The Value and Path of the Application of Artificial Intelligence Technology in Automatic Guided Vehicles from the Perspective of Commercialization

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Abstract

Intelligence is an important direction for the transformation and development of modern logistics systems. Automatic guided vehicles are the key equipment for the intelligent operation of modern logistics systems. In order to improve the commercialization capability of automatic guided vehicles, the functions of automatic guided vehicles must be continuously improved, so that automatic guided vehicles can adapt to more complex road environments and be applied to more application scenarios, so as to make the commercialization process of automatic guided vehicles more smoothly. Based on the perspective of the commercial operation of automatic guided vehicles, this paper uses the relevant theories of management science and computer technology to discuss the value and path of applying artificial intelligence technology to automatic guided vehicles from the perspective of commercialization. The conclusion is that artificial intelligence technology can enrich the function of the automatic guided vehicle, the optimization of the mechanical design of the automatic guided vehicle, and the improvement of the performance of the automatic guided vehicle, thereby expanding the application scenarios of the automatic guided vehicle, reducing the manufacturing cost of the automatic guided vehicle, and reducing the maintenance cost of the automatic guided vehicle. The path of applying artificial intelligence technology to automatic guided vehicles mainly includes the optimization of six fields including motion module, communication module, anti-collision module, power supply module, vehicle-mounted module, and AGVS monitoring and dispatching management system.

Keywords

Commercialization, Artificial Intelligence, Automated Guided Vehicles,

Technology Path

1. Introduction

With the continuous iteration and wide application of intelligent technology and automatic technology, the application of artificial intelligence technology in the manufacturing industry has become more and more extensive, and artificial intelligence technology has effectively improved the intelligent level of manufacturing products. Automatic guided vehicles are a typical case. Automatic guided vehicle refers to a transport vehicle equipped with automatic guidance devices such as electromagnetic or optical, which can travel along a prescribed guidance path, and has safety protection and various transfer functions. The rechargeable battery is its power source. With the continuous improvement of modern economic cooperation, the connection of regional economies is becoming more and more close, which requires the modern logistics system to be efficient, intelligent and scientific. In the modern logistics system, the automatic guided vehicle is the key equipment for the intelligent operation of the modern logistics system. The automatic guided vehicle can significantly improve the logistics efficiency of the manufacturing system, thereby improving the production efficiency of the entire production system. In logistics transportation, the transportation of various commodities through automatic guided vehicles can effectively improve the level of logistics automation, thereby reducing labor costs and transportation time, thereby improving the transportation efficiency of the logistics system, and ultimately greatly improving the efficiency of the logistics transportation system. It lays the foundation for the construction of logistics and transportation for the high-quality, stable and sustainable development of the national economy (Chu et al., 2002).

From a technical point of view, the positioning of the automatic guided vehicle during the movement is the most core technology, because it is the key guarantee to ensure the automatic operation of the automatic guided vehicle. The traditional navigation methods include electromagnetic navigation, two-dimensional code, non-marked navigation and other technical paths. Among them, electromagnetic guidance, as the most widely used automatic guided vehicle guidance method, has a simple and reliable guidance principle, is convenient for control and communication, and has no effect on sound and light. It has the advantages of low interference and low manufacturing cost, but at the same time, it has the disadvantages that the path is difficult to change and expand, and the limitation of complex paths is large. In view of this, based on the perspective of the commercial operation of automatic guided vehicles, this paper explores the value and path of the application of artificial intelligence technology to automatic guided vehicles, in order to provide theoretical references and policies for automatic guided vehicles to play a greater role in the intelligent transformation of modern

logistics systems. Suggest (Huang, 2012).

