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Retraction

Retracted: Attitude Analysis and Evaluation of Camera Based on Planar Double Joint Robot

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Manipulated or compromised peer review

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets 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 own 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] Z. Xu, X. Wang, C. Chen, and J. Zhang, "Attitude Analysis and Evaluation of Camera Based on Planar Double Joint Robot," *Journal of Robotics*, vol. 2023, Article ID 8143828, 7 pages, 2023.

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Research Article

Attitude Analysis and Evaluation of Camera Based on Planar Double Joint Robot

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Planar double-jointed robot is a kind of widely used robot. In the past decades, with the development of science and technology, planar double-jointed robot has a great breakthrough in many aspects, especially in the actual camera and attitude analysis. In recent years, pun-section manipulator has made great progress in technology, but its kinematic characteristics and the human body's ability to move have a great gap. So, in the moving plane, we need to study how to improve its camera ability to find a more stable and effective camera mode, and to a certain extent, to meet its requirements in complex working conditions. Simulating the pose of two joints, we seek a more stable and effective camera mode to improve its moving speed, expand its moving space, and lay a solid foundation for its application. Planar double-jointed robot is the most representative one at present. It includes machinery, material, electronics, computer, sensor, drive, intelligent control, artificial intelligence, and so on. Because it is closer to the human body, more suitable for people's work and work, so it does not need to change its environment, so it is regarded as having a high affinity for people's machinery. Its characteristic is that it has the good adaptability and the flexibility, but the double joint camera's support discontinuity enables it to be able to adapt each kind of complex situation well. It can not only climb the stairs but also in the messy ground smooth through and also in the inconvenient passage through. The aim of this paper is to analyze the unique advantages and irreplaceable characteristics of the planar double-jointed robot based on the bionic and mechanical research results. This paper analyzes the mechanical technology by means of literature review and actual data analysis. The experimental results show that the biggest difference between the two articulated robots and other robots is that they have two human-like joint motions.

1. Introduction

Since the 1980s, double-joint robot has become one of the most popular topics in the world. It has been paid much attention by researchers and engineers, and has great development potential in theory and practice. In recent years, there are more and more tasks of double joints, such as operations in dangerous places, rescue, improve the efficiency of operations, and expand the range of people's activities. America's defence advanced research (DARPA) is preparing the DARPA challenge (DRC). The purpose is to develop a kind of robot that can replace human in emergency rescue work, especially in rough terrain conditions, robot movement performance, and operation ability will be stronger than human. This can better meet the needs of people in the future environment and enhance the responsiveness and mobility of human and natural reactions. DRC is considered to have the highest level of robotics competition in the world. It is the most advanced technology in the world. Many types of robots, such as SCHAFT in Japan, Atlas in the United States, and HUBO in Korea, are representative. They made remarkable achievements in this project and made everyone realize that this kind of robot has a huge development space in the future [1–4].

1.1. Stable Camera Principle for Planar Two-Joint Robots. At present, most of the stabilization camera is based on the ZMP stability criterion. ZMP refers to a small circle point on the contact surface of the foot and the ground, and the transverse component of the equivalent moment of the center of the circle is 0 at this position. The stability criterion of ZMP is widely used due to its high efficiency. For example, Japan's famous ASIMO, HRP, Zhejiang University's

WUKONGL8, Beijing Institute of Technology's HRP, National University of Defense Technology's pioneer robot, and so on. However, the existing research results show that the stability criterion of ZMP is too harsh for two articulated cameras, which will cause some adverse effects on their motion performance. But in reality, higher mobility capabilities are required. Planar camera robot is a kind of mechanical device based on motion camera. The device has no feet and no support area. Based on feet, it contacts with the earth in a straight line or a point to achieve dynamic stability.

The motion control of planar camera robots has been continuously developed and developed for several years, and many new control techniques and methods have been developed. At present, the methods based on passive camera, decomposition control, virtual model, and multidegree of freedom control based on mixed zero dynamics are two mature control methods.

