

Research on Application System Modeling of Industrial Robots and Its Integration with Ideological and Political Education

Zhiqing Chen. Qinghui Zhou. Zheng Shen and Luming Liu*

School of Intelligent Manufacturing, Wenzhou Polytechnic, Wenzhou 325035, China

Email: 1336684621@qq.com

How to cite this paper: Chen, Z., Zhou, Q., Shen, Z., & Liu, L. (2025). Research on application system modeling of industrial robots and its integration with ideological and political education. *Education and Social Work*, 1(1), 117-119. ISSN Print: 3079-515X; ISSN Online: 3079-5168.

<https://doi.org/10.63313/ESW.9010>

Published: 2025-03-31

Copyright © 2025 by author(s) and Erytis Publishing Limited.

This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Abstract

Industrial robots serve as a cornerstone of intelligent manufacturing and play a vital role in China's transformation towards high-end manufacturing[1]. This paper discusses the teaching design and technical structure of the "Industrial Robot Application System Modeling" course, highlighting its integration with ideological and political education. Through the introduction of motion and dynamic modeling methods (with relevant formulas), and the embedding of national strategic awareness, engineering ethics, and social responsibility, the course aims to achieve both technical training and value guidance. The study provides a practical path for cultivating technically competent and socially responsible engineering talents under the new educational paradigm.

Keywords

Industrial Robot; System Modeling; Curriculum Ideology and Politics; Dynamics

1. Introduction

Under the guidance of national strategies such as Made in China 2025, the industrial robot industry in China has seen rapid development, becoming a key pillar of intelligent manufacturing[2]. Higher education institutions must take the lead in aligning professional training with the core educational mission of "moral education and talent cultivation." The Application System Modeling of Industrial Robots course not only delivers foundational professional knowledge but also serves as an ideal platform for integrating ideological and political elements into science and engineering education[3].

2. Course Objectives

The course is designed to:

- Equip students with knowledge of robotic motion, kinematics, and dynamics

modeling;

- Develop their ability to analyze and simulate robotic systems using mathematical tools and software;
- Cultivate national consciousness, innovation spirit, and a sense of engineering ethics;
- Encourage students to link their technical skills with national development needs and industrial applications.

3. Integration of Ideological and Political Education

3.1. National Strategy Awareness

The course includes content on the evolution of China's robotics industry, from dependence on imports to independent innovation, inspiring students with national pride and a sense of historical responsibility.

3.2. Engineering Ethics

Discussions are held around safety design, system failures, and real-world implications, guiding students to understand their responsibilities as future engineers in ensuring public safety and societal well-being[4].

3.3. Project-Based Learning with Values

Students are assigned simulation projects such as designing a robot for a smart production line. During project presentations, they are encouraged to reflect on:

- How does this technology support national industrial upgrading?
- Have sustainability and social impact been considered in design?

4. 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.

5. Teaching Outcomes and Reflection

The course has shown positive results in both skill acquisition and value orientation. Students demonstrated the ability to complete system modeling tasks and expressed clearer understanding of concepts such as "technological self-reliance" and "engineering responsibility." The integration of ideological and political education into technical instruction proved to be seamless and impactful.

6. Conclusion

The Application System Modeling of Industrial Robots course effectively bridges professional training and ideological-political education. By combining theoretical

instruction, practical projects, and value-based discussions, the course enhances students' technical competence and national responsibility. Future work will focus on developing more interdisciplinary teaching resources and deepening the ideological elements embedded in technical learning.

Acknowledgements

This research was partially supported by the Municipal Curriculum Ideology and Politics Teaching Demonstration Course (Grant No. sszkc23015).

References

- [1] Xiao W , Huan J , Dong S .A STEP-compliant Industrial Robot Data Model for robot off-line programming systems[J].Robotics & Computer Integrated Manufacturing, 2014, 30(2):114-123.DOI:10.1016/j.rcim.2013.09.007.
- [2] Hoppe N , Hoffschulte J .Model-driven Engineering and Simulation of Industrial Robots with ROS[J]. 2022.DOI:10.5220/0010883600003119.
- [3] Zhang C , Li S , Zhang Z .Industrial robot arm dynamic modeling simulation and variable-gain iterative learning control strategy design[J].Journal of Mechanical Science & Technology, 2024, 38(7).DOI:10.1007/s12206-024-0644-5.
- [4] Gu X .Research on Visual Recognition Design of Industrial Robots Based on Panel Recognition Modeling[J].[2025-03-25].