2. The Value of Applying Artificial Intelligence Technology to Automatic Guided Vehicles in the Perspective of Commercialization

Based on the perspective of the commercialization of automatic guided vehicles, this paper discusses the value of the application of artificial intelligence technology in automatic guided vehicles, which provides strong support for the application of artificial intelligence technology in the direction and path of automatic guided vehicles. From a commercial perspective, artificial intelligence technology can enrich the functions of automatic guided vehicles, optimize the mechanical design of automatic guided vehicles, and improve the performance of automatic guided vehicles, thereby expanding the application scenarios of automatic guided vehicles, reducing the manufacturing cost of automatic guided vehicles, Reducing the maintenance cost of automated guided vehicles is the value of applying artificial intelligence technology to automated guided vehicles from the perspective of commercialization. (Liu et al., 2009)

2.1. Artificial Intelligence Technology Can Enrich the Functions of Automatic Guided Vehicles and Expand the Application Scenarios of Automatic Guided Vehicles

Artificial intelligence technology can enrich the functions of automatic guided vehicles, which is the primary value of the application of artificial intelligence technology in automatic guided vehicles in the field of commercialization. Its core goal is to expand the application scenarios of automatic guided vehicles, thereby promoting the commercialization of automatic guided vehicles process.

First, the core function of automatic guided vehicles is to automate handling, thereby reducing labor costs and avoiding errors in manual operations. Through the use of artificial intelligence technology, automatic guided vehicles can help automatic guided vehicles to travel more accurately along the prescribed guidance path, thereby ensuring the improvement of automatic handling efficiency (Lu et al., 2003).

Second, the safety protection of handling goods is an important function of automatic guided vehicles. Through the application of artificial intelligence technology, the automatic guided vehicle can improve the safety protection function of the automatic guided vehicle, and at the same time enrich the other transfer functions of the automatic guided vehicle, so as to improve the safety of goods transportation, which is for the improvement of the transportation efficiency and efficiency of the modern logistics system., has a huge promoting effect that cannot be ignored.

Third, at present, automatic guided vehicles are mainly used for the transportation of indoor goods, and the transportation scenarios are mainly in closed indoor environments such as logistics warehouses and internal workshops. With the application of artificial intelligence technology, the functions of automatic

guided vehicles continue to be enriched and the performance continues to improve, and the technology of outdoor or semi-outdoor automatic guided vehicles will gradually improve and enter the application stage. For a long time, outdoor applications have been difficult for automatic guided vehicles, mainly subject to relatively harsh natural conditions, such as temperature, humidity, sunlight, fog, rain, snow and other weather. Through the application of artificial intelligence technology, the focus of future automatic guided vehicle applications will shift from indoors to outdoors (Shen, 2009).

2.2. Artificial Intelligence Technology Can Optimize the Design of Automatic Guided Vehicles and Reduce the Manufacturing Cost of Automatic Guided Vehicles

Artificial intelligence technology can optimize the design of automatic guided vehicles, which is the core value of the application of artificial intelligence technology in automatic guided vehicles in the field of commercialization. Its key goal is to reduce the manufacturing cost of automatic guided vehicles, thereby promoting the commercialization of automatic guided vehicles process.

On the one hand, artificial intelligence technology can scientifically optimize the design scheme by enriching the functions of automatic guided vehicles, so that the selection of various technologies and materials for automatic guided vehicles is more targeted, scientific and appropriate. The selection of scientific technical solutions can reduce costs and expenses on the basis of ensuring the stability of the core functions of automatic guided vehicles (Wang, 2017).

On the other hand, through the application of artificial intelligence technology, the function and performance of automatic guided vehicles can be improved through the combination of various technologies, and then the function and formation of automatic guided vehicles can be improved without increasing the manufacturing cost. It also effectively reduces the manufacturing cost of the automatic guided vehicle. On the basis of ensuring that product functions and performance are not reduced, by continuously reducing the manufacturing cost of automatic guided vehicles, this plays a very critical role in the further commercialization of automatic guided vehicles.

2.3. Artificial Intelligence Technology Can Improve the Performance of Automatic Guided Vehicles and Reduce the Maintenance Cost of Automatic Guided Vehicles

Artificial intelligence technology can improve the performance of automatic guided vehicles, which is the main value of the application of artificial intelligence technology to automatic guided vehicles in the field of commercialization. The core goal is to reduce the maintenance cost of automatic guided vehicles, thereby promoting the commercialization process of automatic guided vehicles.

