problem of students' employment better. At the same time, close cooperation with enterprises also promotes course content more close to the industry. In the long-term practice, we have accumulated a lot of successful experience. However, with the industrial transformation and upgrading, traditional mechanization has gradually become more intelligent. The traditional job positions have slowly shrunk, and the number of actual demand for certain positions has become less and less. Therefore, adjusting the mode of school-enterprise cooperation according to industry development and characteristics is necessary and can better support industrial development.

2. Characteristics of IoT Industry

In 1999, Professor Ashton proposed an integrated solution to the Internet of Things based on item coding, RFID and Internet technology. Since then, Internet of Things (IOT) technology has come into researchers' attention. In 2005, the International Telecommunication Union (ITU) first proposed the concept of IoT at the World Summit on the Information Society in Tunisia, and further expanded its connotation from the original RFID, coding and Internet. More and more technologies are involved. As the earliest city in China to develop the IoT industry, Wuxi has defined IoT as a key emerging industry in 2008. Based on the foundation of its traditional manufacturing industry, the vigorous development of integrated circuits, sensing technology, and etc., the development path of IoT industry has been gradually sorted out after several years[2,3]. In recent years, the development of IoT industry has been more supported with the maturity and application of communication technology, cloud computing, artificial intelligence and other technologies. Its application scope is more and more extensive. In addition to traditional applications like smart home, smart city, smart agriculture and etc, new applications like smart manufacturing, new retail and etc have also received widespread attention. At present, the development of IoT industry presents the following characteristics[4].

1. More technology involved

The whole architecture of IoT includes perception layer, network layer and application layer. Each layer contains many technologies[5]. Perception layer is the key part of collecting information. Common technologies include two-dimensional code tag and reader, RFID tag and reader, camera, GPS, sensor, M2M terminal, sensor gateway and so on. The network layer is mainly responsible for information transmission and processing. Common key technologies include the Internet, mobile communications and so on. The application layer is mainly used to process the massive data coming from the network. In addition to the software technology developed by the application, technologies like large data analysis, artificial intelligence algorithm are also important.

IoT involves a wide range of technologies, including traditional electronics, communications, software and other specialties. Such characteristics determine that few enterprises can take into account all the technology research and development of IoT. Most enterprises mainly focus on the overall solution.

2. Wide applications

With the rapid development and application of 5G, new generation sensors and other technologies, the application field of IoT is constantly expanding. Smart home based on smart home gateway can integrate most household appliances into the network. Intelligent agriculture has been able to achieve remote feeding, no artificial sowing and so on. At present, IoT technologies have been applied in most field of life. Each industry has its own characteristics, and the technology used is different. Taking communication technology as an example, NB communication technology can meet the requirements of small data application

scenarios for collecting environmental information such as temperature. And the cost of this technology is low[6]. For real-time video surveillance, the technology can not meet the requirements of large data transmission. Therefore, the application of IoT technology is closely related to the application scenario. Wide application fields determine that we should have a comprehensive and profound understanding of the technical characteristics and applicable scenarios of the IoT technologies.

3. Characteristics of enterprises

At present, the characteristics of enterprises of different scales are quite obvious among the enterprises that mainly focus on IoT. One is the telecommunications giants represented by China Mobile and Huawei. They pay more attention to the ecological construction. They aim to introduce more IoT nodes by building cloud platforms and base stations. One is the Internet enterprise represented by Taobao, which pays more attention to the value of large data introduced by a large number of IoT nodes. Another kind of enterprise is Invengo, which is engaged in IoT hardware. This kind of enterprise provides necessary hardware equipment for the IoT nodes. The rest are more small and medium-sized enterprises engaged in the overall solution. These enterprises are the customers of the above-mentioned large enterprises in terms of platform and hardware. To cooperate with such enterprises, it is not only necessary to cultivate students' familiarity with various technologies, but also to make them more adaptable to the various application fields of the whole IoT industry. The cooperation can also meet the problem of small and medium-sized enterprises' talent shortage. However, single enterprise is small in scale. It can't satisfy the problem of sustainable employment of school students. Small and medium-sized enterprise cluster is more suitable for school-enterprise cooperation in student joint training.

From the above characteristics, we can see that with the IoT industry development, the demand of talents has been very different from the traditional electronic information industry. Traditional manufacturing industry has more unitary demand for talents and skills. A good command of assembly, debugging and maintenance of electronic products can meet the needs of many jobs. However, only a single technology can no longer adapt to the characteristics of IoT industry development with many kinds of technologies and wide applications. At the same time, such industry characteristics also determine that it is difficult to look for cooperative enterprises. Few enterprises involve technologies that can cover the entire technology chain of IoT, and apply the technologies to a comprehensive industry. Most of the enterprises in the whole industry are small and medium-sized enterprises, and involve many technical categories. How to focus on the target enterprises and choose a representative enterprise which is satisfied, representative and promotional are valuable research issues.

