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Retraction

Retracted: Robot Structural Optimization Based on Computer Intelligent Image

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This article has been retracted by Hindawi, as publisher, following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of systematic manipulation of the publication and peer-review process. We cannot, therefore, vouch for the reliability or integrity of this article.

Please note that this notice is intended solely to alert readers that the peer-review process of this article has been compromised.

Wiley and Hindawi regret that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] J. Zhao, “Robot Structural Optimization Based on Computer Intelligent Image,” *Wireless Communications and Mobile Computing*, vol. 2022, Article ID 3328986, 6 pages, 2022.

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Research Article

Robot Structural Optimization Based on Computer Intelligent Image

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In order to solve the problems of low degree of automation, difficult identification of picking objects, and large picking damage in traditional fruit and vegetable picking operations, the author proposes a robot structure optimization method based on computer intelligent images. This method introduces the computer imaging technology, examines the principle of imaging the computer imaging technology as the in-depth study of the computer imaging technology, completes the mechanical design of the selected robot, and optimizes all hardware models of choice robot. At the same time, the computer image acquisition system, image acquisition module, and execution module are designed; finally, the computer image information processing flow design of the picking robot is completed, and the simulation experiment of the picking robot is carried out. Experimental results show that in the experiments with 166, 142, and 165 tomato identification numbers, the identification accuracy rates were all over 96%. *Conclusion*. The picking robot based on computer images has a simple structure, high recognition accuracy of picking targets, less damage to the picking targets, high safety and stability, and great promotion value.

1. Introduction

In recent years, in the course of the continuous development and progress of science and technology, the use of technology has made great progress, given strong support for economic development, culture and other economic activities in the community, and to facilitate global development. It effectively expands people's daily lives and access to information. While people acquire information more quickly, the requirements for computer technology applications are also constantly improving [1]. Under the background of the new era, the promotion and application of computer image processing and recognition technology give full play to its image digital processing function, and with the help of the application advantages of computer technology, the processing and storage requirements of massive data can be effectively met [2].

In various image analysis and processing processes, the application of computer image processing technology can effectively improve the utilization of image information, the application process includes the following aspects: first, analyze and transform the image to be processed, this process provides a strong reference for the computer system to carry out information identification later and provides a strong support for improving the quality and efficiency of image processing; scientifically process the selected images and effectively guarantee the validity of the image information; rationally and scientifically apply the processed images, so that the application value of computer image processing technology can be fully utilized, it plays an effective role in promoting the sustainable development of various industries [3]. In addition, in the application of computer image processing technology, various types of images need to be scientifically classified. For example, in different industries, the application direction and application of analog images and digital images should be clarified [4]. Through the effective application of processing technology, the image can be processed into data, and the image data can be analyzed and processed with professional computer software, and the processed data can be restored, and the required image can be effectively extracted [5]. Therefore, the computer digital image processing technology needs to be based on the visual information technology, using the principle of object imaging, and using computer software tools to realize the data transformation and processing of the image, and then use the algorithm processing method for the processed image, so that the data can be converted into image [6].

In the application process of computer image processing and recognition technology, images, as the most common information carrier, can effectively describe the similarity and vividness of objective objects [7]. The images include visual information extracted from photos, paper, computers, and televisions and can be divided into digital images and analog images. With the rapid development of computer technology and related edge disciplines, computer image processing technology is also becoming more and more mature, and it is widely used in many fields such as industry, remote sensing, biomedicine, and traffic monitoring and has prompted new developments in these disciplines [8]. The application of computer image processing technology in the field of agricultural engineering will also be paid more and more attention by people.

2. Literature Review

Fruits and vegetables need to be picked in time after maturity, otherwise they will rot or fall, which will seriously affect the quality and yield of fruit and vegetable production; therefore, fruit and vegetable picking plays a crucial role in fruit and vegetable planting [9]. However, the level of automation of agriculture in our country is low, the method of harvesting fruits and vegetables is still at the level of writing books, and fruits and vegetables are often affected by human events. Manual picking requires a lot of energy and materials due to lack of time, lateness, and incorrect selection, which increases the price of fruits and vegetables and makes it unachievable [10].With the development of automation technology and artificial intelligence technology, the operation mode of fruit and vegetable picking has changed, and it has begun to develop from traditional manual picking to mechanical picking and automatic picking; the application has greatly improved the efficiency of agricultural production [11]. However, a single picking robot arm and manipulator cannot accurately identify the picking target and perform precise positioning during the fruit and vegetable picking process, so the picking efficiency needs to be improved, and the identification and positioning of the picking target determines the quality of fruit and vegetable picking [12]. Computer image technology adopts the principle of profiling and replaces human eyes and brains with machines to complete image acquisition and processing.

