



ASSISTIVE DEVICE FOR VR GAME BASED REHABILITATION

S. RAJASEKARAN¹, M. HARISHDEVA², F. SAQHIBUDDEEN AHMED³, A. SEENIVASAN⁴, K. KARTHICK⁵

1ASSOCIATE PROFESSOR, 2,3,4 UG SCHOLAR
MEDICAL ELECTRONICS ENGINEERING,

PAAVAI ENGINEERING COLLEGE(AUTONOMOUS), TAMILNADU, INDIA.

ABSTRACT

Our Aims to provide effective and active rehabilitation for patients suffering from upper limb paresis, using gaming based a therapy technique. By disguising the tasks into further amusing, patients are motivated to train for longer and more constantly. The advantage of this system can be a tone- managed, at- home remedy system; reducing fatigue for physical therapists, and the time needed for therapist- case sessions. The system incorporates a virtual reality (VR) terrain displaying both the games and a mortal model as feedback of the patients' conduct whilst playing the games. The game was developed, each targeting enhancement of muscle strength, control, delicacy, and speed. The difficulty of the games can be varied to suit several impairments and patient progress is covered. The games are played using a band. The successful advancements with lower costs associated with this system, are pronounced advancements for patients suffering from such an enervating condition.

Keywords: Paralysis, Rehabilitation, Stroke, Upper extremity, Video games, Virtual reality.

1. INTRODUCTION

A study reveals that over 5000 cases register every month on spinal injury and post stroke to overcome these shortcomings, the paper proposes a new wearable device which is designed as motion sensitive game controller. It can combine with rehabilitation game design to encourage patients to exercise anywhere. Combined with rehabilitation actions and game content, home exercise therapy has gradually become a viable treatment method. Patients do not need to return to the hospital for treatment, but they can exercise at home and assess immediately. Recent studies have verified that the motor impairment can be remedied by violent use and accession of new motor chops needed for cortical reorganization, in addition active

movement in task acquainted, repetitious conditioning prove perfecting motor chops and muscular strength. Upper extremity motor impairment after stroke significantly impedes the performance of diurnal conditioning and affects cases quality of life.

2. LITERATURE SURVEY

Usually Generally after post stroke croaker are advised to be under a physiotherapist for the recovery where it bring further cost and boring way to recover so some of invention which involves in virtual way are developed. A Virtual Reality grounded Serious Games for Rehabilitation of Arm (1).

The minimal necklace needed – on average- to sustain the forearm weight

during flexion is 1. Most importantly, is the need for a low- powered, light weight and accurate selector with feedback, therefore Maxon Motor EC 90 flat which provides a can nonstop necklace of 444nm. Here they're used to measure the elbow flexion/ extension angle. Game-Grounded Virtual Reality Interventions to Ameliorate Upper Limb Motor Function and Quality of Life After Stroke Methodical Review and Meta-analysis (2)

Study selection and data birth First, we carried out a hunt combining keywords in different databases. latterly, an total verification of compliance with the addition criteria was carried out to gain the papers included in the present methodical review. operation of Serious Games grounded on Virtual Reality for Rehabilitation of Cases with Parkinson's Disease through a Wrist Orthosis (3) This work presents an operation of serious games and Virtual Reality (VR) for the treatment of muscle stiffness in cases with Parkinson's Disease (PD) through integration with a wrist orthosis accelerometer. Physical Rehabilitation grounded on Smart Wearable and Virtual Reality Serious Game (4) These measures can be also used to estimate the posture of the stoner during the exercises of the remedial games.

3. EXISTING SYSTEM

The existing system for patient motivation and adherence to treatment protocols are major barriers to recovery in people with long-term conditions. Virtual reality-based games can create fun environments that engage users and increase motivation. While positive benefits of virtual reality games have been seen in stroke survivors, there is a lack of structured information on the users' perspective of such interventions. To develop games that successfully engage users, it is important to involve the users themselves in product development and the products are heavy to handle and not compact.

4. PROPOSED SYSTEM

This paper proposes a virtual rehabilitation technology to improve the upper extremity function of an post stroke patients we have been implemented a wireless compact device which can be attached with our hand

with elastic band and with EEG sensor we can continuously monitor our electro muscular activities and improve the games developed with different features can enable our function with more optimization and with accuracy function improves The games are designed according to rehabilitation.

5. SYSTEM SPICIFICATION:

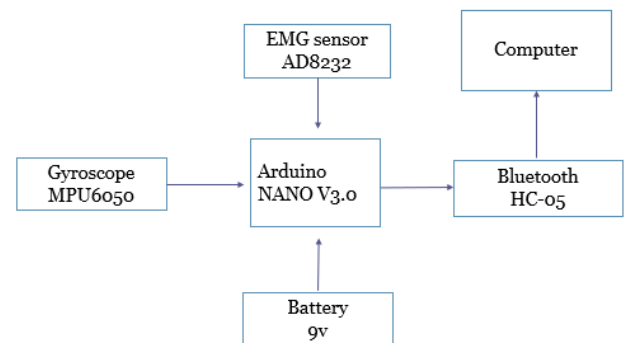
5.1 HARDWARE REQUIREMENT

Arduino Nano Microcontroller.
Gyroscope Sensor.
EMG Sensor.
Bluetooth Module.

5.2 SOFTWARE REQUIREMENT

Arduino Ide.
Processing Software.

