Talking About the Industrial Robot Grasping Technology Based on Machine Vision

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Abstract. In terms of industrial development at this stage, an important measure to ensure the status of industrial development is to improve production efficiency and strengthen the quality of management. Based on the above content, this article analyzes the application and improvement measures of industrial robot grasping technology on the basis of machine vision.

Keywords. machine vision; industrial robots; grasping technology

1. Introduction

In the process of industrial development, with the help of intelligent industrial robots, they can effectively complete the specified tasks in combination with related program codes, and play an irreplaceable role in the transformation of modern industries. The development of new technologies is inseparable from the grasping technology of machine vision industrial technicians, it is conducive to effectively enhancing the operating efficiency of industrial robots, effectively solving common operating problems, and promoting technological innovation in the industrial field.

2. The operating principle of industrial robots based on machine vision

Combining machine vision with industrial robots can make industrial robots have vision. The image of working environment and workpiece is collected with the help of visual function, and the measurement judgment is made on this basis, which increases the function that traditional industrial robots do not have. In the process of industrial automation operation, traditional industrial robots are used to replace manual labor. This is conducive to effectively improving the efficiency of the production line for colleagues who have reduced labor costs, and it can also improve the quality of products to a certain extent [1]. The introduction of industrial robots using machine vision into production can further expand the scope of robot applications. For tasks that require identification and measurement, industrial robots can also be used to replace manual labor and promote more intelligent production operations. Industrial robot based on machine vision, as shown in Figure 1:
Figure 1. Industrial robot based on machine vision

The integration of machine vision technology and industrial robot control technology can effectively promote the development of intelligent and flexible production lines. Machine vision includes hardware and software. The software refers to the algorithm applied in the process of image information acquisition, and the hardware refers to the non-contact optical sensor. The main principle of applying this technology is: target workpiece is photographed by the camera of the system, and the target workpiece is photographed by optical mirror. After imaging the target workpiece, use a converter to transform the image into corresponding information. Finally, the digital information is transmitted in the corresponding computer of the machine vision system to ensure that the system can effectively obtain image information. After receiving the image information, the system performs analysis and processing work, extracts the content required in the target workpiece feature information, and transfers the extracted content to the robot control system based on the protocol, thereby effectively adjusting the state of the industrial robot. With the help of industrial robots with machine vision, the number of workers can be reduced, wages can be reasonably controlled, and at the same time, the full application of raw materials can be achieved to increase production.

3. Industrial robot grasping technology based on machine vision

When machine vision technology is combined with vision guidance technology, it includes functions such as image processing functions, optical principles, and pattern recognition. In the process of applying industrial robots, combined with machine vision technology, it can well promote the robot to accurately and quickly obtain environmental information, optimize the robot's intelligence and versatility.

3.1. Three-dimensional positioning technology

Machine vision is the core of the three-dimensional positioning technology. It is reasonable to judge the accuracy of the robot's grasping. Managers also pay more attention to this technology. The binocular stereo vision system is the basis for the function of the 3D positioning technology, guarantees the 3D coordinate positioning and it can ensure accurate positioning. Compared with the two-dimensional positioning technology, modern engineering production needs to be able to fit the unit positioning technology, and the three-dimensional positioning technology can be combined with the actual situation to adjust the corresponding coordinates. In the actual industrial production process, industrial production has a more complicated environment. The application of three-dimensional positioning technology can effectively recognize the three-dimensional information in the actual coordinates. At the same time, it can also realize the conversion between the image coordinates and the actual coordinates, fully display the position in the image, and it have a clear grasp of the target [2].

3.2. Image processing technology

This technology is an important part of the industrial robot positioning and grasping technology based on machine vision, the internal image can generate a variety of different information data, picture clarity is easily affected by image processing technology. In general, image processing technology mainly
includes types: First, binary processing technology. The application of this technology is mainly to
design the gray value of pixels to ensure that the gray value is between 0 and 255, which effectively
reduces the workload of data processing. Second, grayscale processing technology. This technology can
transform the color of an image into black and white, effectively clarify the digital information in the
image, reduce the amount of calculation, and effectively improve computer processing efficiency. Color
is the main difference between grayscale images and color images. With the help of grayscale images,
information can be extracted more effectively. Third, filtering processing technology. Carry out filter
processing work on the image, effectively weaken the noise in the image, and ensure the existence of
the information point in the image, which effectively guarantees the validity and reliability of the image.