To harvest fruits, vegetables, and berries, the main task is to identify the fruit from the background, determine the three-dimensional spatial position, and then write it down. The fruit and area identification process has a good relationship with the different colors and background of the fruit. Fruits such as apples, citrus, tomatoes, and strawberries have red skin when ripe and are easily distinguished from the green background. Such fruits are mostly identified by color camera systems and image processing systems. A variety of vegetable and fruit picking robots have been developed abroad, such as tomato and fruit picking robots, banana harvesters, and mushroom picking robots. Domestic research on agricultural robots began in the mid-1990s, although it started late compared to developed countries, but it has grown rapidly, and many universities and research institutions have conducted research on agricultural robots and intelligent agricultural machines. Yu et al., using a computer vision as a guide and using chromaticity and intensity information for fruit picking in natural backgrounds, proposed using color features only, the Bayesian decision classification model was used to discriminate the tomatoes in the natural background, and the centroid calculation technology was used to evaluate the classification model, and it was concluded that the accuracy of the tomato pixel classification was more than 80% [13]. Dundar et al. studied the use of LAB color space to realize the extraction of ripe tomato images from the background [14]. Yu et al. applied the a^* channel information in the $L^* a^* b$ color model of the strawberry image to identify the ripe strawberry, and initially established a bridge-type Cartesian coordinate robot [15].

To this end, the author introduced the computer image technology, on the basis of an in-depth study of the imaging principle of embed computer image technology into fruit and vegetable picking robots, it ensures that the fruit and vegetable picking robot has high target recognition and positioning capabilities, effectively improves work efficiency and picking quality, and has a very important guiding significance for promoting the intelligent development of agricultural production.

3. Methods

3.1. The Principle of Computer Imaging Technology. Computer image technology mainly includes image acquisition technology and computer technology, using image acquisition technology to collect target images, the target image is transmitted to the image processing center (computer) for target judgment, recognition, and positioning, after the image processing center completes the image processing, it controls the actuator to pick the target according to the set path [16].

The imaging principle of computer imaging technology is similar to that of pinhole imaging, it uses dual cameras to collect target images, the two images captured by the dual cameras are integrated through computational analysis to obtain the same point image, which corresponds to the same depth of field information in real space [17].

Computer imaging technology selects two cameras to work at the same time, and the focal length and internal parameters of the two cameras are exactly the same [18]. The dual cameras maintain a physical position parallel to each other, at the same time coincide with the imaging plane. Let $O_1(x_1, y_1)$ and $O_2(x_2, y_2)$ be the corresponding pixel coordinates of the two cameras in the imaging plane, respectively, and establish a coordinate system with the origin of the two cameras, they are the left camera coordinate system $O_1X_1Y_1Z_1$ and the right camera coordinate system $O_2X_2Y_2Z_2$, respectively, the focal length of the camera is f, and the center distance between the two cameras is B.

The center line O_1O_2 of the two cameras is the center B, the intersection of the optical centers of the two cameras is the target P, and the point of view is $Q(x, y, z)$. Figure planes of the two cameras overlap, and the distance (d), the triangle from P to O_1O_2, can be obtained by a similar rule

$$d = \frac{bf}{|x_1 - x_2|}. \quad (1)$$

The distance (d) from P to O_1O_2 is the coordinate from the target point P to the Z axis, then,

$$Z = \frac{bf}{|x_1 - x_2|}. \quad (2)$$

In the same way, the coordinates of X and Y are

$$X = \frac{b(x_1 + x_2)}{2(x_1 - x_2)}, \quad (3)$$

$$Y = \frac{b(y_1 + y_2)}{2(y_1 - y_2)}. \quad (4)$$

Since the focal length f and center distance B of the camera are known, the observation point $Q(x, y, z)$ can be obtained in the image pair of the two cameras, and the coordinates of the target point P are

$$\begin{cases} X = \dfrac{b(x_1 + x_2)}{2(x_1 - x_2)}, \\ Y = \dfrac{b(y_1 + y_2)}{2(y_1 - y_2)}, \\ Z = \dfrac{bf}{|x_1 - x_2|}. \end{cases} \quad (5)$$

3.2. Structural Design of Picking Robot. The manufacturer has chosen to get a tracked chassis, which can achieve a simple path regardless of the terrain and obstacles, which makes the robot work efficiently and change the environment around. Computer-based selection robots combined with computer graphics in the form of traditional selection robots improve the objective complexity and the known problem area of traditional selection robots [19]. The computer graphics-based robot consists of a computer graphics system, electric claw, control box, and joint operation [20]. The computerized imaging system is often used to complete the acquisition of the selected target, which is easy to identify and locate the selected target and send the image data to the controller, review, analysis, and integration after completion. As the system follows the parameters, the power claw can be placed in the right direction and the target can be moved quickly to complete the selected task. Joints usually include joint devices used to drive the electric motor to determine the position, push rod, forearm motors, upper arm, and lower arm.

