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Fusing Technical Competence and Socialist Values: Ideological-Political Teaching in Industrial Robot Modeling

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Abstract

This paper presents the design and implementation of the course Application System Modeling of Industrial Robots, a professional mandatory course aimed at cultivating both technical and ideological competence in vocational college students. The course utilizes project-based teaching methods to engage students in practical robot modeling tasks using SolidWorks and integrates six core ide-ological elements—teamwork, integrity, innovation, standardization, crafts-manship, and patriotism—into its content delivery. Through a "Four-Dimensional, Six-Element, Four-Stage" ideological-political framework, this course supports students in acquiring modeling skills while fostering their moral development, professional ethics, and social responsibility. A mul-ti-dimensional feedback and evaluation mechanism ensures sustained im-provement and long-term impact.

Keywords

Industrial robots; system modeling; vocational education; project-based learning

1. Introduction

With the accelerating demand for intelligent manufacturing, industrial robots have become essential in China's "machine substitution" strategy. The vocational course Application System Modeling of Industrial Robots aims to equip students with practical skills in 3D modeling[1], while embedding ideological and political education throughout the learning process[2]. The course not only serves technical learning goals but also functions as a vital carrier of moral education, in line with the national education objective of "establishing morality and cultivating people"[3].

2. Course Design and Teaching Objectives

The course targets second-year students majoring in Industrial Robotics Technology

and adopts a hybrid format with online and offline components. The main learning goals are:

To master the basic operations of 3D modeling (sketching, constraints, extrusion, chamfering, assembly, etc.);

- To complete typical robotic system design tasks aligned with real-world industry demands;
- To instill the values of cooperation, responsibility, precision, and service to the nation;
- To foster independent learning, teamwork, and innovation awareness.

3. Evaluation and Feedback Mechanism

A multi-dimensional evaluation system has been established based on the OBE (Outcome-Based Education) concept[4]:

- Process Assessment: Class attendance, modeling exercises, participation in discussions
- Online Assessment: Quizzes, microlecture viewing, assignment submission
- Final Assessment: Written theory test + practical modeling test
- Ideological Assessment: Reflection journals, teamwork evaluation, creativity in design

In addition, a long-term and short-term feedback loop has been built:

- Long-term feedback: Alumni surveys
- Short-term feedback: In-course peer and teacher feedback, expert reviews

These mechanisms help ensure continuous optimization of both teaching quality and ideological-political effectiveness.

4. Innovations and Achievements

Three-Dimensional Curriculum Framework: The course features a "Three-Dimensional, Four-Link, Six-Element" framework that fully integrates ideological values into technical instruction.

Resource Sharing and Expansion: A shared ideological-political education resource database has been built with over 500 multimedia items.

Awards and Recognition: The course team has won municipal and provincial teaching competitions, and trained over 200 students for national-level skills certifications.

Sustainable Development Mechanism: QR-code integrated teaching materials, online cases, and digital micro-courses support continuous learning and expansion.

5. Case Study: Python-Based Robot Modeling

In the practical component, students use Python to build and simulate a robotic arm model using D-H parameters. They animate the robot's motion path and discuss technical challenges as well as the role of robotics in national development. This

combines hands-on skills with ideological reflection.

6. Conclusion

Application System Modeling of Industrial Robots serves as a successful model of integrating technical training with ideological and political education. Through innovative curriculum design, real-case-based teaching, and multi-source evaluation, the course not only enhances student competencies but also nurtures moral values and national responsibility. Future efforts will focus on expanding the case library, improving feedback loops, and enhancing cross-disciplinary collaboration to further promote high-quality development in vocational education.

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References

[1] Shi Q .Modeling and Parameter Identification of a 3D Measurement System Based on Redundant Laser Range Sensors for Industrial Robots[J].Sensors, 2023, 23.DOI:10.3390/s23041913.

[2] Abele E , Weigold M ,S. Rothenbücher.Modeling and Identification of an Industrial Robot for Machining Applications[J].CIRP Annals - Manufacturing Technology, 2007, 56(1):387-390.DOI:10.1016/j.cirp.2007.05.090.

[3] Karlsson R , Norrlof M .POSITION ESTIMATION AND MODELING OF A FLEXIBLE INDUSTRIAL ROBOT[C]//IFAC (International Federation of Automatic Control) World Congress.0[2025-03-25].DOI:10.3182/20050703-6-CZ-1902.01312.

[4] In Naturesociety D D .Retracted: Dynamic Simulation Modeling of Industrial Robot Kinematics in Industry 4.0[J].Discrete Dynamics in Nature & Society, 2024.DOI:10.1155/2024/9757491.