

# Research on the Certificate accommodation scheme of “Industrial Robot Vision and Sensing Technology” under the “1+X” certificate system

Huabing Li

Leshan Vocational and Technical College, Leshan 614000, China

**Abstract:** In the exploration of “1+X” certificate system under the professional course of industrial robot technology certificate accommodation scheme, analyze the connotation of “1+X” certificate system, Aiming at the problems existing in the school, such as the mismatch between the professional courses of industrial robot technology and the vocational skill level certificate of “Industrial Robot Application Programming”, the low integration between the course content and the vocational skill level standard, and the lagging construction of professional teaching resource base, taking the course of “Industrial Robot Vision and Sensing Technology” as an example, According to the teaching practice, a professional course system matching the vocational skill level standard should be constructed, a diversified and integrated teaching resource library should be created to realize the integration of courses and certificates, and the “1+X” certificate system should be integrated into the whole process of talent training.

**Key words:** 1+X certificate; Industrial robot vision; And credit accommodation

## 1. Introduction

“1+X” certificate system is a new talent training mode, which combines academic certificate and vocational skill level certificate, and organically integrates academic education and vocational training. “1+X” certificate system is an important system innovation implemented in vocational colleges, so that vocational college students can obtain the effective connection between academic certificate and vocational skill level certificate upon graduation. It is helpful for deepening the reform of education and teaching, promoting the integration of industry and education, school-enterprise cooperation, improving the quality of personnel training, and stimulating students’ enthusiasm, initiative and creativity in learning. It is of great significance to promote the high-quality development of the socialist education cause with Chinese characteristics in the new era.

This paper mainly aims at the “1+X” industrial robot application programming vocational skill level certificate, which is not only applicable to industrial robot technology majors, but also to industrial robot related majors such as machinery manufacturing and automation, intelligent manufacturing technology, numerical control technology and so on. By exploring the integration of the “Industrial Robot Vision and Sensing Technology” course certificate under the “1+X” certificate system as an example, this paper analyzes the connotation of the “1+X” certificate system. In view of the existing problems in schools, such as the mismatch between professional courses and vocational skill level certificate standards, the low integration between course content and vocational skill level standards, and the lagging construction of professional teaching resource base, etc. Put forward the strategy of course integration of “Industrial robot vision and sensing technology” under “1+X” certificate system. According to the current teaching situation, the “1+X” certificate system is closely combined with the course system, course content, course assessment methods, course resources, etc., to promote the organic connection of “1” and “X”, and improve the quality of vocational education and students’ employability.

## 2. Analysis of the current teaching status of industrial robot vision and sensing technology courses

### 1. The curriculum training goal is not comprehensive

With the rapid development of intelligent manufacturing, the application of industrial robots in production is more and more extensive, and the demand for industrial robot vision is also higher and higher. Industrial robot Vision and Sensing Technology course, as the core course of intelligent manufacturing professional group, is a comprehensive course involving machine vision installation and debugging, software debugging, vision scheme design, vision system development, mechanical design basis, automation integration, image processing technology, etc., which integrates multiple disciplinary knowledge. At present, the training of industrial robot vision and sensing technology talents is based on industrial machine technology and control theory, and takes industrial robot vision and sensing technology as the core, with a relatively single training goal.

### 2. The course content is out of step with the industry demand

Due to the influence of various objective factors such as resources and capabilities, the deployment of industrial robot vision and sensor technology course content is too simple, focusing on the installation and debugging of industrial robot vision hardware, while the industry needs comprehensive talents who are integrated in the design and development of robot vision software, visual scheme design, information processing and automation technology. At this stage, there is a gap between the teaching content and the needs of the industrial robot vision industry. In addition, there are also problems that the teaching content is difficult to reflect the certificate requirements in the “1+X” certificate system, such as: “image processing”, “deep learning” and other vocational skill level certificate content can not be effectively integrated into the “industrial robot vision and sensing technology” teaching.

### 3. The teaching means lack of new ideas

Robot vision course has the characteristics of advanced, comprehensive and practical. However, due to the limitations of teaching

conditions and teaching methods, the existing teaching methods are mainly classroom teaching. For example, when teaching the contents of “image processing” and “image analysis”, due to the limited training conditions, the teacher can only pass on the basic theory of the content to the students through multimedia explanation. However, the traditional classroom teaching method has some drawbacks. Teachers usually explain knowledge points by PPT or blackboard. Since they cannot show the situation on the spot in real time, students can only learn and understand through books, and there are not many opportunities for intuitive experience, resulting in students being unable to combine theoretical knowledge with practical application.