Table 1 shows the importance of each joint in robot selection.

Computer vision is an important part of any pick-up robot and similar to the human eye, it is mainly responsible for collecting images of the environment. Target selection and target acquisition, it has a CCD camera and a graphics card, preprocessing, and segmenting the target image using video cable and computer, extracting image feature values, matching, aligning, and calculating image pairs are shown in Figure 1.

Table 1: Main parameters of each joint mechanism in the picking robot.

Joint name	Parameter
Lifting device	0~0.8 m
Rotation joint	-160~160
Main arm joint	-80~80
Forearm joint	-80~80

3.3. Hardware Design of Picking Robot. The computer driver is usually based on the robot model selection, which includes a computer, data acquisition card, graphics card, camera, various pressure sensors, RS-232 converter, AC servo drive, drive motor, and a joint mechanism and related photoelectric encoders [21].

The business computer is the basis of all the robot hardware used to analyze, process, and calculate image data and sensor data, and the RS-232 converter is used to complete the data communication. End effectors are controlled to perform their actions in accordance with the quality control.

Frame grabber collects the image data from two cameras, process the image, and send it to the computer to complete the location calculation of the selected location; data acquisition cards usually receive sensor data collected by various sensors, such as photoelectric sensors, pressure sensors, and limit sensors, which improve the accuracy and quality of robot selection [22].

The final equipment is a specialized robotic launcher for selected tasks, including various AC servo drives, motor drives, and various joint systems. After receiving the image data of the material collected during the operation, the production computer calculates and analyzes the selected target location and calculates the control parameters for each operation; the parameters can be sent to each AC servo drive through the RS-232 converter to control AC servo motor control, coupling, electric push rod, cable small arm, and large arm according to actual needs move; the incremental photoelectric encoder sends the operation state of the end actuator to the AC servo drive in real time, continuously adjusts the control parameters of the end actuator, and finally switches to the operation state of the target device to complete the selection. Figure 2 shows the hardware structure of a computer graphics system.

In Figure 2, the dual camera adopts the Bumbelee2 camera, which contains two image sensors, the model is Sony ICX204. The dual cameras are fixed on the base bracket of the picking robot, near the electric gripper. The technical parameters of the Bumbelee2 camera are shown in Table 2.

3.4. Design of Picking Robot Information Processing Process. Target recognition and target localization are the goals of

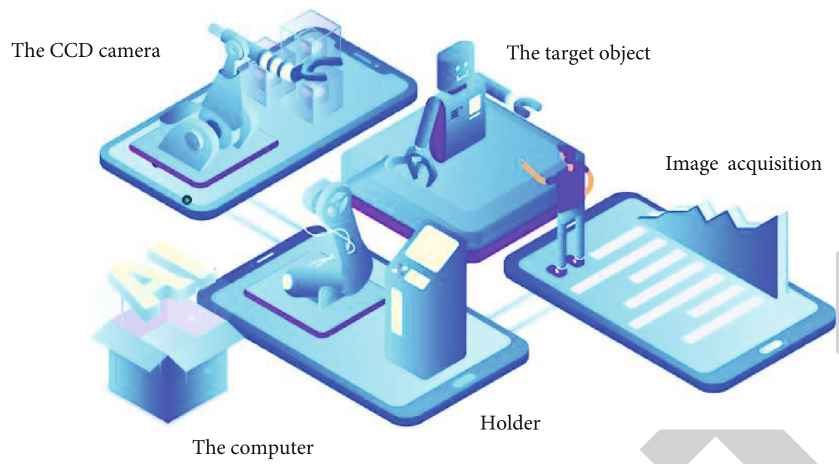

Figure 1: Hardware composition of computer graphics system.