The camera pose proposed by McGeer et al. at Cornell was developed from the unpowered camera technique. Originally, passive photography refers to automatic photography propelled by gravity without any power. A passive camera system gives full play to its dynamic performance, no external energy or input only a small amount of energy to achieve the camera. Obviously, the energy use of this car is very good, and it is very consistent with people's walking habits. However, the assignment of a special mechanical structure with physical properties is a prerequisite for its stability in passive photography. In order to expand the diversity of its application, reduce the dependence on its mechanical parameters, and the sensitivity to the initial value of the system, a lot of optimization and improvement have been carried out. For example, passive control and potential energy shaping based on the connection mode and vibration reduction mode. The abovementioned research provides a strong impetus for the development of motion control technology for passive photography. In order to make the robot based on passive camera better meet the requirements of users in more complex works, it can better meet the requirements of users.

1.2. Robot Camera Pose Analysis and Evaluation System. In the 1980s, Raibert et al. proposed a simple and efficient motion control strategy. The key of the proposed method is to divide the robot action control into three quantities, which are torso, torso, and forward rate. It is a method close to decoupling, and through the steady state control of the three variables, the motion state of the system can be kept unchanged. In general, the robot jumps and jumps are achieved by the thrust at the joint, while the robot is controlled by the torque at the joint and hip, and the robot adjusts its action according to the angle of each landing. Once all three energies are controlled, then the robot can move smoothly [5].

Pratt et al. built a set of virtual devices in a virtual environment that can follow the desired control object to achieve its motion. Because a virtual device will finally apply a force or a moment on a passive object, in the end, the force or moment are all obtained from the corresponding articulated moments equally. In planar camera foot robots, lateral elastic shock absorbers, elastic shock absorbers, constant applied forces, and torques are commonly used. This method has the characteristics of a simple structure, is easy to grasp, is easy to implement, and does not need to use the cumbersome dynamic modeling technology so as to realize the dynamic simulation of the system. The control quantities are processed in a closed manner to ensure the stability of the system. From the application examples of virtual modeling, whether it is Spring Flamingo or MIT Cheetah, they all use the connection between the outside world and the controlled component, thus realizing the control of virtual control.

Based on the study of hybrid zero dynamics, Grizzle et al. presented a new hybrid zero dynamics algorithm. Compared with the real-time online plan tracking of conventional ZMP, mixed zero is a trajectory tracking method based on time invariance. The schedule of the control quantity does not change over time, but it is just a variable of a state, which is essentially a virtual limit [6]. This method uses the virtual limit of a plane camera device to plan a specific action and then uses the dynamic mode of the system to control so that the system has certain convergence to a certain extent.

2. Research Content

2.1. Camera Position Adjustment for Planar Two-Joint Robots. In addition, Hurst used a simple antipendulum spring model to realize the camera and running of ATRIAS. In view of the activity characteristics of human joint parts, Hurst et al. analyzed the reaction on the ground according to the physiological characteristics of human and animal, as well as in various situations, so as to determine the amount of human movement. This method gives full play to the active control characteristics of the elastic inverted pendulum and then adjusts the transmission device to achieve the ideal action form. Until now, Hurst et al. have continued with this approach and have achieved very good results. When photographing, the contact with the surface is a discontinuous collection of point groups. But each foot is in a dynamic continuous motion. When the feet switch, the system collides with the floor and puts the whole system in a jumping state.

Camera is one of the most basic robots, and it is also an important topic in robot technology. The dynamics of two articulated robots with planar camera motion has also received much attention. This paper introduces a control scheme of planar camera based on planar two-joint and makes motion plan and control for it so as to control the motion of each part in the process of camera [7, 8]. Then, according to the motion state and the change of the motion state, the motion parameters are used to adjust the motion trajectory so as to obtain the motion trajectory of the motion trajectory. Finally, the stationary planar imaging of the two articulated robots is completed on the experimental platform [9].

The camera strategy is a prerequisite for the realization of dynamic camera, and its action limits are given as the basis for its design. In this paper, a video strategy is proposed and the camera is used to describe the camera situation. The controller uses the camera as the top control system and realizes the control rate of multiple robots in each stage in the bottom layer. The transition of the camera state directly affects the conversion of various control rates and the operation of the control system.