6. BLOCK DIAGRAM



7. RESULTS

The result of this project is device which is compact and enables rehabilitation for post stroke patients with a gaming environment the virtual reality gaming device with pre-defined functions for the patients and their disability is very useful to improve the function ability and mindset of the patients in a healthy manner and very effectively.

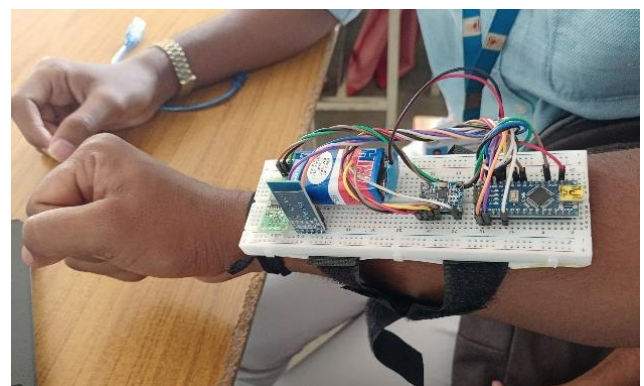


Fig 6.1 Hardware Implementation.

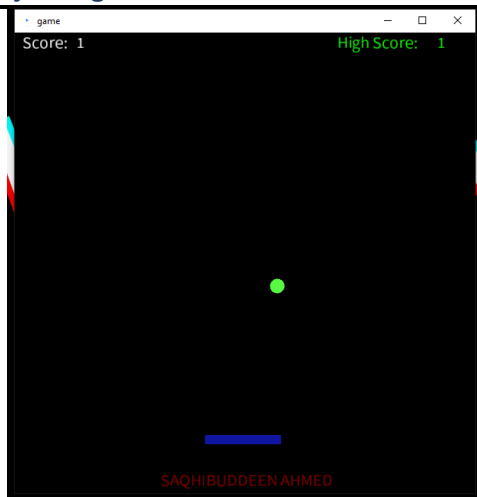


Fig 6.2 Game.

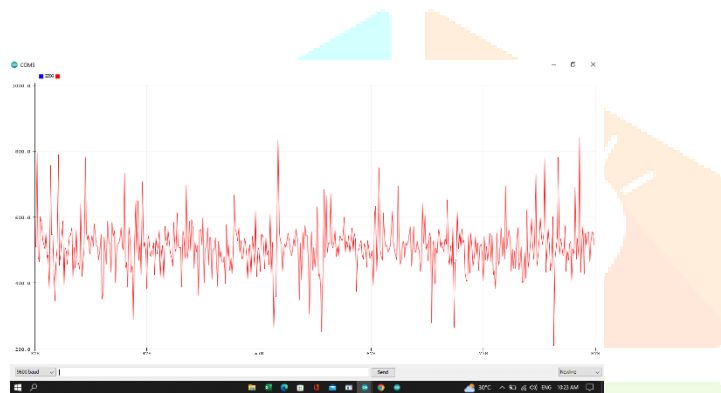


Fig 6.3 Data EMG output generated during game.

7. CONCLUSION

This paper describes the device for rehabilitation for post stroke patients with a compact gaming device and the function are improved from previous versions and it also analyses the EMG of the patients and improvement of the limb function with the rehabilitation process it also provides a entertaining environment for the patients which enables to recover emotionally and physically.

8. REFERENCES

- [1]. Leong, S.C., Tang, Y.M., Toh, F.M. and Fong, K.N., 2022. Examining the effectiveness of virtual, augmented, and mixed reality (VAMR) therapy for upper limb recovery and activities of daily living in stroke patients: a systematic review and meta-analysis. *Journal of neuroengineering and rehabilitation*, 19(1), pp.1-20 .
- [2]. Fernández-Vázquez, D., Cano-de-la-Cuerda, R. and Navarro-López, V., 2022. Haptic Glove Systems in Combination with Semi-Immersive Virtual Reality for Upper Extremity Motor Rehabilitation after Stroke: A Systematic Review and Meta-Analysis. *International Journal of Environmental Research and Public Health*, 19(16), p.10378
- [3]. Hsu, H.Y., Kuo, L.C., Lin, Y.C., Su, F.C., Yang, T.H. and Lin, C.W., 2022. Effects of a Virtual Reality–Based Mirror Therapy Program on Improving Sensorimotor Function of Hands in Chronic Stroke Patients: A Randomized Controlled Trial. *Neurorehabilitation and Neural Repair*, p.15459683221081430
- [4]. Wiley, E., Khattab, S. and Tang, A., 2022. Examining the effect of virtual reality therapy on cognition post-stroke: a systematic review and meta-analysis. *Disability and Rehabilitation: Assistive Technology*, 17(1), pp.50-60.
- [5]. Zhang, B., Li, D., Liu, Y., Wang, J. and Xiao, Q., 2021. Virtual reality for limb motor function, balance, gait, cognition and daily function of stroke patients: A systematic review and meta-analysis. *Journal of Advanced Nursing*, 77(8), pp.3255-327
- [6]. Li, Y., Huang, J., Li, X., Qiao, J., Huang, X., Yang, L. and Yu, H., 2021. Effect of Time-DoseMatched Virtual Reality Therapy on Upper Limb Dysfunction in Patients Poststroke: A MetaAnalysis of Randomized Controlled Trials. *Archives of Physical Medicine and Rehabilitation*32