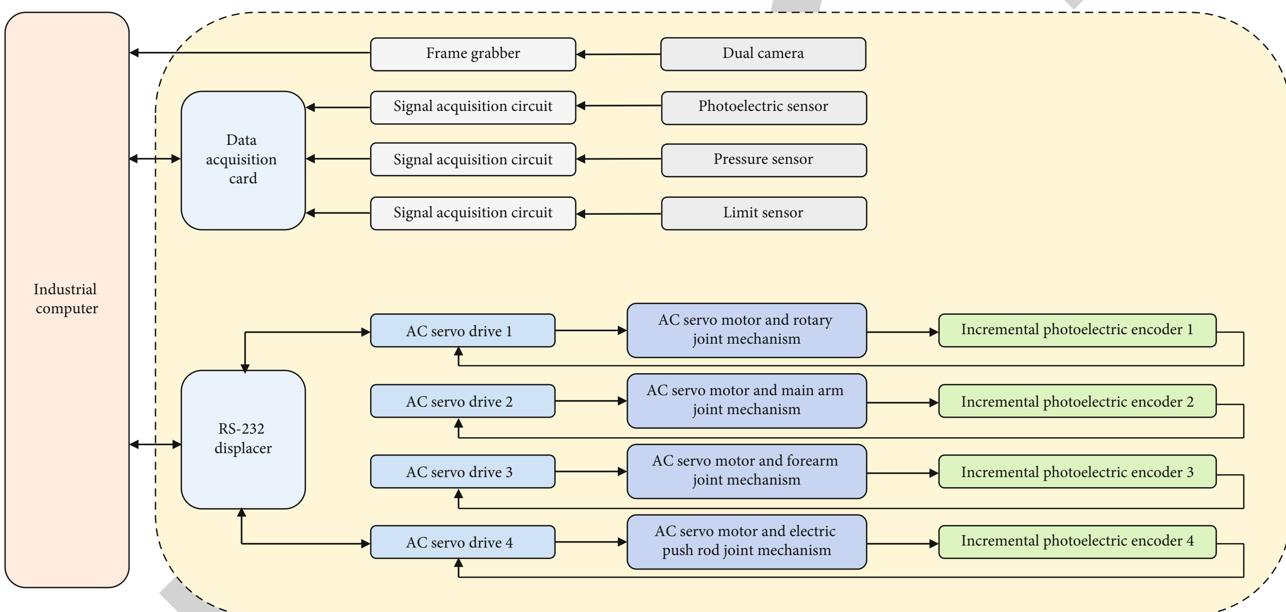

Figure 2: Hardware composition of computer graphics system.

Table 2: Technical parameters of Bumbelee2 camera.

Parameter name	Unit	Parameter value
Resolution		640x480
Frame rate		20FPS
Sensor model		Sony ICX204
Sensor category		CCD
Sensor format		1/3”
Focal length	mm	2.5
Pixel size	μm	4.65
Aperture		f/2.0
Power supply	V	12
Operating temperature	°C	0~40
Interface		FireWire 1394a

computer image technology, and the main technology for target recognition and localization is the image data. In the process of image data processing, the computer image-based robot picking robot includes a location information system and a guidance information system: location information robot. To reach the selected target, each actuator moves to a location near the selected target to connect with the selected target; personal information is often used to provide image information such as environmental information, location information about target selection, initial selection control, final effector and driver control, and final control and other functional materials [23].

A dual-camera camera shows itself, receives images, and sends image data to the graphics card for processing; after calculating and analyzing the image data, start the relationship management option; since the controller cannot adjust the operation of the controller, the control function can be

