Research on Ideological and Political Education of Industrial Robot Course Under the Three Fusions Mode

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Abstract. Industrial robots is the core course of intelligent manufacturing, and it has the responsibility of delivering intelligent manufacturing talents to social enterprises. In this paper, the "ideological and political elements" such as the noble feelings of patriotism and love for the people, the professional spirit of love and dedication, the cooperative spirit of unity and cooperation, the work style of combining theory with practice, and the innovative spirit of pursuing excellence are effectively integrated into the industrial robot curriculum. With the cultivation of "craftsman spirit" as the soul, we will actively integrate ideological and political education into learning goals, learning content and learning methods, and through the whole process of this "three fusions" teaching mode.

Keywords: three fusions · industrial robots · ideology and politics

1 Introduction

Combined with the ideological and political connotation construction of the curriculum, the curriculum standards for industrial robots are re-established. The original goal of the course is to improve students' industrial robot operation and programming skills, focusing on cultivating students' robot operation ability to meet the needs of enterprises for skilled talents. On the basis of knowledge goals, skills goals, and attitude goals, the current course adds new elements of ideological and political education. Including cultivate the great country craftsman spirit of excellence and responsibility, improving the professional quality of unity and cooperation, honesty and trustworthiness, and having a safe, civilized, green environmental awareness of production and so on.

2 Teaching Mode of the Three Fusions

Ideological and political education is integrated into learning goals: The course team guides students to think about the applications of robotics in daily life and production, and What is the connection with the national "manufacturing power strategy". Integrate ideological and political education into learning goals, guide students to establish family

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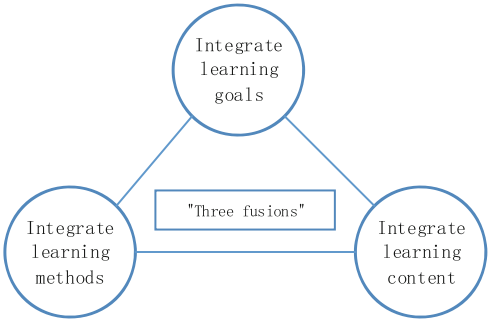

Fig. 1. Three fusions course

and country feelings, establish a correct world outlook, outlook on life and values, and stimulate desire for strong skills and interest in learning.

Ideological and political education is integrated into the learning content: According to the requirements of the "project-led, task-driven" teaching model. The course team deconstructs and reconstructs the original course content. The course content is divided into several teaching situations, and each situation is integrated with relevant ideological and political elements.

Ideological and political education is integrated into learning methods: The course team finds out the corresponding learning methods according to the knowledge characteristics of each learning task. Through the teaching methods of group discussion and competition between groups, create a learning atmosphere where you catch up with me. In practice, we should cultivate students' spirit of responsibility and teamwork, and improve collective cohesion and sense of honor [6] (Fig. 1).

3 Teaching Situation Setting

According to the project-led, task-driven teaching mode, with FANUC industrial robots as the carrier, the original course content is deconstructed and reconstructed. The course is designed into seven teaching situations, including: jogging robot, coordinate system setting, program management and execution, tool replacement programming, OFFSET control command, I/O signal configuration, and robot palletizing. Each situation incorporates relevant content of ideological and political elements (Fig. 2).

3.1 Jog the Robot

The elements of love and dedication should be integrated into the practical training process. Love and dedication is a valuable professional moral spirit and quality, and it is a comprehensive expression of people's high loyalty, love and responsibility for their profession. After the course practice, students are required to keep the environment of the training room clean and orderly, to return the robot to the original position, and to return the tools, workpieces, and teach pendants. These imperceptibly cultivate their

