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Automatic Arm Exerciser using Arduino

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Abstract— What is so special about wearable exoskeleton technology? The answer is quite simple. Wearable exoskeleton technology has the potential to change the world for the better. Wearable exoskeleton technology has the potential to affect every person on this planet, all seven billion of us. Consider what robotics has done for the world and now imagine if that capability is paired with a human, not to replace them but to augment them.
Wearable human exoskeletons can be used in a variety of applications. There is not a single work on this earth, where the wearable exoskeletons can't be used. So the use of exoskeletons will definitely facilitate human beings to various jobs or works with less efforts and of course with the greater efficiency.
The present work, which describes the mechatronic designed development of arm exoskeleton which is used for various purpose like for lifting heavy items and holding them for longer period without pain. A normal person without using exoskeleton can't perform better as compared to a person who is using exo arm as assistant for lifting load. The exoskeleton doesn't completely vanish the load but it reduces it up to some extent as the load is being transmitted to whole body. This project aims to prepare a low-cost arm exoskeleton for doing various activities.
Keywords— Arduino, LCD, Sensor, Assembly, Motor

I. INTRODUCTION

There is increase in number of patients of physical damage like fracture in hands and legs etc. There are many reasons behind this physical damage, like accidental fall, vehicle accidents, sports etc. Automation of smart system is the essence of today's world. With the advance developments using electrics there are different intelligent systems are developed and now a day in the medical fields also several machineries are developed. But till today in the medical field for the exercise the traditional ways are used for measurement of the patient's hand movement and for the exercise the way of manual assistance is provided. All the records are maintained manually. The Lateral Hand Motion Measurement and Monitoring System is can be an example of required smart system. And it should not only continuously update the improvement in hand motion but also helps the patient to give exercise and avoids the time-consuming process of manually writing the patient's data. This project efficiently reflects the principles of Control Engineering.

II. LITERATURE SURVEY

In 1996, Ertas and Jones st an engineering design process this procedure is applied to design a home exercise machine. This machine uses a person's own weight as the source of resistance. The design process is used to take this idea from concept to prototype. The design process can be used to devise a system, component or process to meet desired needs. Another definition of the design process is "The process of applying the various techniques and scientific principles for the purpose of defining a devise, a process or a system in sufficient detail to permit its realization. Design may be simple or enormously complex, easy or difficult, mathematical or non-mathematical; it may involve a trivial problem or one of great importance."
Some electronic equipment has been designed by Universal Gym and Life Fitness. The goal of these machines is to provide an intelligent workout that optimizes the user's time. This is done by measuring the strength curve of the user and then matching it. The machines can also add more resistance for the eccentric motions and adjust for fatigue. The electronic machines also reduce boredom by creating an interactive experience. They also coach the user with feedback on fitness results. Universal Gym and Life Fitness designed a system that stores each user's information on a magnetic strip and can be used for future workouts. These machines use dc motors and a motor controller to create resistance (Dibble, 1989)

III. METHODOLOGY

In the present system there are some drawbacks as follows:
Less accuracy
Taking lots of time in maintaining patient's record
Requires extra manpower
This system does not provide progress report of patient.
Considering all the drawbacks the need is to develop and intelligent systems which will not only overcome the drawbacks in the existing system but also give some more advantages.

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IV. WORKING PRINCIPLE

A. Testing Assembly

Figure below shows block diagram of arm exerciser module. There are two mechanical assemblies tasting assembly and actual working assembly. We are used here position sensors on testing assembly. Magnetic reed relay sensors are used to detect the position of patient's hand. Sensors are placed near the mouth of the assembly. After the testing all the data is then send to the Arduino. The detected positions are then displayed on the LCD display.

B. Actual Working Assembly

Now as the data collected from testing assembly, the data in terms of position of sensors are given to the working assembly. Working assembly, then does the exercise as instructed by the Arduino data input.