4. Traditional assessment methods

At present, the assessment of the course of industrial robot vision and sensing technology is mainly carried out by the method of theoretical examination and daily homework. This assessment method can test the degree of students’ mastery of the course knowledge to a certain extent, but it cannot effectively test students’ practical operation ability and innovation ability. There are two reasons for this phenomenon: first, teachers do not integrate theory and practice well in the teaching process, resulting in students unable to combine theoretical knowledge with practice in the learning process; Second, the single final assessment content is designed according to the teacher’s content, which can not reflect the students’ learning situation of the course.

5. Unreasonable structure of the teacher team

At present, although the teachers engaged in the teaching of industrial robot vision and sensing technology have deep attainments in machine vision theory, they are not familiar with the assessment standards of vocational skill level certificates and the integration of certificate standards into the classroom, which results in the lack of “double quality” teachers in the industrial robot vision and sensing technology teacher team.

6. Lack of curriculum resources

The construction of teaching resource bank plays a very important role in teaching reform and is an important guarantee for the training of high-quality technical talents. However, there are still some problems in the construction of school teaching resource bank at present. First, the construction of the curriculum resource database is lagging behind, the existing teaching resource database is not comprehensive, the lack of professional practical skills training content, can not meet the needs of students practical training; Second, the existing resource base is short of updating and expanding, and teaching reform cannot be separated from the support of teaching resources. At present, the content of the existing teaching resource base is relatively simple and outdated, which cannot meet the needs of students’ independent learning. The third is the lack of effective supervision and evaluation mechanism for the construction of the existing teaching resource library, and the lack of scientific and effective supervision and evaluation of the teaching process.

### 3. The integration path of industrial robot vision and sensing technology curriculum

1. Restructuring of certification financing system

At present, the same major is divided according to different disciplines or different training objectives, and the implementation of parallel curriculum certificates, but there are problems such as high repetition rate of professional course content, insufficient connection between the same or similar professional courses, and unreasonable curriculum structure between the same or similar majors.

In order to promote the construction of “1+X” certificate system, integrate the training content of vocational skill level certificate into the professional teaching system, and promote the organic integration of professional courses and vocational skill level certificate, based on the analysis of the teaching status of “Industrial robot vision and sensing technology” specialty, take the vocational skill level certificate of Industrial robot technology Application programming as an example. Integrate the training content of the vocational skill level certificate in the 1+X certificate system into the professional teaching system, and integrate the knowledge, skills and attitudes required by the vocational skill level certificate into the talent training program, so as to break the unreasonable course structure and teaching content system in the existing talent training system. On the premise of keeping the basic framework and core content of the original professional talent training program unchanged, the course of industrial robot vision and sensing technology is reconstructed and adjusted (Figure 1). At the same time, corresponding suggestions are put forward for the implementation of curriculum certification integration in subsequent courses, so as to ensure the quality of talent training.

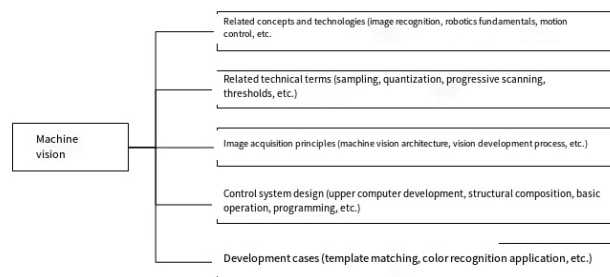


FIG. 1 Course structure of robot vision

2. The content of the course is hierarchical

Analyze the connection between the machine vision requirements and the industrial robot vision and sensor technology course content in the industrial robot application programming vocational level, integrate the vocational skill level certificate requirements into the course teaching at different levels, pay attention to the order from easy to difficult, and achieve the course content layer by layer. At the same time, according to the latest professional ability needs of machine vision industry posts, timely update and adjust the teaching content, so that the

course content can realize the transformation from fragmentation to hierarchy.

In the course of industrial robot vision and sensing technology, taking industrial robot as the carrier and machine vision as the core, the machine vision is applied to the design, manufacturing, debugging and other links of industrial robot products, so as to realize the operation control and environmental control of industrial robots and realize the intelligence of industrial robots. The course includes the structure and working principle of the machine vision system, the calibration of the machine vision system, image processing technology, target detection and recognition technology, image processing technology application, motion control and so on.