First of all, the application of artificial intelligence technology will greatly improve the intelligent level of automatic guided vehicles, thereby reducing the wrong operation of automatic guided vehicles, reducing collisions, and reducing

the maintenance cost and operation cost of automatic guided vehicles in the later period. From the practical data, the maintenance and operation cost is an important cost of automatic guided vehicles. Through the application of artificial intelligence technology, the operating cost and maintenance cost of automatic guided vehicles can be effectively reduced (Xu et al., 2015).

Secondly, from the current technical path, the power supply of automatic guided vehicles mainly uses rechargeable batteries as its power source. Through the application of artificial intelligence technology, the energy consumption of automatic guided vehicles can be reduced, thereby effectively delaying the working time of automatic guided vehicles, which will undoubtedly significantly reduce the operating efficiency of automatic guided vehicles, and then reduce the maintenance costs of automatic guided vehicles.

Furthermore, through the application of artificial intelligence technology, the functions of automatic guided vehicles are more abundant and the performance is more stable, so the wear and tear during the transportation of goods will be significantly reduced, which is very important for reducing the operating costs of automatic guided vehicles. It is an important prerequisite for all kinds of logistics and transportation enterprises to adopt automatic guided vehicle transportation. It can be seen that artificial intelligence technology can improve the performance of automatic guided vehicles and reduce the maintenance costs of automatic guided vehicles.

3. The Path of Applying Artificial Intelligence Technology to Automatic Guided Vehicles from the Perspective of Commercialization

This paper discusses the path of applying artificial intelligence technology to automated guided vehicles from the perspective of commercialization. The application of artificial intelligence technology and automatic guided vehicles is to improve the control and adjustment ability and actual driving ability of automatic guided vehicles in complex road environments such as bumpy roads, gravel roads, and water-filled roads. By training the AI model to control and adjust the mechanical structure to enhance the environmental adaptability of the automatic guided vehicle, expand the commercial application scenarios of the automatic guided vehicle, and finally build a set of low cost, strong controllability, and can effectively improve the stability of transportation operations. The overall technical scheme of automatic guided vehicles for running speed and control accuracy. The conclusion of the study is that the path of applying artificial intelligence technology to automatic guided vehicles mainly includes the optimization of six fields, including motion module, communication module, anti-collision module, power supply module, vehicle-mounted module, and AGVS monitoring and dispatching management system (Zhang, 2021).

3.1. Motion Module

The motion system of the automatic guided vehicle consists of a reducer, a drive

and a steering motor, etc. It is the key technical module for the automatic guided vehicle to move from point A to point B, mainly to ensure that the automatic guided vehicle runs according to the trajectory set by the system. For the motion module, the application of artificial intelligence technology is mainly to improve the sensitivity, accuracy and reliability of the motion module, so as to ensure the good motion performance of the automatic guided vehicle and the competition of the motion trajectory. Through the application of artificial intelligence technology, it can ensure that the automatic guided vehicle has the advantages of high speed, high precision, high reliability, convenient operation and maintenance, etc., to meet the objective needs of logistics and transportation enterprises.

3.2. Communication Module

The communication module is the key hub module for the application of artificial intelligence technology in automatic guided vehicles. The performance of the communication module determines the application efficiency of artificial intelligence technology. The communication module is used for the information exchange between the automatic guided vehicle and the dispatching system and the navigation system, generally in the form of establishing a wireless local area network. The automatic guided vehicle only communicates with the dispatching system in two directions, and the bicycles generally do not communicate with each other. The communication protocol is generally based on the TCP/IP protocol. The application of artificial intelligence technology mainly ensures the reduction of communication delay and avoids misoperation of automatic guided vehicles (Zhao et al., 2017).

3.3. Anti-Collision Module

The anti-collision module is one of the most critical technical modules of automatic guided vehicles. The safety measures of automatic guided vehicles are divided into software and hardware parts, among which: software includes fault detection and processing of automatic guided vehicles; hardware uses various sensors such as contact collision sensors, sound waves and lasers and other non-contact sensors. From the perspective of the process of technological development, through the empowerment of automatic guided vehicles by artificial intelligence, future automatic guided vehicles will not only use traditional position, speed, acceleration, but also use machine vision, force feedback and other intelligent sensor fusion technologies to make decisions and control. Of course, more and more attention is paid to improving the running accuracy, monitoring accuracy and obstacle avoidance accuracy of automatic guided vehicles.

