International Journal of Advanced Research

in Electrical, Electronics and Instrumentation Engineering

INTERNATIONAL STANDARD SERIAL NUMBER
INDIA

Impact Factor: 7.282

Smart Therapy Chair with Physiological Parameter Measurement

Thomas P Rajan[1], Ashy P Saji[2], Aswin Sivadasan[3], Kiran George[4], Ranju Mohan T[5]

Assistant Professor, Dept. of EEE, M A College of Engineering, Kothamangalam, Kerala, India[1]

UG Student, Dept. of EEE, M A College of Engineering, Kothamangalam, Kerala, India[2345]

ABSTRACT: Each and every person in this world has a desire to live a normal healthy human life but accidents, diseases and old age restricts this to some extent. They might need to consult a therapist frequently to help them with physical exercises to recover from strain. This system is a combination of different controlling features and has the ability to detect physiological parameters such as pulse rate, temperature and weight, and if any abnormal variation is detected, it immediately sends a message to the registered guardian. It also incorporates a system for physical therapy of the user. The aim of the system is to compact many facilities in a single smart chair at low cost.

KEYWORDS: Physiotherapy, vitals monitoring unit, alerting system.

I.INTRODUCTION

Human beings have the freedom to move around as they like, but due to various reasons like accidents and related injuries, their ability to freely go around might get hindered. These individuals may not be able to move as they require, and regular checkups and physiotherapy might be required to aid their recovery. As we know, it is quite difficult to consult a doctor or hospital for routine checkups in the present COVID-19 affected world.

Smart therapy chair takes the activities of a therapist in a cost-effective manner. The system ensures that the user can undergo regular check-ups by being in their home itself.Check-ups are not only to detect potential medical problems. They help one to identify the change in lifestyle required to overcome certain medical conditions and thereby improve the health condition. By improving and strengthening a person's health, the quality of life is enhanced.

II.SYSTEM MODEL AND ASSUMPTIONS

The system consists of three units: therapy unit, vitals monitoring unit and an alerting system. An Arduino acts as the central controller and drives the other units. The block diagram of the system is given in Fig.1.
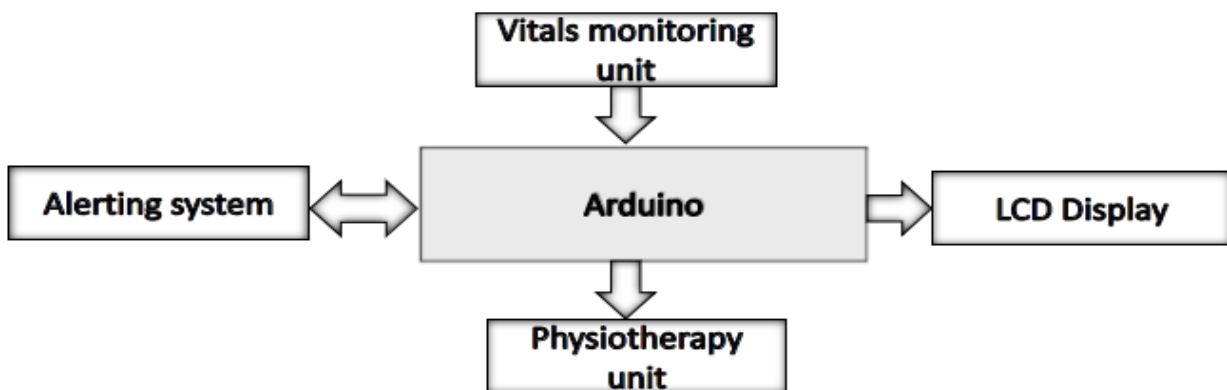

Fig.1. Block diagram of smart therapy chair with physiological parameter unit

The therapy unit consists of two parts; the first one is used for upward and downward movement of legs and hands. It consists of controlled weight loading with help of pulley system and DC motor set. DC motor set is fixed on the chair with pulley connect to it through belt. With the help of the DC motor the vertical movement of hand and legs can be done. The second part of the therapy unit is the vibration part, the vibration pad provide vibration to the foot. Fig.2 shows the frame of wheelchair.