### 3. The teaching means from teaching to learning pluralistic change

Centering on the vocational skill level standards, the teaching mode of “project-based and task-driven integration of class certificates” is built. Students make full use of various resources to complete the independent exploration and learning of the curriculum tasks introduced by the vocational skill level norms and standards; Teachers play the role of guides and answer questions when students encounter problems, so as to realize students’ independent exploration learning. In the teaching process, it is necessary to integrate a variety of teaching methods, such as lecturing method, case analysis method, task-driven method, project teaching method, etc. At the same time, it is also necessary to introduce virtual simulation environment and virtual simulation experiment platform to enrich teaching methods.

### 4. Diversified transformation of assessment methods

The traditional assessment method adopts the usual homework + final scores. To solve the problem of the unicity of such assessment methods, practical operation assessment and project report are added in the final assessment process to improve the proportion of practical operation assessment, so that students can better master professional knowledge and practical operation skills. In addition, some comprehensive application test items can also be designed according to the characteristics of this course. For example, in the machine vision detection task design target detection, parameter identification, position measurement and other test items. In the final exam, some comprehensive practical test items can also be added, such as visual calibration, location information recognition, visual measurement and other test items in robot grasping tasks.

### 5. Practice and innovation to build “double master”

Practical training teaching should be innovative, and teachers should take the lead. Teachers’ words and deeds, their own quality and innovation ability directly affect the quality of students’ training. For the purpose of cultivating teachers’ “double quality”, teachers are encouraged to participate in temporary training and social practice in enterprises, so as to improve their practical teaching ability. At the same time, encourage the team teachers to actively apply for machine vision-related vocational skill level certificates and assessors, and improve the understanding of the assessment standards of vocational skill level certificates.

### 6. Diversification of curriculum resources

Combine the actual situation of “1+X” of the school. On the one hand, through the school library, enterprise research and other ways to obtain the assessment outline and standards of corresponding certificates, with electronic teaching plans as the carrier, through the smart vocational education platform and network teaching platforms such as Super star learning to produce supporting electronic textbooks, and paper textbooks complement each other; For some of the content that is difficult to present in paper textbooks, it can be supplemented by animation, video and other forms. On the other hand, offline resources can be combined with online resources to establish a comprehensive stepped online resource library of elementary, intermediate and advanced courses. Make full use of the network teaching platform to implement the supervision and evaluation of the teaching process, and realize the all-round monitoring of the teaching process.

## 4. Conclusion

Teachers should combine the “1+X” certificate training content with reference to the corresponding vocational skill grade standards, market-oriented and practice-oriented, improve the existing teacher team, teaching methods, textbook content, assessment and evaluation system, so that the practical application ability of students’ knowledge system can be improved. For students, they should actively master new skills and obtain as many “X” certificates as possible, which will help to enhance their employment and entrepreneurial skills.

Through the integration of class certificates, the course system of industrial robot vision and sensing technology is rebuilt, teaching content is optimized, teaching methods are reformed, and multiple and integrated teaching resources are created, etc., so as to realize the docking and integration of the course of “Industrial robot Vision and Sensing Technology” under the “1+X” certificate system and vocational skill level certificate standards. Integrate the “1+X” certificate system into the whole process of talent training, and improve students’ professional quality and post skill level.

## References:

- [1] Linshan Liu. The significance, dilemma and Guiding Strategy of the implementation of 1+X Certificate System from the perspective of learners [J]. Education and Occupation,2021(6):13-18.
- [2] Xiaoyan Xu. Curriculum Reform of Intelligent Control Technology Major in Higher Vocational Colleges under the “1+X” Certificate System -- A case study of Robot Vision System Technology course [J]. Education Forum,2022(9):165-168.
- [3] Menghua Liu. A Study on Course Construction of Accounting Major under “1+X” Certificate System -- A case study of Cost Accounting and Management Course [J]. China Management Informatization,2023(3).
- [4] Xuecan Li. Exploration on Course Reform of Instrument Analysis under the background of “Curriculum and Credit Integration” [J]. Journal of Jilin Engineering and Technology Normal University,2023,39(06):66-70.

**Author Introduction:** Li Huabing (1990-), male, Han nationality, Luzhou, Sichuan, Bachelor degree, lecturer. His research interests include Mechatronics, Industrial robot.