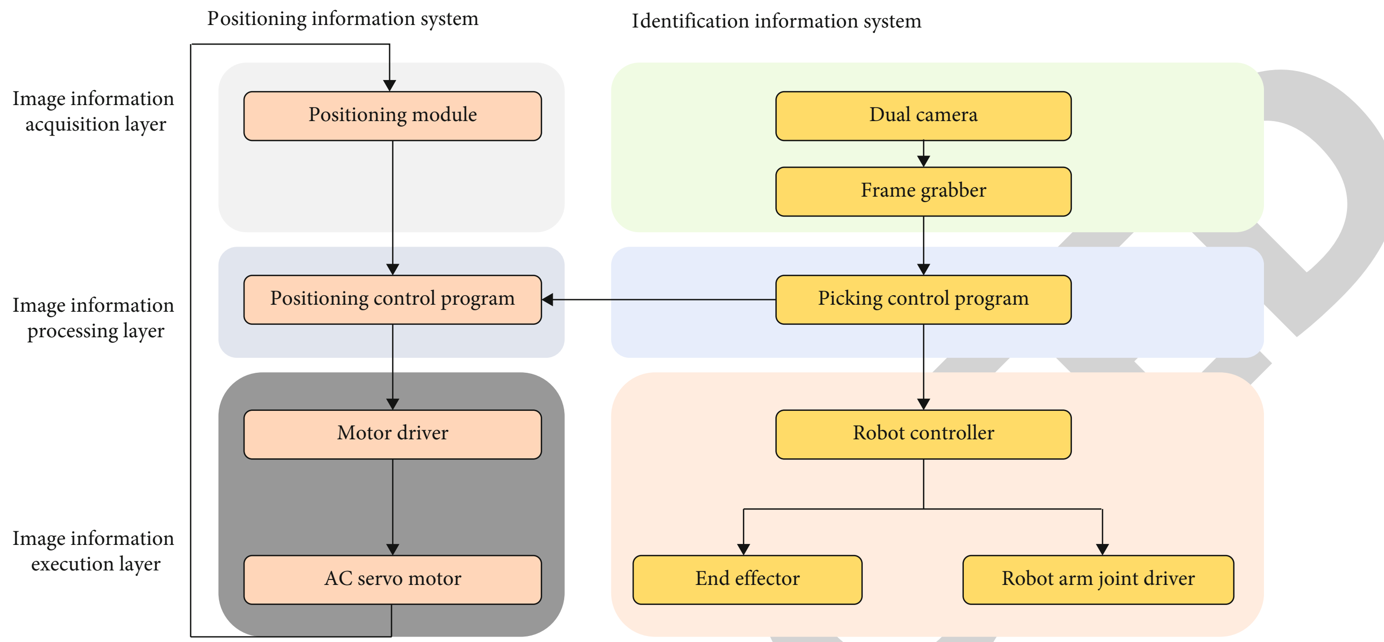

FIGURE 3: Design of the information processing flow of the picking robot.

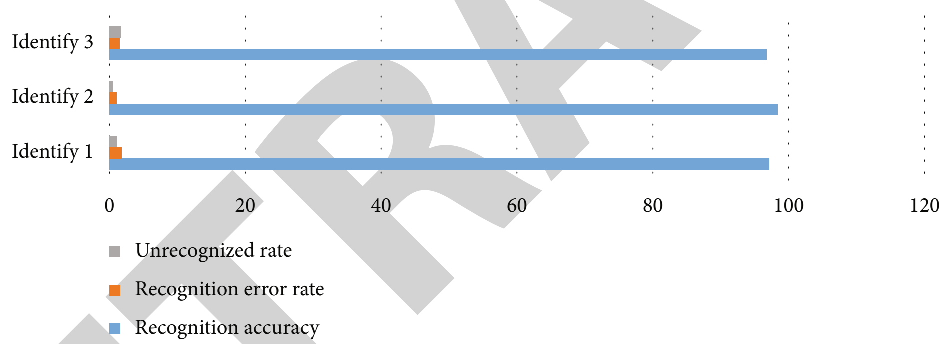

FIGURE 4: Identification of picking targets.

started and the driver walking on the driver can drive the driver to the target area; at the same time, the site continuously collects the current position of the selected robot, sends it to the control center in time, continuously updates the position of the carrier, and finally reaches the target area. Figure 3 shows the generation of functional data for selected products [24].

4. Results and Discussion

In order to verify whether the computer graphics-based robot picker has a high target recognition and location capabilities, a simulation experiment was conducted on the robot pick recognition function. Analysis of the simulation experiment by eating tomato in the farm as a test product, using the computer image system of the selected robot to collect tomato image data, count the number of target tomatoes, calculate the correct value, the confirmed error, and the unknown value of the selected target [25]. An analysis of selected targets is shown in Figure 4.

It can be seen in Figure 4 that the accuracy is over 96% for the tests with tomato juice numbers of 166, 142, and 165. This shows that people who make choices based on computer images can identify the chosen target and have a high recognition rate.

5. Conclusion

The author presents an intelligent computer image-based robot optimization model for accurate and efficient fruit and vegetable selection and robot selection based on computer graphics. Based on the analysis of the art principle of computer graphics technology, the traditional selection robot has been optimized, and the computer graphics system has been introduced, and all the design and hardware schemes of the robot have been successfully selected, and the data has been released at the same time. Streamlines the carrier's operational flow and conducts simulation on the target's knowledge and operations. The result is that the computer graphics-based transporters have adopted tracked chassis, which are important indicators of success, with good performance, environmental friendliness, quick target accuracy, and improved fruit and vegetable selection quality smart agricultural production.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The author declares that there are no conflicts of interest.

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