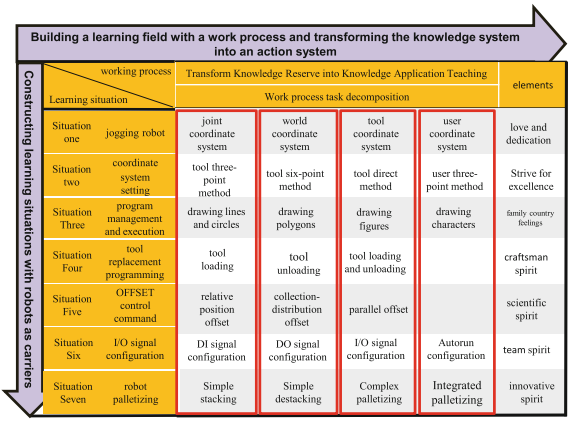

Fig. 2. Seven teaching situations

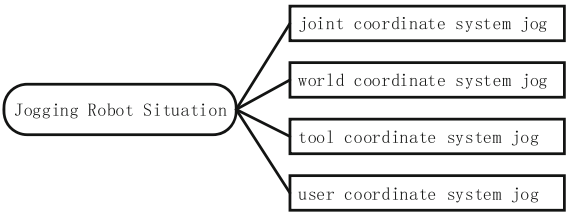

Fig. 3. Jogging robot situation settings

professional quality and consciously form the habit of practicing the 5S requirements of the factory environment [8].

Elements of safe production should be integrated into operational practices. Robot operation should be based on the principle of "safety first, prevention first", and be familiar with knowledge points such as operator safety and equipment safety. Every student participating in the practice must wear a safety helmet, and it is not allowed to place any part of the body in the fence, so as to cultivate a cautious industrial safety production awareness.

Use the robot as the carrier to construct the learning situation, construct the learning field with the work process, transform the knowledge system into the action system. It construct the learning fields of joint coordinate system jogging, world coordinate system jogging, tool coordinate system jogging and user coordinate system jogging in the situation. As shown in Fig. 3. Experience the movement characteristics of different coordinate systems and master the movement direction of the robot. Train students to have a work attitude of devotion to their jobs and safe production. The list of industrial robot coordinate systems is shown in Fig. 4.

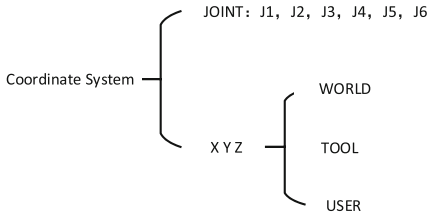

Fig. 4. The list of coordinate systems

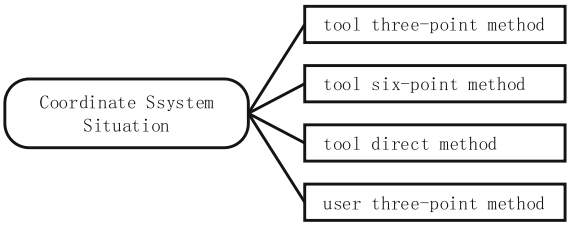

Fig. 5. Coordinate system situation setting

3.2 Coordinate System Settings

The elements of excellence should be integrated into the practical training process. In the process of work, from shallow to deep, step by step. In the coordinate system setting project, the robot equipped with pen tool needs to approach the thimble safely without collision through the teaching pendant. Master the operation of single axis, linear and repositioning motion. The group members set up a method one by one to compare whose setting is more accurate and perfect, stimulate the enthusiasm of skill training.

Adhering to the characteristics of the action teaching system with repeated knowledge points and non-repetitive learning content in the work process, the three-point method, six-point method, direct method of tool coordinate system, and three-point method of user coordinate system are constructed in the situation. It is necessary to use theory to guide practice, and then use practice to verify the theory, repeatedly debug and verify, and pursue perfection. Cultivate the professional quality of excellence, overcome the fear of difficulties, and cultivate the will and perseverance of self-discipline and progress despite difficulties [4]. As shown in Fig. 5. The process of tool coordinate setting of industrial robot is shown in Fig. 6.