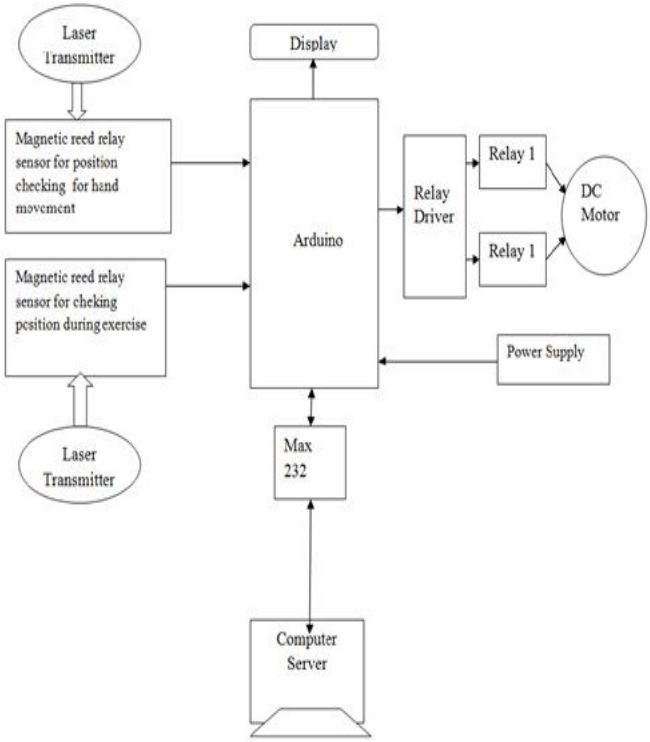


Figure. Arm exerciser model

V. FUTURE SCOPE

As in the fast and busy life the usage of the no of vehicles a tremendously increased and with the same the no of accidents are also increased. In the accidents the several time the damage to bones are observed and in such case of fractures it's very important take care of suffered patient. With the increase no of patients and the rush in hospital it's clear that there is a lot of scope for the development of the project.

VI. CONCLUSION

In paper, we represented an automatic arm exerciser model which will successfully able to heal patient in less time. It also reduces the human workload as automation is there. The technology used by the system is user friendly everyone can perform the task no need of special training to handle the system. Only doctor is sufficient to handle all the work. The project can be increased by adding joints to add sophisticated motions.

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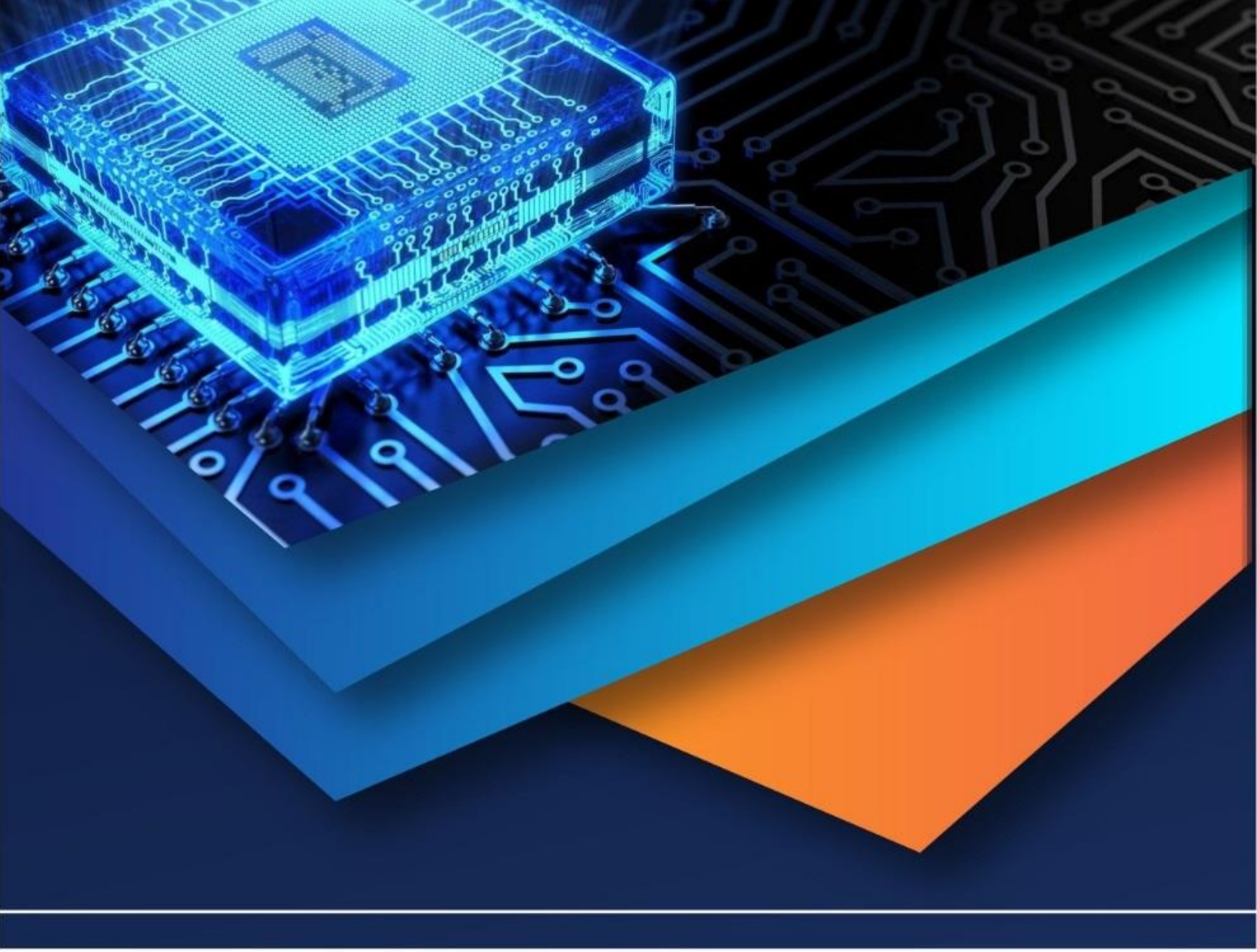
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