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Exploration and Practice of the Talent Training Model of "Industry University Research Application Integration" in Robotics Engineering

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Abstract: With the rapid development of technology, robot technology has been widely applied in various fields, and the demand for robot engineering professionals is increasing day by day. In order to meet this demand, Chinese universities have successively established robotics engineering majors to cultivate high-quality talents with innovative spirit and practical ability. This article explores and practices the talent cultivation mode of robot engineering major based on the integration of industry, academia, research and application, aiming to provide reference for the teaching reform of robot engineering major in universities.

Keywords: robotics engineering major, industry university research application, talent cultivation mode, exploration and practice

Introduction

As a representative of high-end intelligent manufacturing, the robotics industry will become the core of manufacturing mode transformation and the engine driving the upgrading of the manufacturing industry in the new round of industrial revolution[1]. In this context, the cultivation of talents in robotics engineering is particularly important. However, traditional education models often focus on imparting theoretical knowledge and neglect the cultivation of practical and innovative abilities, resulting in a disconnect between talent cultivation and practical needs[2]. Therefore, exploring a talent cultivation model that integrates industry, academia, research, and application has become the key to improving the quality of talent cultivation in the field of robotics engineering.

1. Background and current situation

The proposal of Germany's "Industry 4.0" strategy marks the beginning of the fourth industrial revolution era globally, and the widespread use of industrial robots has become a significant feature of the new industrial revolution era[3]. In response to the global wave of Industry 4.0, China has proposed the "Made in China 2025" strategy, aiming to lead the transformation of manufacturing methods through intelligent manufacturing[4]. Against this backdrop, Chinese universities have successively established robotics engineering majors to cultivate high-quality talents with innovative spirit and practical ability.

According to the Notice of the Ministry of Education on the Announcement of the Filing and Approval Results of Undergraduate Majors in Ordinary Higher Education Institutions in 2019, as of 2020, 249 universities in China have opened undergraduate majors in robotics engineering[5]. These universities actively explore and practice the cultivation of robotics engineering professionals through different training modes and paths. However, there are still some problems,

such as unreasonable curriculum design, weak practical teaching links, and insufficient integration of industry, academia, and research, which have led to uneven quality of talent cultivation.

2. Path and strategy

2.1 Curriculum system reform

Build a curriculum system based on robotics, control science and engineering, computer science and technology, covering multiple fields such as mechanical design, electronic technology, automatic control, and artificial intelligence, laying a solid foundation for subsequent practical operations and innovation.

2.2 Strengthening the practical teaching process

Strengthen the practical teaching process, improve students' practical and innovative abilities, and cultivate high-quality talents that meet market demand. Specifically involving experimental teaching, internship training, and project cooperation, etc.

2.3 University-industry cooperation

Enhance cooperation with enterprises and research institutions, jointly carry out scientific research projects and talent cultivation work, and achieve resource sharing and complementary advantages. Specifically involving scientific research project cooperation, talent cultivation cooperation, and the construction of industry university research public service platforms.

3. Case analysis: Robotics engineering major adopts a talent cultivation model that integrates industry, academia, research, and application

3.1 Training objectives

Aim to cultivate high-quality composite talents with a sense of social responsibility, strong innovative spirit, and practical ability, as well as an international perspective. Students should possess basic knowledge and professional cultivation in robotics engineering, and be able to engage in research and development, integration, installation, debugging, maintenance, technical management, and sales operations of robots and automation systems.

3.2 Curriculum system

This study has established a curriculum system based on robotics, control science and engineering, computer science and technology, covering multiple fields such as mechanical design, electronic technology, automatic control, and artificial intelligence. By optimizing the curriculum, students can master the basic theories and skills of robotics engineering in a shorter period of time. At the same time, we will strengthen the practical teaching process and improve students' practical and innovative abilities through various forms such as experiments, internships, and project collaborations.

3.3 Practical teaching

This study has established an internship and training base through enterprise cooperation, providing students with a real working environment and tasks. Through practical teaching, students can deepen their theoretical knowledge and improve their practical skills. In addition, the college encourages students to participate in internships and employment opportunities with well-known domestic and foreign enterprises, broaden employment channels, and enhance students' career competitiveness.

3.4 Integration of industry-university-research-application

Collaborate with research institutions to jointly carry out scientific research projects and enhance students' engineering practical abilities. Through collaborative projects, students can participate in various aspects of enterprise research and development, production, sales, etc., understand market demand and industry trends, and enhance their ability to solve practical problems. At the same time, the college invites enterprise experts to serve as part-time teachers, imparting cutting-edge industry knowledge and practical experience to students, and improving the pertinence and effectiveness of teaching.

3.5 Integrated industry education public service platform

This study has established a public service platform for the integration of industry and education through industry

cooperation. The platform is committed to collaborating on technology research and development, achievement transformation, talent cultivation, and other aspects to promote the sustainable development of the robotics engineering profession. Through the platform, students can obtain more practical opportunities and resource support, improve their comprehensive quality and employment competitiveness.

4. Effect and inspiration

4.1 Implementation effect

The practical and innovative abilities of students have been significantly improved, and their employment competitiveness has been significantly enhanced. At the same time, through cooperation with enterprises, the college has achieved fruitful results in technology research and development, achievement transformation, and other aspects, promoting the sustainable development of the robotics engineering profession.

4.2 Inspiration

(1) Strengthening school enterprise cooperation: Adopting school enterprise cooperation can achieve resource sharing, complementary advantages, and improve the quality and effectiveness of talent cultivation.

(2) Optimize course offerings: Optimize course offerings based on industry demand, strengthen practical teaching, and enhance students' practical and innovative abilities.

(3) Building an industry education integration platform: providing strong support for talent cultivation, it can achieve resource sharing, complementary advantages, and promote deep integration of industry, academia, research, and application.

(4) Emphasize international perspective: Through cooperation with internationally renowned enterprises and research institutions, introduce advanced educational concepts and technological means, and improve the internationalization level of talent cultivation.

5. Conclusion and prospect

Practice has shown that the talent cultivation model that integrates industry, academia, research, and application plays an important role in improving the quality and effectiveness of talent cultivation. In the future, our school will continue to strengthen cooperation with enterprises and research institutions, optimize curriculum design and practical teaching, build an industry education integration platform, cultivate more high-quality talents with innovative spirit and practical ability, and contribute to the sustainable development of robotics engineering education in China.

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