3.3 Program Management and Execution

The elements of family and country feelings should be integrated into the practical training process. Patriotism is a rock-solid emotion and belief, and an inexhaustible driving force for national development. Through the integration of "family and national feelings" into the robot programming course, students are encouraged to study seriously, and keep pace with the times. In the practical operation of the "painting" project, setting up links such as drawing national flag graphics, drawing slogans and words, establishing

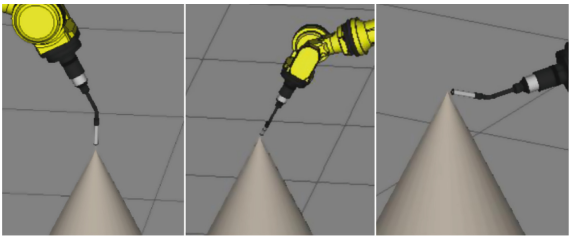

Fig. 6. Tool coordinate setting

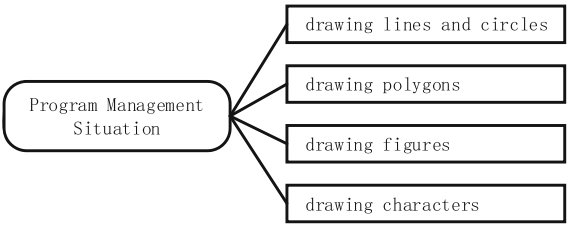

Fig. 7. Program management situation settings

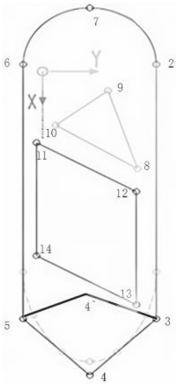

Fig. 8. Drawing polygon scheme

a correct outlook on life, world outlook, and values, and becoming a national builder and successor [1].

The situation is set from easy to difficult, and the learning content is gradual. In the situation (painting), the learning fields of drawing straight lines and circles, drawing polygons, drawing figures, and drawing characters are constructed. Taking the national flag graphics and characters as the elements, seek the best movement trajectory, draw the best patterns, create a good patriotic atmosphere. As shown in Fig. 7. The industrial robot drawing polygon scheme is shown in Fig. 8.

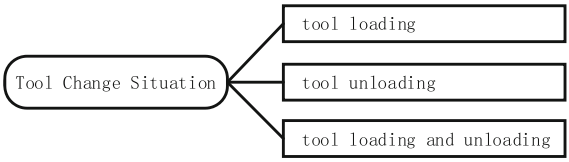

Fig. 9. Tool change situation settings

3.4 Tool Replacement Programming

The elements of craftsman spirit should be integrated into the practical training process. Craftsman spirit refers to the spiritual concept of being meticulous and striving for perfection in one's own products. Practitioners should not only have superb skills and skills, but also have a rigorous, meticulous and responsible working attitude. In the process of robot teaching, especially at the teaching target point, students are required to be very focused, patient and meticulous. In the practical operation of the tool replacement project, students are not proficient in the rocker of the teaching pendant, and the problems of collision or jamming between the flange of the sixth axis of the robot frequently occur. It leads to students' fear of difficulties and loss. There is no shortcut to learn robot skills. Only by "calming down, observing carefully, practicing hand feeling", strengthening solid basic skills, that can make our eyes sharp and debug robots conveniently.

A progressive process from simple to complex, from single to comprehensive is realized between situations. The learning area of tool loading, unloading and tool loading integration is constructed in the situation. It can help students understand the concepts of HOME point, transition point, approach point, pickup point, and escape point, understand the difference between line command L and joint command J, and know the importance of adding WAIT command after action command. Cultivate the craftsman spirit of excellence, dedication and innovation in students. As shown in Fig. 9.

As shown in Fig. 10, taking the tool loading as an example, planning the path points of the industrial robot loading tools, especially in the assembly process of shafts and holes, requires concentration, patience and meticulous operation of the robot. Effectively cultivate students' craftsman spirit with sharp eyes and quick hands.