The method of "feedforward + feedback" is used to control the balance of the human body. First, the motion status of the human body is obtained by an aerial gyroscope, and the corresponding feedback control is carried out. Second, the disturbance of the human body in the camera is analyzed, and a simplified mathematical model is used to predict the disturbance so as to obtain a forward compensation. In the joint part of the movement plan, the system state is used as the calculation parameters to achieve the movement plan required by the camera. For the dynamic characteristics of hardware, the kinematic control is carried out to converge the action of the joint position.

2.2. General Analysis of Robot Position for Planar Camera. Under planar camera, the camera rate is a key factor to realize the camera action of a two-arm robot. The optimal estimation of the motion velocity is obtained by fusing the information of the aeronautical runner and the joint coding so as to obtain the real-time data of the motion trajectory. Based on the motion trajectory in the current motion state, the motion speed of the motion is achieved by adjusting the tread position.

The simplified modeling of the two articulated robots in the 2D camera is five four-drive. These include trunk, right joint, right joint, and double joint. Its body is composed of a simple pillar connected by two hips and two large joints. The left and right feet are symmetrical, and the large and small joints of each foot are simply knee-connected. The end of the subsection can be regarded as a puncta foot in contact with the surface. The two hips and two knees are a single

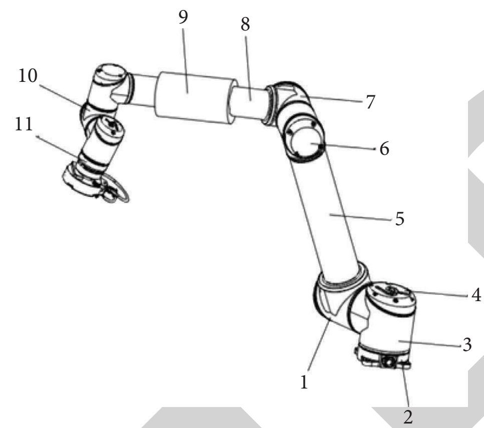

Figure 1: Camera generic pose for a planar two-joint robot.

actuator. The last simple pattern of the five four-wheel transmissions is as follows (in Figure 1).

The camera mode of the planar camera robot is carried out with one foot and two joints. One joint supports the body and one foot swings forward. The two-joint support phase is when the two feet are balanced on the ground. For the camera action of the planar camera, generally from the theory point of view, two joints will appear in a split second so as to realize the conversion between the two joints. The transition between the single-joint and the two-foot support phases is initiated by swinging and supporting joint part movements. The transition from a foot support phase to a foot support phase at the point where the swing joint touches the ground is an interchange of the swing foot and the support foot. If the swing foot moves from the ground to the air, it is a different story. So, the planar camera is a cyclic movement that combines two states. On this basis, a simple mathematical model of two swinging roots is established, whose static equations are as follows [10]:

$$\begin{aligned} \tau_k &= -\widehat{m}_s g\left[-l_s \sin\left(\theta_b + \theta_k + \theta_h\right) + y_{cs} \cos\left(\theta_b + \theta_k + \theta_h\right)\right], \\ \tau_h - \tau_k &= \widehat{m}_s g l_h \sin\left(\theta_b + \theta_h\right) + \widehat{m}_h g l_h \sin\left(\theta_b + \theta_h\right) - \widehat{m}_h g y_{ch} \cos\left(\theta_b + \theta_h\right). \end{aligned} \tag{1}$$

For equations (2) and (3), we define the parameter direction, the input vector, and the output direction to the basis.