3.4. Power Module

In the current practical manufacturing and use of automatic guided vehicles, automatic guided vehicles generally use batteries (24v, 48v and other types of batteries, and the specific types include lead-acid batteries, lithium batteries,

etc.). The application of artificial intelligence technology in power modules is mainly There are two directions: first, through the application of artificial intelligence technology, the automatic guided vehicle can enable the battery system to detect the use state, charging state, and use state of the battery, and automatically send the status report to the control center to ensure the automatic guided vehicle. Second, the automatic guided vehicle can ensure the improvement of power utilization efficiency through artificial intelligence, reduce energy consumption, and improve the working efficiency of automatic guided vehicles.

3.5. Vehicle Module

In terms of on-board modules, the common controllers of automatic guided vehicles are based on single-chip microcomputer, based on PLC and based on industrial computer control systems. Realize functions such as navigation calculation, guidance realization, vehicle walking, and cargo loading. The on-board software roughly includes the following modules: navigator test module, software interface module, initialization module, motion control module, and path planning module. Other auxiliary modules include alarm module, wireless communication module and so on. Flexibility is an important trend of automatic guided vehicles. Through the application of artificial intelligence technology, the automation and informatization of automatic guided vehicles require handling robots to improve parts processing accuracy and production efficiency, and shorten product manufacturing cycles. The empowerment of on-board modules by artificial intelligence technology mainly improves the reliability and accuracy of automatic guided vehicle functions.

3.6. AGVS Monitoring and Scheduling Management System

The host computer system of the automatic guided vehicle realizes tasks such as task reception, scheduling and task allocation, environmental map drawing and management, path planning and coordination, and automatic charging. Under the empowerment of artificial intelligence technology, instructions and route information are sent to each automatic guided vehicle through communication equipment, and then each automatic guided vehicle is guided to complete the corresponding task. With the support of artificial intelligence technology, the automatic guided vehicle can be integrated with other information systems to receive task information from ERP, WMS, MES terminal equipment and so on. In the specific technical path, according to the implementation, it can be divided into centralized and distributed. The distributed system expands and enhances the functions of the automatic guided vehicle mobile platform. The automatic guided vehicle adopts embedded map technology, which can automatically plan the running path in real time. The centralized system adopts the unified distribution and planning of the central control system, and there is no communication between bicycles.

4. Conclusion of the Research

With the continuous improvement of the level of modern economic development, a modern logistics system with high efficiency, intelligence and safety is the basis and prerequisite for achieving high-quality economic development. With the rapid development of intelligent technology, automatic guided vehicles with many automatic functions have gradually become the key equipment for the intelligent operation of modern logistics systems. In order to improve the commercialization capability of automatic guided vehicles, the functions of automatic guided vehicles must be continuously improved, so that automatic guided vehicles can adapt to more complex road environments and be applied to more application scenarios, so as to make the commercialization process of automatic guided vehicles more smoothly. Based on the perspective of commercial operation of automatic guided vehicles, this paper discusses the value and path of applying artificial intelligence technology to automatic guided vehicles from the perspective of commercialization. In general, artificial intelligence technology can enrich the functions of automatic guided vehicles, optimize the mechanical design of automatic guided vehicles, and improve the performance of automatic guided vehicles, which will affect the application scenarios, manufacturing costs, maintenance costs, and operating costs of automatic guided vehicles positive effect. Therefore, it is necessary and feasible to apply artificial intelligence technology to automatic guided vehicles. From a technical point of view, the path of applying artificial intelligence technology to automatic guided vehicles mainly includes intelligent technology optimization in six fields, including motion module, communication module, anti-collision module, power supply module, vehicle-mounted module, and AGVS monitoring and dispatching management system.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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