3.5 OFFSET Control Command

Elements of scientific spirit should be integrated into the practical training process. The scientific spirit is the common belief, value standard by people in the long-term scientific practice activities. It is necessary to be good at discovering and asking questions, and to boldly question and verify through experiments. In the actual operation of the "OFFSET" project, there are often problems such as incorrect offset direction, inaccurate offset position and offset times. In the scientific spirit of critical questioning and courageous exploration, check whether the correct user coordinate system is used, whether the correct offset distance is input. Using a scientific way of thinking to understand things and solve problems, It helps to develop a rigorous and meticulous work style [7].

The ability modules are gradually integrated in the repeated work process, and the learning fields of relative position offset, collection-distribution offset and parallel offset

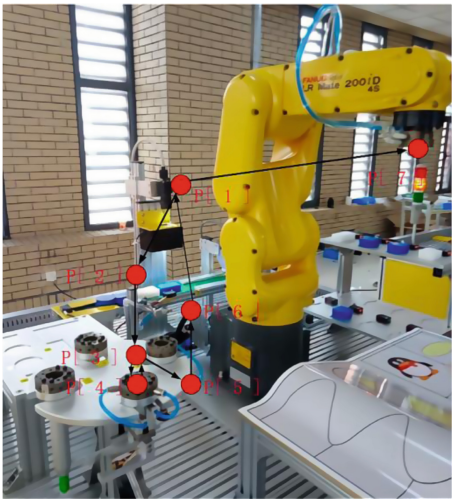

Fig. 10. The path points of the industrial robot

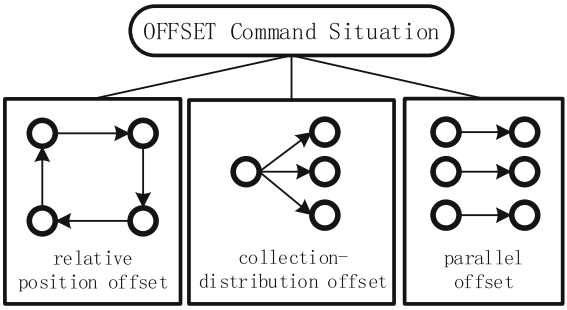

Fig. 11. OFFSET command situation setting

are constructed in the situation. In the OFFSET situation, gradually use the coordinate system command, speed multiplier command, start timer command, etc., It can cultivate students' awareness of independent thinking, so that students' ability and learning enthusiasm are continuously improved. As shown in Fig. 11.

As shown in Fig. 12, we take the collection and distribution offset as an example. We execute the square track and cycle in different areas. It is necessary to scientifically add the offset command at the location point, scientifically judge the offset direction, and scientifically clarify the offset distance, so that the scientific spirit runs through the working process [5].

3.6 Robot I/O Signal Configuration

Elements of team spirit should be integrated into the practical training process. Team spirit is the shared values of team members and the organization, and its core is a

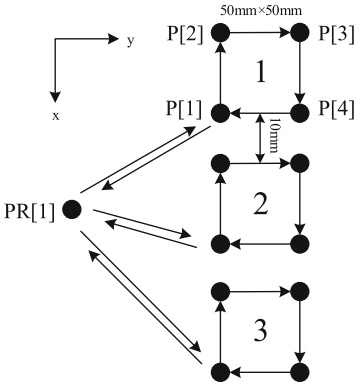

Fig. 12. Collection-distribution offset

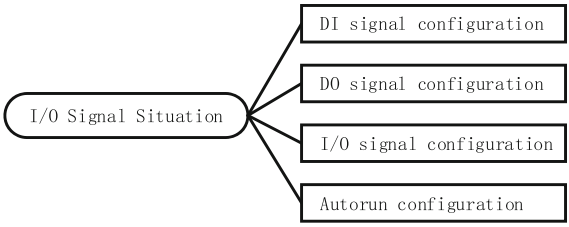

Fig. 13. I/O signal situation settings

dedication spirit of unity, cooperation and complementary advantages. Team can stimulate individual creativity and improve organizational performance and innovation. In the practice session, the I/O signal configuration exercise of the robot is carried out in groups. Student A controls the teach pendant, configures signals and performs signal; student B helps to measure and observe the signal information between the robot and peripheral devices, and timely check whether the robot signal is correct. And in the exchange of students' roles, students' awareness of teamwork is stimulated, the good habit of being willing to cooperate and like to cooperate, cultivate the quality of empathy and service to others, and improve teamwork ability.