$\alpha = [\widehat{m}_s, \widehat{m}_s y_{cs}]^T \lambda u = [g l_s \sin(\theta_b + \theta_h + \theta_k), -g \cos(\theta_b + \theta_h + \theta_k)] y = \tau_k$. Then, the abovementioned equation is simplified as follows:

$$u\alpha = y. \tag{2}$$

Considering the measurement error and noise in the experiment, a noise term is added to the abovementioned equation, denoted by the noise error difference, and written in discrete form:

$$y(k) = u(k)\alpha + e(k). \tag{3}$$

Different output data pairs can be obtained when the swing joint is in different configurations, and the estimation obtained according to the secondary observation results is, let be the system output of the chess type calculation, and let be the residual between the observation output and the model calculation, then the following relationship is obtained:

$$\varepsilon(k) = y(k) - y_m(k). \tag{4}$$

Combining the abovementioned system equations, the following equation can be obtained:

$$\varepsilon(k) = u(k)(a - \widetilde{a}) + e(k). \tag{5}$$

For the input and output data of the secondary measurement, we let

$$Y = \begin{bmatrix} y(1) \\ \vdots \\ y(n) \end{bmatrix}, U = \begin{bmatrix} u(1) \\ \vdots \\ u(n) \end{bmatrix}, e = \begin{bmatrix} e(1) \\ \vdots \\ e(k) \end{bmatrix}, \varepsilon = \begin{bmatrix} \varepsilon(1) \\ \vdots \\ \varepsilon(n) \end{bmatrix}. \tag{6}$$

Then, the system equation and residual equation are as follows:

$$\begin{cases} Y = U\alpha + e, \\ \varepsilon = Y - U\widetilde{\alpha} = U(\alpha - \widetilde{\alpha}) + e. \end{cases} \tag{7}$$

The least squares parameters are estimated as in

$$J = \varepsilon^T \varepsilon. \tag{8}$$

When the minimum value is obtained, the value is the least squares estimate of the parameter $\widetilde{\alpha}$. When enough data are collected and most of the data are uncorrelated, the full rank of the matrix can be guaranteed, and the least square estimate of the parameters has a unique solution. The result is as follows:

$$\widetilde{\alpha} = \left(U^T U\right)^{-1} U^T Y. \tag{9}$$

By finding the simple model parameters and, similarly, by finding the least squares parameters, estimates are obtained. The off-line least square method is used to identify the sum of the static parameters of each connecting mechanism. According to the parameters, the dynamic and static analysis in dynamic control can be realized so as to adjust the machine position as shown in Figure 2.

In daily walking, there will be no flight state, but if it is at the beginning of the system operation, or in some specific circumstances, there will be such a change. Therefore, during the whole process, the reliability of the process must be fully explained and guaranteed. In addition, the left and right feet can act as support feet and sway at the same time, so the whole camera has six forms. In the two joint support phases and in the flight phase, the position of the single joint is subsequently adjusted according to the sway of the previous single joint support phase and the sway of the support joint and the support joint, as shown in Figure 3.

In the different point positions mentioned previously, the condition of 1 is that the left foot is a supporting joint part and the condition of 2 is the support phase of two joints in the condition of I, that is, the support phase of two joints, one is a flight phase in a situation and one is a situation in a situation. 4 is a support phase of one joint, 5 is a support phase of two joints in four conditions, one is a support phase of two joints, one is a support phase of four conditions, and one is a support phase of four conditions. In this image, the black arrow represents a normal camera, and in general, at the beginning of the system, the state will be from 3 to I, or from 6 to 4, and then between states 1, 2, 4, and 5; according to the direction indicated by the arrow, the movement will be made periodically [11]. For example, after the transfer from phase 3 to phase I, in phase I, the right foot is stepped forward, the front swing touches the ground, and then the

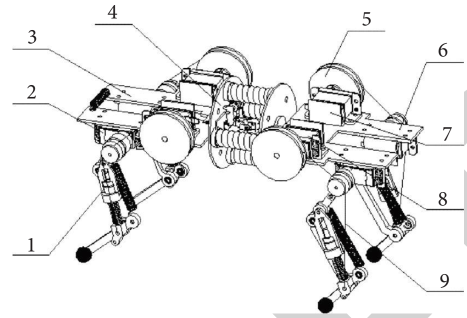

Figure 2: Camera pose transformation for a two-joint robot.