3. School-Enterprise Cooperation Model with Industrial Park as Link

In view of the characteristics of IoT industry, most of the enterprises are small and medium-sized enterprises. Selecting a single enterprise for school-enterprise cooperation has certain limitation. How to choose a suitable cluster of small and medium-sized enterprises is the key problem to obtain better school-enterprise cooperation effect. There are two kinds of suitable operation modes. One is to cooperate with the large enterprises that build the platform. The large platform can further radiate the effectiveness of cooperation. Another one is to cooperate with local industrial parks. And then a cooperation can be carried out between the Small and medium-sized enterprises included in the industrial parks. Both approaches are feasible. The former is more common, and the latter can produce better benefits.

Considering that industrial parks provide important support for local economic development, small and medium-sized enterprises are the core force of major industrial parks. At present, most of these small and medium-sized enterprises have the problem of employment. They

spend lots of time cultivating talents, but it is difficult to retain talents. By cooperating with schools, we can not only solve the talents shortage of enterprises, but also better support the development of local industries. Local industrial parks are usually not far away from schools. They can better improve the quality of personnel training and achieve the goal of personnel training in Higher Vocational Colleges by means of enterprise strength, teaching by engineers and students' practice. For the industrial park itself, the responsibility of the park management units is to better support the enterprises. They are very familiar with the enterprises. They can select suitable enterprise groups to cooperate with the school. Through the connection with the school, they can solve the practical problems of the enterprises, better serve the enterprises and enhance the strength of the entire industrial park.

The concrete cooperation mode includes the following aspects.

1. Clarifying the Purpose of Cooperation

School, enterprises and the industrial park should uphold the tenet of "facing the future, strengthening cooperation, sharing resources, mutual benefit and common development". They should establish and develop friendly and cooperative relations in good faith. All of them should give full play to the advantages and further strengthen school-enterprise cooperation. By clarification common interests of schools, industrial parks and enterprises, they can establish long-term and stable cooperation mechanism. Finally, all of them can achieve the goal of mutual benefit and win-win cooperation. A new situation of school-enterprise cooperation can be created, which is significant for to the social and economic development of Suzhou.

2. Schools and industrial parks perform their respective functions

In the whole cooperation, schools and industrial parks need to perform their respective duties. The school is responsible for the quality of personnel training. Industrial park is responsible for screening the high-quality enterprises of professional counterparts in the platform for docking. During the implementation process, the cooperative enterprises are urged to invest and provide necessary supports in the fields, equipment and personnel. Regularly communication and visits can be organized between schools and enterprises. Industrial park can investigate the situation of school-enterprise cooperation as a third-party platform, and provide support for further improving of the cooperation quality.

3. Flexible forms of cooperation

The form of cooperation is flexible. The Industrial Park screens suitable counterparts. Enterprises and schools further cooperate in the form of order class, name class and other personnel training. Other cooperation can also be carried out like joint scientific research, tackling key problems, providing enterprises with technical training, academic upgrading and so on.

4. Conclusion

Based on the analysis of the characteristics of IoT industry, this paper puts forward a cooperation mode with industrial parks as a link. Through the link role of industrial parks, it can solve the problem of difficult employment of small and medium-sized enterprises in the process of regional industrial development. Through flexible forms of cooperation, we can achieve win-win situation among schools, enterprises and industrial parks.

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References

- [1] Information on:http://www.gov.cn/zhengce/content/2019-02/13/content_5365341.htm
- [2] Editor of Radio Frequency World. Reality and Dilemma of Internet of Things in China [J].Radio Frequency World, vol.6(2012),p25-27. (in Chinese)
- [3] Yang Dachun. Competitive Advantage and Strategic Choice of Developing Internet of Things Industry in Wuxi [J]. Jiangnan Forum, vol.6, (2009), p18-21.(in Chinese)
- [4] Inventory of the development of intelligent logistics in 2018 will show five trends in 2019.Logistics Science and Technology[J], vol.42, (2019), No.1,p2-3.(in Chinese)
- [5] Stogner, Lee. An introduction to the Internet of Things from the perspective of the IEEE Internet of Things initiative. 2015 International Conference on Collaboration Technologies and Systems (CTS) [J]. 2015,p506-506.
- [6] Ratasuk R, Vejlgaard B, et al. NB-IoT system for M2M communication, IEEE Wireless Communications & Networking Conference [C]. 2016. P428-432.