AN INTELLIGENT MECHANICAL ARM FOR JOINT RANGE-OF-MOTION DETECTION

Field of the Invention

The invention relates to the technical field of joint mobility detection, in particular to an intelligent joint mobility detection mechanical arm.

Background to the Invention

With the deepening of the concept of rehabilitation medicine, people's requirements for the evaluation of rehabilitation treatment effect are increasing day by day. Rehabilitation treatment involves a large number of patients with impaired joint function due to stroke, fracture, joint replacement and other reasons. For these patients, accurate monitoring of joint range of motion is a key step in assessing the rehabilitation process.

In the prior art, in the process of using the existing intelligent joint motion detection mechanical arm, the position of the rotating block at the joint is fixed, and cannot be adjusted according to the arm length and width of different patients, which has a large limitation and poor practicability.

Statement of Invention

The invention mainly provides an intelligent joint activity detection robot arm that can be adjusted according to the arm length of the patient and the arm width of the patient.

In order to achieve the above object, the present invention adopts the following technical scheme: an intelligent joint activity detection mechanical arm, comprising a bracket, a second telescopic rod is installed at both ends of the inner wall of the bracket, a connecting plate is fixed at the opposite end of the two second telescopic rods, two first wall plates are symmetrically arranged between the two connecting plates, a rotating block is rotatably connected in the two first wall plates, and a connecting block is fixed at the opposite end of the opposite end of the two rotating blocks, the opposite ends of the two connecting blocks are fixed with second wall plates, the opposite ends of the first wall plate and the second wall plate are both mounted with third telescopic rods, and the opposite ends of the two third

telescopic rods are both fixed with third wall plates.

Preferably, a motor is installed at opposite ends of the two connecting plates, and the output ends of the two motors are respectively fixed to the two connecting blocks. Through the operation of the motor, the connecting blocks can be driven to rotate through the cooperation of the rotating blocks, so that the second wall plate fixedly connected to the connecting block can be driven to rotate, thereby adjusting the different angles formed between the second wall plate and the first wall plate.

Preferably, a mounting plate is provided on one side of the bracket, a first telescopic rod is installed on one end of the mounting plate facing the bracket, and the output end of the first telescopic rod is fixed with the bracket. Through the operation of the first telescopic rod, the whole bracket can be driven to rise and fall. Because the bracket is designed with one end open, when the first telescopic rod is above the whole bracket, the device detects the arm joint of the user, when the first telescopic rod is located under the whole of the support, the device detects the leg joint of the user.

Preferably, rubber pads are fixed at opposite ends of the two first wall plates, the rotating block, the second wall plate and the third wall plate. By setting the rubber pads, when the two first wall plates, the rotating block, the second wall plate and the third wall plate move toward each other, a certain buffer effect can be achieved, so that the legs or arms of the patient can be clamped more comfortably.

Preferably, support blocks are fixed at opposite ends of the two connecting plates, and the opposite ends of the two support blocks are respectively fixed to the two first wall plates. The first wall plate is connected to the connecting plate through the arrangement of the support blocks, so that the position of the first wall plate can be limited, and the first wall plate can be driven to rotate when the rotating block rotates.

Preferably, the four corners of the mounting plate are all provided with mounting holes, and the opposite ends of the first wall plate and the second wall plate are connected in a movable manner. Through the setting of the mounting holes, the whole device can be installed by driving bolts.

Compared with the prior art, the advantages and positive effects of the present invention

are:

In the present invention, through the operation of the two second telescopic rods, the two connecting plates can be driven to move toward or opposite to each other, so that the two first wall plates, the rotating block, the second wall plate and the third wall plate arranged inside can be driven to move toward or opposite to each other, and can be clamped and fixed according to the arm width of the user. Through the operation of the two third telescopic rods, the spacing between the two third wall plates and the corresponding first wall plates can be adjusted, therefore, it can be adjusted according to the different lengths of the patient's forearm, calf, big arm and thigh, so that the rotating block can always be at the joint.

Brief Description of the Drawings

Figure 1 is a three-dimensional view of an intelligent joint activity detection robot arm proposed by the present invention;

Figure 2 is a cross-sectional view of an intelligent joint activity detection robot arm proposed by the present invention;

Figure 3 is a diagram of the external structure of the first wall plate of the intelligent joint activity detection robot arm proposed by the present invention;

Figure 4 is a schematic diagram of the external structure of a support of a robotic arm for detecting the range of motion of an intelligent joint according to the present invention.

Legend description: 1. Support; 2. Mounting plate; 3. First telescopic rod; 4. Mounting hole; 5. Second telescopic rod; 6. Connecting plate; 7. First wall plate; 8. Rotary block; 9. Connecting block; 10. Motor; 11. Second wall plate; 12. Third wall plate; 13. Third telescopic rod; 14. Rubber pad; 15. Support block.

Detailed Description

In order to more clearly understand the above objectives, features and advantages of the present invention, the present invention will be further described below with reference to the

accompanying drawings and embodiments. It should be noted that, in the case of no conflict, the embodiments of the present application and the features in the embodiments can be combined with each other.

Many specific details are set forth in the following description to facilitate a full understanding of the present invention. However, the present invention may also be implemented in other manners than those described herein. Therefore, the present invention is not limited to the specific embodiments disclosed in the following description.