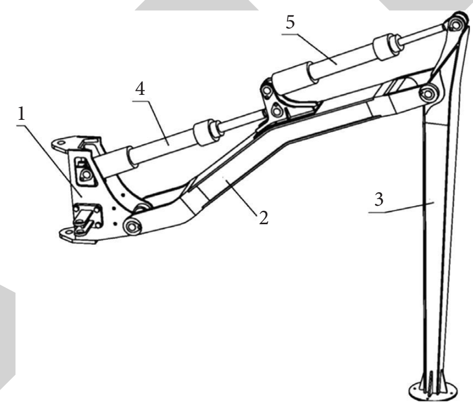

Figure 3: Single joint camera pose for a two-joint robot.

second phase is reached. In the second condition, the left foot leaves the ground and enters the fourth position. In the fourth case, the left foot was moved forward and the forward swing point of the body reached 5. Step 5 involves the right foot off the ground at 1. At this point, the system is back to level 1 and the two-joint robot has already taken one camera. From the cyclic transition of the states described previously, it can be seen that in the cycle of one camera, the mobile robot will move forward twice. If the system is working, the camera will repeat from 1 to 2, 4, 5, 1, and so on. In the event of an anomaly, the camera can switch to the third or sixth. This phenomenon is when the robots of both joints are detached from the floor at the same time. At this point, the camera will determine the abnormality and perform abnormal operation.

According to the abovementioned camera, in a planar camera, the two main motion phases are a joint and the support phase of a joint. So, the camera scheme of the planar camera can be regarded as a mobile strategy of the robot based on two joint support stages.

2.3. Camera Pose Analysis of Two-Joint Robots in Different Planes. In the support phase of a joint, the connection between the joint part and the floor is supported. When the foot sliding is not considered, it can be regarded as a non-transmission rotation assist limit, and at this time, the robot is a planar camera system. When filming, we used a simple method of supporting the joint length unchanged, that is, in the single-joint support stage, by controlling the angle of the knee supporting the joint. The joint support joint is connected by the hip and the body, where the hip joint is to maintain the stability of the body posture. At the same time, the swinging joint should not interfere with the floor and take a long distance forward to prepare for entering the joint support stage.

When both feet touch the ground during the support phase, the system is not a flat camera. In the support phase of the two joints, the center of gravity of the system is overloaded and the swing joint part of the support joint is exchanged, and then the swing joint part is retracted from the ground so that the whole system is in a single support phase. In a movement cycle, the length of the support phase of the two joints lasting in a cycle is small. Its primary job is also to realize the transformation of the support sway in order to maximize the introduction of the whole system to the next support stage.

The abovementioned several camera strategies can be summarized as follows: maintain the stability of the body posture while filming, the length of the support joint is unchanged, and the foot balls of the swing joints move according to the predetermined plan, and we ensure that the floor is not disturbed when swinging. In other words,

$$\begin{aligned} \theta_b &= 0, \\ l_{sp} &= l_0, \\ x_s &= f_1(x_h), \\ y_s &= f_2(x_h). \end{aligned} \tag{10}$$

In this paper, we present four programming equations for the system. When the controller makes the state of the system converge to the above plan, the robot converges to the designed gait. The analysis can be obtained, the motion plan is given, and the motion plan is given. Planning on the arc trajectory, that is,

$$\sqrt{x_h^2 + y_h^2} = l_0. \tag{11}$$

The massage joints are used to adjust the joint length, and the joints and knees of the swing foot are used for activities. However, there are five degrees of freedom in this system, while there are only four planning equations in the camera method, so the system still has one degree of freedom [12]. We take it as a condition of freedom under the abovementioned restrictions. As the movement of the system is determined, the state movement of the system as a whole is also determined. All other system states are arbitrary with the step size control. Depending on the camera strategy, it is easy to obtain

$$\begin{aligned} \theta_b &= 0, \\ y_h &= \sqrt{l_0^2 - x_h^2}, \\ x_s &= f_1(x_h), \\ y_s &= f_2(x_h). \end{aligned} \tag{12}$$

Therefore, in the case of stable degrees of freedom, other motions of the system are relatively stable; that is to say, the overall motion of the motion is stable. In a plane shooting process, there is no direct control of any position. It is affected by the starting conditions of the camera cycle, the action control of the camera, and other factors. In the process of photographing a two-arm robot, the difference method for time is characterized by its photographed gait. This is a difference from regular static photography, and it is also a major operation in planar photography.