Fig.2 Wheelchair frame

In the physiological parameter measurement unit, it measures the important vitals of the user. It measures the heart rate and oxygen level of the user with the help of a pulseoximeter, weight of the patient with the help of load cell, lungs capacity of user with the help of flow meter and temperature is also measured. The alerting unit alerts the caregivers when the measured vital values shows any abnormalities, and with help of GSM module a message is sent to the caregivers about the condition of the patient.

III. RESULTS AND DISSCUSSIONS

A. SYSTEM OUTCOMES

In the trial run of the system, the dc motors in the therapy system lifts the weight up to10 kg in each side. In the vital monitoring system that consists of various sensor . The pulse oximeter senses heart beats of the patients and BPM value and oxygen level are detected. Similarly temperature sensors, senses the body temperature and measured the temperature level.Also the flow meter installed and it determined the lungs capacity of the users.The weight of the the users is obtained by installing the load cell arrangement in the system. All this measured values are displayed on the LCD display that is attached to the chair. An alerting system installed, it sends message to the caretakers in the emergency situation. Here the fig.3 shows the display of the system, which shows the measured vitals value. In fig.4 shows final implemented therapy chair.

Fig.3 Display of the therapy chair

Fig.4 Therapy chair

B. FUTURE DEVELOPMENTS

The modification can be added to the system are mentioned below:

1. All types of therapy related facilities can be implemented.

2. Software application can be incorporated so that real time data of the user can be forward to the guardian.

IV.CONCLUSION

It was created a smart therapy chair with a physiological parameter measurement system. A therapy unit and various sensors were incorporated in this system to perform therapy and measure physiological data. The user's lung capacity could be measured to determine the peak flow in order to foresee any breathing problems and guardians could be notified by SMS in the event of an emergency.

Along with these features, an android application can be included in the future so that the information of the vitals monitored may be transmitted to the guardian so that they may check on the user on a regular basis.

REFERENCES

[1] M. F. Islam Chowdhury, S. M. Lutful Kabir and S. M. Rashedul Hasan, "AnAutomated Therapy Chair for Patients having ChronicObstructive Pulmonary Disease (COPD),"IEEE International Conference on Biomedical Engineering, Computer and Information Technology for Health (BECITHCON), Dhaka, Bangladesh, 2019.

[2] M. M. Rahman, S. Chakraborty, A. Paul, A. M. Jobayer and M. A. Hossain, "Wheel therapy chair: A smart system for disabled person with therapy facility ,"International Conference on Electrical,Computer and Communication Engineering (ECCE), Cox's Bazar,2017.

[3] WANG, Xiao & LI, Jian-Liang & SONG, Jing & WANG, Ya-Song & CHEN, Zheng-Hao. (2017). "Human Physiological Parameter Detection System Based on Android and Arduino", International Conference on Mechanics Design, Manufacturing and Automation (MDM 2016), DEStech Transactions on Engineering and Technology Research,2016.

[4] Leocádio, Rodolfo & Rêgo Segundo, Alan Kardek & Louzada, Cibelle. (2018). "Sensor for Measuring the Volume of Air Supplied to the Lungs in Ventilation Maneuvers during Cardiopulmonary resuscitation in adults embedded on mannequins", 5th International Electronic Conference on Sensors and Applications, Proceedings, 2018.

[5]   Mohammed Faeik Ruzaij , S.Poonguzhali,Y.-C. Liang et al., "Design and Implementation of Low Cost Intelligent Wheelchair",*International Conference On Recent Trends in Information Technology (ICRTIT),* IEEE,2012, pp 468- 47,2012.