3.3. Automatic crawling technology
Based on three-dimensional positioning technology, image processing technology is the basis for the
function of automatic grabbing technology, which can transmit clear pictures and three-dimensional
coordinate information to the system. After the system gathers all the hehe, the function of automatic
grabbing technology can be demonstrated. The application of automatic grasping technology can reduce
manual debugging, effectively reduce manual working pressure, at the same time, it can also consume
lower cost, effectively prolong the service life of the robot. In addition, the application of automatic
grasping technology can also reflect the autonomy of industrial robots, effectively reduce the possibility
of human intervention, enhance work efficiency, and complete various tasks in a comprehensive
manner.

4. The specific application of machine vision industrial robot grasping technology

4.1. Applied to automobile production line
During the operation of the automobile production line, the application of this technology can effectively
enhance the automation level of automobile manufacturers. This technology can be applied to many
links in automobile production operations, including some difficult links, such as finding solder joints,
you need to clarify the location of the solder joints first to ensure the firmness of the welding work. In
addition, the positioning and grasping system can effectively meet the requirements of welding, such as
spot welding and arc welding, which is also the essence of auto production automation. Spraying paint
is the most complicated step in the automobile production line. The staff can use the grabbing system to
locate, ensure the uniformity of paint spraying, and effectively avoid the waste of paint. The industrial
robot using machine vision on the automobile production line is shown in Figure 2:

![Industrial robot application of machine vision in automobile production line](image)

Figure 2. Industrial robot application of machine vision in automobile production line

4.2. Refining parts
The application of machine vision industrial robots for positioning and grasping can improve the
efficiency of refining parts. Pick out the incomplete parts, thereby essentially maintaining the quality of
industrial products. The system can formulate specific operation steps, take the parts with the help of
cameras, and transmit them to the system. On this basis, image processing is performed. With the help
of image processing technology, the information in the image can be presented. After the image
information extraction is completed, the positioning and grasping work is carried out, the parts are sorted
at different positions, the incomplete parts are selected and operated. In this process, the staff need to transmit parts picture information in the system to ensure that the system can automatically run related tasks, effectively enhance work efficiency, and ensure accurate parts classification.

4.3. Assembled product
The application of industrial robot positioning and grasping technology is beneficial to product assembly work and effectively enhances the work efficiency of the work. In the process of specific operation and application of the system, robot arms and cameras are needed to effectively complete multiple difficult assembly tasks. With this method, the assembly cost can be effectively reduced, the workload and work content of the staff can also be reduced. Before the product is assembled, the staff generally have to clarify the size and size of the parts, transfer the corresponding data to the system, and effectively store the corresponding system. In the process of assembly work, the application of camera equipment can perform part recognition operations well, ensure the robot's flexible grasping arm, and ensure the smooth development of assembly work. In the specific work process, if there are changes in the assembled parts, the staff can fine-tune the operating system, thereby effectively saving manpower and material resources. In addition to the ability to grasp static parts, dynamic parts can also be used to grasp the tool robot technology, to ensure the efficiency of assembly work.

5. Improvement measures for industrial robot grasping technology based on machine vision
In the process of applying machine vision-based industrial robot grasping technology, there are still certain shortcomings, mainly including the following aspects: First, the technical and quality level of the staff needs to be improved. As the operator of industrial robot grasping technology, its operation skill level and quality level can affect the effect of grasping technology to a certain extent. Therefore, it is necessary to strengthen the recruitment and training of workers, and strengthen the technical and quality assessment of staff. Second, factories should pay more attention to machine vision industrial robot grasping technology. The leaders of some factories did not fully understand the advantages and important functions of the above-mentioned technologies, which affected their modern development. Therefore, in view of this problem, it is necessary to strengthen the understanding of leaders and workers on positioning grasping technology, make clear its important value, actively and effectively apply the technology in the process of production work, and effectively stimulate the work enthusiasm of staff. Third, the positioning and grasping system is not suitable. The positioning grasping system plays a carrier role in the industrial robot grasping technology. In the production process of a specific factory, the applied positioning and grasping system is not compatible with the actual production needs, the flexibility is relatively lacking, and it is easy to get stuck in the production process, which causes the production work to be affected [3]. In order to improve the above situation, the relevant research personnel of the factory should strengthen the research on positioning and grasping technology, promote the positioning and grasping system to meet the requirements of engineering production. At the same time, researchers should pay attention to the increasing functional richness of the system, lay a good foundation for industrial production, reduce factory costs, and promote the improvement of factory economic efficiency.

6. Conclusion
In summary, combining machine vision technology with robot control technology will help improve production efficiency and quality. At the same time, it can also promote the development of industrialization, so that industrial robots have a wider range of applications, and it can effectively improve the adaptability of industrial robots. Therefore, relevant leaders and staff should pay more attention to this technology. In view of the shortcomings, relevant staff should strengthen corresponding research.

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