The project setting realizes the goal of practicing cognitive loop through learning by doing, doing and learning. In the situation (I/O signal configuration), learning fields such as DI signal configuration, DO signal configuration and I/O signal configuration are constructed. Cultivate students' professional quality of unity and cooperation. As shown in Fig. 13.

As shown in Fig. 14, taking the I/O signal configuration as an example, it is necessary to complete the hardware wiring, I/O signal configuration and I/O signal debugging in the form of a team. Effectively cultivate students' ability to help each other and learn to communicate.

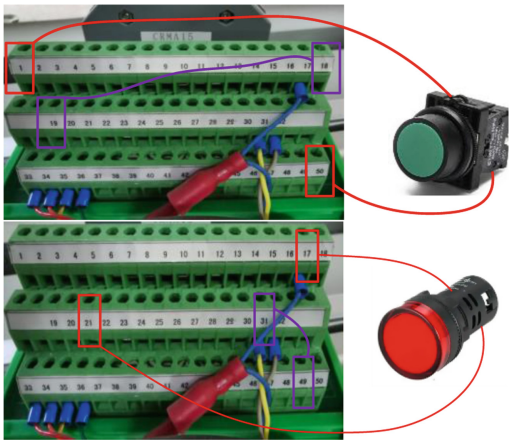

Fig. 14. I/O signal configuration

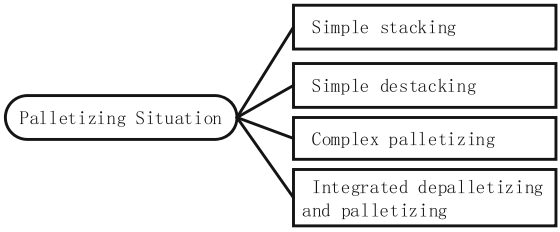

Fig. 15. Palletizing situation settings

3.7 Robot Palletizing

Elements of innovative spirit should be integrated into the practical training process. The spirit of innovation is the ability to use existing knowledge, information, skills and methods comprehensively, to propose new methods and new ideas, and to carry out reforms and innovations. There are many ways to write programs in the stacking programming project, so we need to innovate ways when facing problems. Encourage every student to make breakthroughs in key technologies and form an innovative atmosphere. This requires that in the process of practical learning, students should be inspired to solve problems with new ideas [2].

According to the requirements of real environment, real learning, real doing, and mastering real skills, we build learning fields such as simple stacking, simple destacking, complex palletizing, integrated depalletizing and palletizing in the situation. Challenge the diversification of palletizing forms, cultivate students' innovative spirit of pursuing excellence, as shown in Fig. 15.

As shown in Fig. 16, taking integrated depalletizing and palletizing as an example, it is necessary to flexibly use the stacking B and stacking E instructions, innovate and plan a safe path, and effectively improve students' ability of scientific and technological innovation [3].

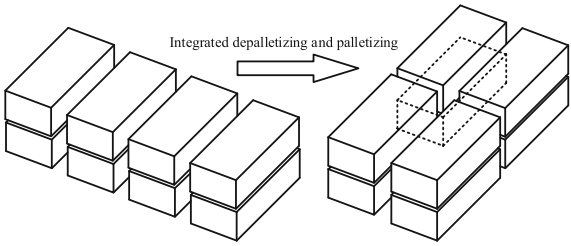

Fig. 16. Integrated depalletizing and palletizing

4 Conclusions

Teachers must not only master the professional knowledge of the course, but also understand the background knowledge of each situation point, dig out the ideas behind the situation point, and impart these ideas to the students in combination with the course knowledge points. In the industrial robot course, the course team combines industrial robot ideological and political textbooks to discover celebrities and stories about industrial robots, learn and promote their patriotic feelings, effectively integrate all elements into learning goals, learning content and learning methods, cultivate and Create a high-quality, dynamic manufacturing talent team.

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