

Solar Based Portable Physiotherapy machine

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Abstract—one of the main goal of physical therapy after an elbow fracture is to restore normal range of motion to the elbow. The elbow is a complex joint that allows to bend arm or turn hand over. The physiotherapy machine for elbow exercise is mostly presented at physiotherapy centers. The main objective of this physiotherapy machine to build the light and cheaper invention for the patients who unable to buy the machine or cannot afford it.

Keywords— PIC controller, angle sensor, motor, limit switch, PV array

I. INTRODUCTION

Physical therapy means physiotherapy. Physiotherapy is one of the similar to health occupations that, by using mechanical force on the various parts for movements. The importance of the role of physical activity in disease prevention and health promotion is the basic aim for every patient. Being active and keeping active are important whether person is young or old, who are able to find the abled or disabled, male or female. Physical activities and exercise is not only maintain fitness but also recover mental health. But when the activity is not possible to be done by human then machines are used for the movements. The physiotherapy machine for exercise of elbow is mostly available at physiotherapy centers. For patients who are unable to walk, it is difficult to take them to physiotherapy center for regular exercise. Even charges are also expensive. In such cases our portable physiotherapy machine can be taken to patient's site in hospital or at home. The relative of patient / patient can be trained to use proposed physiotherapy machine everyday as per schedule given by physiotherapist.

Our proposed physiotherapy machine also has solar battery back-up for energy conservation. Based on PIC – Intel 8259 programmable interrupt controller, which is fast and easy to implement program when we compare other microcontrollers like 8051. It has the ease of programming and easy to interfacing with other peripherals hence will be used in our proposed project. Input commands will be given by devices like computer or laptop or simply screen then PIC (Intel 8259) will proceed and operate to help to perform the tasks as per algorithm. Here we propose to perform the task for the movement of elbow in angle rotations. Once angle and no. of rotations are fed, the exercise performance will start with some set speed. Also, we propose to make the outer part of plastic and Al (Aluminum) metal which will lowers the weight of machine and make it portable with high quality.

II. TECHNICAL REVIEW

There are many physiotherapists are available at physiotherapy centers as well as hospitals and they provide service of guidance to patients in monthly or yearly basis. But, it can be possible to use the physiotherapy machine without any manual use and in proper order. Thus, if we feed the required input for certain time duration, it works for that certain period and then it stops or ask for next activity. Thus, it has various advantages in our day to day life.

[1] This paper describes an augmented reality physiotherapy rehabilitation system called ARkanoidAR, implemented using the Microsoft Kinect, focus is to provide the feedback for biomechanical movements, more specially those which occurs on the sagittal plane. Here ARkanoidAR is proposed and evaluates its usability in the rehabilitation context. Usability quiz, and its results obtained shows that the application is efficient in guiding and engaging the users to do motor rehabilitation exercises and that it is easy to be set up and handled. The physiotherapy rehabilitation system which is called as ARkanoidAR which was implemented using the Microsoft Kinect. Main focus of this ARkanoidAR is to provide feedback for biomechanical movements and the patients which have this problem. In this, the body of user is fully engaged for the movements and thus there is full concentration of patient and operator is needed for operation.

[2] This paper discusses how a system, namely Fitness mate is designed and implemented to enable users to engage in physical exercises without the presence of a physical trainer. Visual c#, Matlab programming language, and Unity game engine are the technologies used to develop the system. The main goal is to provide a home-based environment where the people can engage in physical exercise without the presence of a physical trainer and to avoid the physical injuries. In this, the embedded system language is used which is help to perform the exercises as without the presence of physical trainer.

[3] This work deals with the design of interactive monitoring tool for home based physical rehabilitation. The software performed the working on video processing stage and the exercise performance evolution. The Image features are extracted by a Kinect V2 sensor and elaborated to return the exercises score. Furthermore, the tool is providing to the physiotherapists a quantitative exercise evolution of the subject's performances. Kinect is line of motion sensing device which is produced by Microsoft Company from which is most preferable camera sensor.

