Combined multi-functional rehabilitation machine

Tianyi Zhang

School of Electrical & Electronic Engineering,North China Electric Power University, Baoding, 071003 China;

1274241914@qq.com

Keywords: Rehabilitation, training machines, Multifunction

Abstract. The design is a function with a variety of rehabilitation training machine, for there are injuries and recovering patients. The multi-functional integrated set by upper training, lower body and unified protection protective function of limbs force patients were fully trained to play a role in rehabilitation.

1. Introduction

Develop rehabilitation robots started in the 80s of the last century, history is very short, but very fast, has become a hot area of international research.China's research in this area later than Europe, the United States and other western countries, the current advanced technology in this area is mainly made in Europe and other developed countries, due to the different ethnic and regional factors and other Westerners body size and structure of our people with distinction they studied devices allow our people to use also will not reach good results, and therefore the need for research on the unique size of the human body. At present, domestic research aids in the rehabilitation aspect has also made a lot of achievements, but the overall trend is a functional single bias in the functional aspects of a comprehensive rehabilitation aids research is only just beginning. Provide safe, reliable, comfortable and user-friendly, easy operation and more affordable multifunction device has great necessity and importance for our country above the crowd.

2. Research Status and Development Trend

Rehabilitation robot as an important branch of medical robot, its research throughout the rehabilitation medicine, and many other areas biomechanics, mechanics, mechanics, electronics, materials science, ergonomics, computer science and robotics, etc., have become an international field of robotics research focus.

Germany RENK company developed MOTOmed viva2 for patients with complete loss of muscle strength can not own motion, by patients with lower limb motor driven exercise, in order to avoid or mitigate adverse effects caused by lack of exercise, Such as joint stiffness, muscle atrophy, many patients muscle strength is insufficient to support them standing, walking and other simple movement, which can be mistaken for completely lost muscle strength. MOTOmed viva2 After you enable this feature, the motor resistance is reduced to zero, the patient can use the power of tiny step on the brake pedal, this function can not only help find the remaining patients with muscle power and the remaining power of the muscles can be strengthened through regular training .

Figure 1MOTOmed lower limb training system

Figure 2 The Lokomat gait trainer

Switzerland Lokomat system with enhanced feedback to make continuous repetitive training through activities of daily living are trained and improved so progressive functional exercise therapy possible. To implement this progressive artificial functional exercise therapy training needs sufficient staff, it is entirely in heavy physical labor and only for a short time training. Computer-controlled motor, move the patient's legs through simulated physiological gait pattern, to precisely control the speed of the treadmill to make it consistent with the gait. Adjust training parameters to suit the needs of different patients. Automated operation reduces labor burden therapist for a long time and make more effective treatment possible.

3. Key functions to achieve

A large number of clinical data and theoretical medical research showed that patients with disabilities need immediate surgery and medication. Meanwhile reasonable scientific rehabilitation can be a good help the patient's body motor function recovery.Patient care and rehabilitation training to assist them, to their families and medical staff have increased a heavy burden, not only to study rehabilitation equipment patient brought the gospel, their families and medical staff is also very helpful.But judging from the analysis of the introduction,the current research and development for lower limb rehabilitation equipment Disabled single function, such as rehabilitation robot can only rehabilitation training, and has a fixed position, bulky, complicated operation questions. Thus developing a multi-functional instrument having rehabilitation, with good prospects for research and market prospects, while promoting the development of our society also has a role.

4. Function implementation details

1. Seat moving and lifting: To achieve this functionality rely mainly on lifting column to achieve lift in the vertical direction, with the motor to adjust the horizontal direction to achieve through this part of the exercise and adjust upper and lower extremity exercise handover sitting.

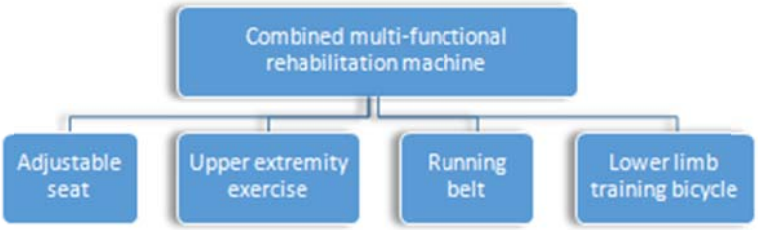

Figure 3 Functional Analysis

2. Upper extremity exercise: Patients can through different exercises posture, take advantage of Rally and Bili armrest portion rehabilitation exercises in the early armrest partially to the upper limbs provide an additional load driving limb passive movement, gradually activate muscle tone

and vitality, later reduced by the recovery auxiliary load or increase the load to play a role in recovery.


3. Running belt : Here the lower limb training equipment, the protective device can be folded up and put the upper part of the storage tank, when the patient is scheduled rehabilitation should support protection Wear fixture for standing and walking provide support and protection, with a front console adjustable walking speed, rehabilitation programs and display various training project completion and physical indicators.


4. Lower limb training bicycle: Here borrow MOTOmed recovery systems, providing power assist device, the motor will be reduced to zero resistance, increase resistance when reaching a certain extent. According to the actual situation of the patient to set the recovery plan.

5. Summary

Customize movement rehabilitation has become an essential and effective therapy, and all kinds of rehabilitation training robot, with its affordable price, simple operation, timely feedback illness and rehabilitation coaching obtain medical experts and patient affirmed.Although in our country, rehabilitation medicine project has been widespread attention, but the rehabilitation robot research is still in its infancy, some simple rehabilitation equipment can not meet the market demand for intelligent, human-engineered rehabilitation robot. So rehabilitation robot broad market prospects will drive this new technology to get more attention and promotion.Combined rehabilitation robot as an automation equipment, improve training efficiency, can help patients with scientific and effective rehabilitation of motor function so that patients get better recovery.

Reference

[1]Xu Xiang, Hou Liya, Zhang Weiyi. Wearable exoskeleton upper limb rehabilitation robot based design and research,J.Robot,2014,(02)

[2]Li Jian, Zhang Xiufeng, Pan Guoxin. Weight walking rehabilitation training robot design and its clinical application,J.Medical Biomechanics,2012,(06)

[3] Chen Wenbin. Kinematic analysis of human and humanoid upper body design and motion planning, D. Huazhong University of Science and Technology2012

[4] Ding Min, Li Jianming, Wu Qingwen, Shen Haitao.Lower limb gait rehabilitation robot: Research and Clinical Applications,J.Chinese Journal of Clinical Rehabilitation Tissue Engineering,2010,(35)

[5] C. Werner,S. von Frankenberg,T. Treig,M. Konrad,S. Hesse. Treadmill Training With Partial Body Weight Support and an Electromechanical Gait Trainer for Restoration of Gait in Subacute Stroke Patients: A Randomized Crossover Study[J]. Stroke: Journal of the American Heart Association . 2002 (12)