Please refer to Figures 1-4, the present invention provides a technical solution: an intelligent joint activity detection mechanical arm, including a bracket 1, the two ends of the inner wall of the bracket 1 are equipped with second telescopic rods 5, and the two opposite ends of the telescopic rod 5 are both fixed with connecting plates 6, and two first wall plates 7 are symmetrically arranged between the two connecting plates 6, and the two first wall plates 7 are both rotatably connected with rotating blocks 8, the opposite ends of the two rotating blocks 8 are fixed with connecting blocks 9, the opposite ends of the two connecting blocks 9 are fixed with second wall plates 11, the opposite ends of the first wall plate 7 and the second wall plate 11 are both installed with third telescopic rods 13, and the opposite ends of the two third telescopic rods 13 are both fixed with third wall plates 12, first, the user's arm or leg is placed between the two first wall panels 7, the rotating block 8, the second wall panel 11 and the third wall panel 12. Through the operation of the two third telescopic rods 13, the distance between the two third wall panels 12 and their corresponding first wall panels 7 and second wall panels 11 can be adjusted respectively, so that the distance can be adjusted according to the different lengths of the patient's forearm, calf, big arm and thigh, the rotating block 8 can always be at the joint. After adjustment, the two connecting plates 6 are driven to move toward each other by the operation of the two second telescopic rods 5, so as to drive the two first wall plates 7, the rotating block 8, the second wall plate 11 and the third wall plate 12 to clamp the leg or arm of the patient. The operation of the motor 10 drives the connecting block 9 to rotate, thus driving the connected second wall plate 11 to rotate, bend the patient's forearm or calf, detect the joint activity through the externally connected angle sensor, force sensor and position sensor, and transmit the statistics to the computer for display.

1-4, motors 10 are installed at opposite ends of the two connecting plates 6, and the output ends of the two motors 10 are respectively fixed to the two connecting blocks 9. The operation of the motors 10 can drive the connecting blocks 9 to rotate through the cooperation of the rotating blocks 8, thereby driving the second wall plate 11 fixedly connected to the connecting blocks 9 to rotate, thereby adjusting different angles formed between the second wall plate 11 and the first wall plate 7.

As shown in Figure 1-4, a mounting plate 2 is arranged on one side of the bracket 1, a first telescopic rod 3 is installed on the end of the mounting plate 2 facing the bracket 1, and the output end of the first telescopic rod 3 is fixed with the bracket 1. Through the operation of the first telescopic rod 3, the bracket 1 can be driven up and down as a whole. Because the bracket 1 is designed with one end open, when the first telescopic rod 3 is located above the bracket 1, the device detects the arm joint of the user, and when the first telescopic rod 3 is under the whole of the support 1, the device detects the leg joint of the user.

1-4, rubber pads 14 are fixed at opposite ends of the two first wall plates 7, the rotating block 8, the second wall plate 11 and the third wall plate 12. By setting the rubber pads 14, when the two first wall plates 7, the rotating block 8, the second wall plate 11 and the third wall plate 12 move toward each other, a certain buffer effect can be achieved, so that the patient's legs or arms can be clamped more comfortably.

1-4, supporting blocks 15 are fixed at opposite ends of the two connecting plates 6, and the opposite ends of the two supporting blocks 15 are respectively fixed to the two first wall plates 7. By setting the supporting blocks 15, the first wall plate 7 is connected to the connecting plate 6, so that the position of the first wall plate 7 can be limited, and the first wall plate 7 can be driven to rotate when the rotating block 8 rotates.

As shown in Figures 1-4, the four corners of the mounting plate 2 are provided with mounting holes 4, and the opposite ends of the first wall plate 7 and the second wall plate 11 are connected in a movable manner. Through the setting of the mounting holes 4, the whole device can be installed by driving bolts.

The use method and working principle of the device: when the device is used, the support 1 can be driven to move up and down as a whole through the operation of the first telescopic

rod 3. Because the support 1 is designed with one end open, when the first telescopic rod 3 is above the support 1 as a whole, the device detects the user's arm joint, and when the first telescopic rod 3 is below the support 1 as a whole, the device is to detect the leg joint of the user, through the installation plate 2 and the installation hole 4, the overall position of the device is fixed installation, first the user's arm or leg is placed between the two first wall plates 7, rotating block 8, the second wall plate 11 and the third wall plate 12, through the operation of the two third telescopic rods 13, the distance between the two third wall plates 12 and their corresponding first wall plates 7 and second wall plates 11 can be adjusted respectively, so that the adjustment can be made according to the different lengths of the patient's forearm, lower leg, big arm and thigh, so that the rotating block 8 can always be at the joint. After adjustment, the two connecting plates 6 are driven to move towards each other by the operation of the two second telescopic rods 5, therefore, the two first wall plates 7, the rotating block 8, the second wall plate 11 and the third wall plate 12 are driven to clamp the leg or arm of the patient. Through the operation of the motor 10, the connecting block 9 is driven to rotate, so that the connected second wall plate 11 is driven to rotate and bend the forearm or leg of the patient. The joint activity is detected by the externally connected angle sensor, force sensor and position sensor, and statistics are transmitted to the computer for display.

The above is only a preferred embodiment of the present invention, not to limit the present invention in other forms. Any technical personnel familiar with the art may use the technical content disclosed above to change or modify the equivalent embodiment of equivalent changes applied to other fields, but all without departing from the content of the technical scheme of the present invention. Any simple modifications, equivalent changes and modifications made to the above embodiments according to the technical essence of the present invention still fall within the protection scope of the technical solutions of the present invention.