[6]   D. Bilic, T. Uzunovic, E. Golubovic and B. C. Ustundag, "Internet of things-based system for physical rehabilitation monitoring," 2017 XXVI International Conference on Information, Communication and Automation Technologies (ICAT), pp. 1-6, doi: 10.1109/ICAT.2017.8171641,2017.
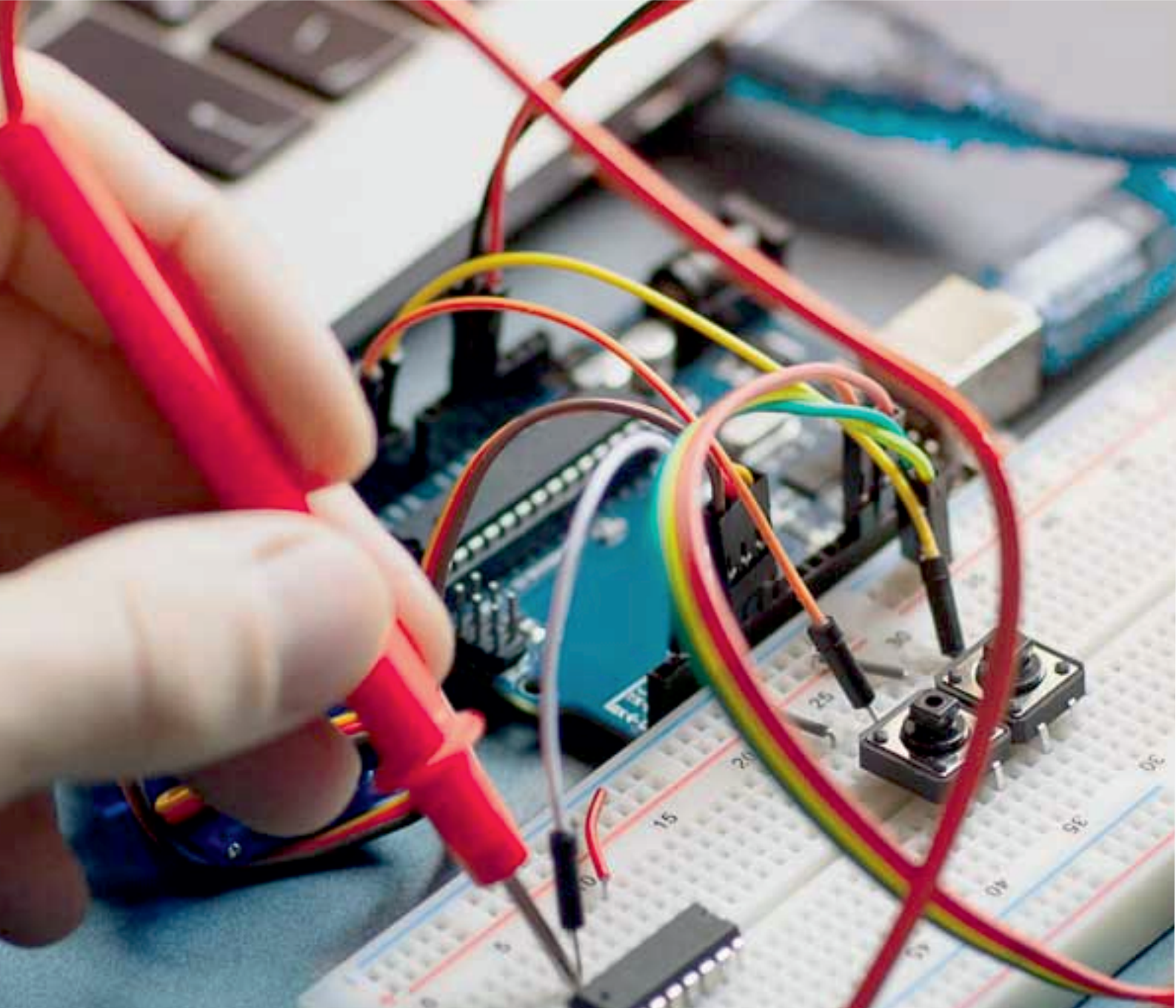
International Journal of Advanced Research

in Electrical, Electronics and Instrumentation Engineering

📱 9940 572 462 ⬤ 6381 907 438 ✉ ijareeie@gmail.com