3. Result Analysis

3.1. The Balance of the Camera Poses of the Robot and the Motion Control and Planning of the Joint Position. In the process of robot joint movement, maintaining the stability of human posture is the key to ensure its movement ability and application ability. The movement of the joint parts is the basic premise of the continuous camera of the robot, which not only supports the torso and upper arm but also allows the swaying joint parts to advance to ensure continuous camera shooting. The stability of the joint position is also a very critical issue in the continuous camera process of a two-joint robot. During the movement of the robot, these two problems cannot be avoided. The quality of its control has a great impact on the performance of the whole robot.

$$\tau_{fb} + m_b g C_b \sin\theta_b = J_b \ddot{\theta}_b. \tag{13}$$

It can be seen from the abovementioned formula that the dynamic equation of the body link is a nonlinear differential equation. Therefore, the feedback linearization method is used to design the controller. The opposite deformation can be obtained as follows:

$$\ddot{\theta}_b = \frac{1}{J_b}\left(\tau_{fb} + m_b g C_b \sin\ \theta_b\right). \tag{14}$$

Suppose the system formula is as follows:

$$v = \frac{1}{J_b}\left(\tau_{Ab} + m_b g C_b \sin\ \theta_b\right). \tag{15}$$

Thus, the abovementioned nonlinear differential equation becomes a double integral system, namely,

$$\ddot{\theta}_b = v. \tag{16}$$

Let the control target of the body posture be and the deviation between the control target and the actual state be $\theta_d e$. When it converges to 0, $e\theta_b = \theta_d$. That is, the body pose converges to the target pose. For the second-order differential equation, the poles are configured to converge as follows:

$$\ddot{e} + a\dot{e} + be = 0. \tag{17}$$

Appropriately chosen values of the poles can be configured such that the convergence to 0 follows the desired rate a, bee. For equation, it can be obtained as follows:

$$\ddot{\theta}_d + a\left(\dot{\theta}_d - \dot{\theta}_b\right) + b\left(\theta_d - \theta_b\right) = v. \tag{18}$$

Putting in equation, we can obtain

$$\tau_{fb} = J_b\left(\ddot{\theta}_d + a\left(\dot{\theta}_d - \dot{\theta}_b\right) + b\left(\theta_d - \theta_b\right)\right) - m_b g C_b \sin\theta_b. \tag{19}$$

In the process of dynamic walking, the target attitude of attitude control will be set as follows:

$$\ddot{\theta}_d = \dot{\theta}_d = \theta_d = 0. \tag{20}$$

In a real system, the controller design requires to obtain the parameters of that system. On this basis, the parameter identification technique is introduced to obtain the parameters of this system. The relevant information of nodes and the existing parameters are obtained through experiments so that the physical parameters of the system to be measured can be identified. After getting the physical indexes of the human body, the posture and joint movements of the human body can be controlled. Using the idea of combining feedforward and feedback, the feedback control rate of the human motion system is designed and a simple modeling method is used to correct the disturbance. Combined with the action plan of the joint parts, based on the attitude of the system, the combination of the robot action and the forward movement of the robot are realized. According to the dynamic characteristics of the joystick on the test bench, combined with the motion trajectory control of the joint parts, the system simulation is carried out [13]. The relevant parameters are summarized in Table 1 as follows.

As shown in Table 1 previously, in planar photography, the balance of posture is a key issue that affects the stability of the whole system, while the deviation of posture will inevitably cause the divergence of the camera. On the test platform, the gyro system connected to the human body can realize the attitude information of the human body, and according to the measurement results, a feedback controller for human posture equalization is designed. In addition, in the process of power photography, the motion of the human body encounters a lot of interference, such as in the case of a joint, the shaking joint will interfere with the connection of the body, the inertial influence of the camera, and some random interference. This makes it possible to control the attitude equilibrium of the aircraft in a sense. Model prediction is an effective way to deal with complex system disturbance. For some disturbances, if the mathematic model of the disturbance can be established in the system, the dynamic prediction and calculation can be carried out, and the compensation of the disturbance is introduced into the feedback controller of the system so that the interference to the system can be eliminated well. To this end, the pose equalization control of the system is carried out in the way of "feedback + feedforward." By using the feedback of the gyro sensor, some disturbances of the human motion in the human motion are realized, thus providing an effective compensation for the disturbances in the motion. Through the fusion of feedforward and feedback inputs, the posture equilibrium of the human body is realized.