[4] Patients which have functional motor disorder (FMD) including weakness and paralysis disease are commonly suggested for the physiotherapists. There is one proof that physiotherapy is an effectively worked treatment, but the literature has limited explanations of what physiotherapy contents and there is insufficient data to provide guidelines. Thus, this problem is solve by presenting suggestions for physiotherapy treatment. In option, physiotherapists, neurologists and neuropsychiatrists, all with

more experience in treating FMD term. A set of recommendations were created on basis of existing experience. In result, they recommend that physiotherapy treatment is based on a bio-psychosocial work. Treatment should address illness thoughts, self-attention and abnormal movement of various patterns. Through a process of education, movement retrained and management strategies within a positive and without judgment views are allowed. They provide examples of these strategies for different symptoms. In conclusion, Physiotherapy has a role in the management of patients with FMD. There is to be specific physiotherapy techniques which are useful in FMD and which are acceptable to and require prospective study.

[5] This research shows that the expectations a patient wants from treatment to have important effects on the clinical working, experience of treatment, treatment procedure, outputs which are getting from and satisfaction. This means that, the expectations from patients are important for physiotherapists as well as researchers to take into account which helps to care and treatment developments. Research method highlighted main points and the need of a better understanding for the expectations from physiotherapy treatments for various problems to start more effective, quality full and cost-beneficiating care. The aim of this study was to enhance the responses to an item on patients' expected outcome of their physiotherapy treatment that was full filled within a larger research. A reliability study was taken with newly patients physiotherapy departments in SE England. The outcome tool has items, which included a pre-treatment work to provide feasibility of their physiotherapy treatment.

[6] Paper describes a low-cost, vision based monitoring system for home-based exercises. It contains two modules, the first module used to identifying the exercise with the help of motion or movement patterns, by information, and object information in gray-level pattern and then collects these specifications in a generative Bayesian network pattern. The second module is used for the counting of repetition in an exercise session by any special approach. We created a data which contains 240 exercise movements and then test this system on that data. The time duration of exercise is around 30 seconds to 1 minute.

[7] Robot mask with shaped memory that follows the request of handling the skin through minimum number of wires, transparent rob and tapes based pulling mechanism to increase the expressions of the face. To achieving facial expressions by taking the advantage of some features of the skin. Robot Mask follows a human body which follow some of the points from facial movements and as well as directions. In this paper, they describe a study by using the Robot Mask helps for the physiotherapy of a paralyzed patient. Differences in shape and size of different individual peoples have proper choices of the Robot Mask for wearing it. They also introduced us about the depth of image sensor data based analysis process, which can be studying characteristics of facial expressions in a continuous manner. From that study, they found that the Robot Mask could handle the physiotherapy tasks of paralyzed phases. They also verify that, while providing immediate responses, the Robot Mask can reduce the dissimilarity of a smiling face.

[8] There are many problems are arrived at human such as Low Back Pain (LBP) is one of the most common problems among adults as well as for older. The general physiotherapy treatment is to perform physical exercises for particular time. However, most of LBP patients do not able to carry their home exercises which may increase their pain and disability. Moreover, some LBP patients have wrong assumptions and thus they avoid the movements. In this paper, they explained that, patients are engaged in movements or exercises in particular environment and thus distract them from their pain. This is one solution for best outcome. And other option is patients who are able to buy the devices they can handle the machine at their own places by cell phones or other devices.

III. CONCLUSION

To develop this new device by our own techniques with the support of mechanical framework for patient use and help in social economy. Also, to give the support for the saving of electricity by use of renewable energy i.e. solar source. These machines are help people affected by injury, illness or disability for the easy to movement and exercise, manual therapy, education and device. This is mainly the mobility equipment which is help to increase the movement, strength and balance and the coordination too. The by fixing the angle and rotation it moves in that specific period time for such a particular rotations which are entered by input. For this equipment, following skills which will be present in this device:

1. Time management: Managing one's time and time of others.
2. Critical thinking: Using the techniques, to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
3. Service orientation: actively looking the help people.
4. Complex problem solving: Identify the complex problems and reviewing related information the expected outcome of this project is to construct inexpensive portable light in weight Physiotherapy machine for the patients who are unable to walk, as it is difficult to take them to physiotherapy center for regular exercise. Even charges are also expensive.

To make the said machine portable so that it can be taken to patients site in hospital or at home. The relative of patient / patient can be trained to use proposed physiotherapy machine everyday as per schedule given by physiotherapist. To provide solar battery back-up for energy conservation.

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