Table 1: Camera parameters for planar two-joint robots.

Quality parameters (kg)	m_s	0.519
	m_h	1.684
	m_b	3.5
Size parameters (m)	l_s	0.355
	l_h	0.342
	l_b	0.612

3.2. Combinatorial Optimization of Planar Camera and Two-Joint Robot. When the planar camera robot moves, the human motion chain will produce a variety of disturbances, such as swing foot torque, inertial torque, and others. In reality, due to real time, time uncertainty, uncertainty, and other reasons, the motion state in reality cannot meet the requirements well. On this basis, the control method is studied and optimized. Especially for the abovementioned disturbance problem, it is necessary to give the corresponding control strategy to ensure that the better control results can be obtained when the disturbance occurs in the system. For a disturbance with certain nature, if it has certain modeling ability, this method can be used to predict the disturbance. Based on the forecast results, the corresponding correction is carried out, which can effectively eliminate the negative impact brought by the disturbance. In this paper, a feedforward control system based on disturbance model prediction is proposed.

In the single-foot support stage, the swinging feet will swing forward and prepare for the starting line of the next stage. So, during the single-foot support phase, the trunk connection is also disturbed by the swaying joint part. Using the dynamic parameters, the torque of the rocker arm connecting to the human body is compensated in real time. However, in reality, it is difficult to measure the dynamic acceleration of the link in real time. In the test bed described in this paper, the calculated velocity and acceleration must go through the first difference method and the second difference method because the sensors at the joint sites only contain the position encoders of each joint. However, this method will produce a lot of noise, especially the obtained acceleration signal. If a low-pass filter is used for filtering, it will cause a large delay to the interference of the system, and the delay to the acceleration will cause an error between the dynamic simulation and the real interference. In some cases, the feedforward source with delay and offset cannot improve the posture balance of the human body but will reduce the efficiency of its control. For the interference of the oscillating support, the static torque method is proposed, which is an important factor of the interference at low speed.

The abovementioned controller is briefly analyzed, where the former term is the positive relationship between the loading rate and the input, the latter term is the feedback of elastic compression, and the last term is the feedback of the speed deviation, which is the active vibration reduction. The second and three parameters are the effective vibration reduction of the control system. The fourth part is the feedback of positioning error, and the fifth part is the static compensation phase. The test shows that, in the test, the weight of the pendulum joint is mainly concentrated on the joint, while the weight and inertia of the joint are very low, and if the dynamic coupling of the two joints is not considered, it has no significant effect on the control of the movement. Therefore, in the plane camera, the control method described previously is used to track the trajectory of the motion in the joint space so that the motion direction of the swing arm in the motion direction converges.

4. Conclusion

To sum up, the camera attitude of planar dual-joint robot is analyzed in detail from the aspects of camera position adjustment and general data analysis. At the same time, this paper takes the five-link planar camera robot as the research object and discusses the balance of human posture, the control of joint motion, and the estimation and control of the camera rate. It is concluded that using finite camera technology can effectively solve the problem of plane photography and give the limit of photography and movement and give the measurement results of plane photography.

The significance of this paper is to solve the problem of human posture balance in plane camera motion. Through the abovementioned analysis, this paper can also better demonstrate its solution and the use of supporting joint torque as control input, in order to achieve the movement of the human body. In this paper, the motion equations of human motion system are analyzed and the feedback linearization method is used to control the motion of human motion. Secondly, a local interference model is established by studying the external interference on the human movement. A simple mathematical modeling method is used to predict the interference of external factors. It is then used as a forward feedback controller to obtain forward feedback. By comparing the two kinds of dual joint robot with different ratios, an optimal control index of pose balance is obtained.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors declare no conflicts of interest.

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