



Smart Wheelchair With Inbuild Back Massager

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Abstract: In order to relax the back muscles and improve comfort, invented an automated back massager. Manual physical massage techniques have been employed since the beginning of time. This method provides momentary pain alleviation. An excellent substitute for manual massage treatments is an automated back massage chair. This back massager will lessen some of the limitations of the manual therapy outlined above. The entire region of the back muscles encircling the spine is targeted by this device. Compared to handheld or vibrating massager equipment, this is thought to be more effective. The proposed system includes a portable feature that enables use by all age groups even in the absence of a designated chair or location. To better target a particular back muscle for pain alleviation, the handheld motion controller will allow the user complete control over the back rollers' linear movement. The cushioned height adjustment offers the user greater comfort and relaxation when sitting.

Keywords-Back Massager, Manual Therapy

I. INTRODUCTION

Based on the proof, massage therapy is recommended as a pain management option. Massage therapy is recommended for health-related quality of life and improving mood reducing pain as compared to other manual techniques. Safety measures, research challenges and implementations should be done for Massage therapy for its effectiveness and impact in medical treatment.

By incorporating a back massager into the wheelchair, users can enjoy added comfort and therapeutic benefits while navigating their environment. This feature not only promotes relaxation but also addresses potential discomfort or pain that users may experience during prolonged wheelchair use.

"In recent years, there has been a growing interest in developing smart technologies to improve the quality of life for individuals with mobility impairments. One such innovation is the smart wheelchair, which integrates advanced features to

enhance user comfort, safety, and overall mobility. we focus on the design and implementation of a smart wheelchair with a built-in back massager. The inclusion of a back massager aims to provide users with a more comfortable and therapeutic seating experience, addressing common issues such as discomfort and muscle fatigue associated with prolonged wheelchair use. This project not only showcases the

potential of smart technologies in improving accessibility and comfort but also highlights the importance of user-centric design in assistive devices."

II. SCHEMATIC DIAGRAM

Fig. shows a schematic diagram for an Automated Back Massager. The portable assembly of this device enables it to fit over any sitting alternative like chair and sofa. The two cushioned back rests are provided to support user body. A level height adjustment mechanism is provided to fit the use of the device for any user. We are providing two methods of device control. The first method is provided with a push button in user's hand. According to the position of push button rollers will perform up and down linear movement. The second method is fully automatic in which time required for linear up and down movement is predefined in software. Therefore user only needs to rest his/her back on cushioned support and enjoy the massage. The hard wooden frame of device with cushioned back rests allows user to enjoy automatic massage. A 12 V DC adapter is used to power the entire system.



Fig. Schematic of Back Massager

III. CONTROL MECHANISM

Here, a controller called an Arduino is utilized to process and regulate signal. DC motor connected to controller are driven by the motor driver. The motor driver delivers enough current to power motor. A switch connected to a controller regulates the motion of rollers for convenient and smooth operation.

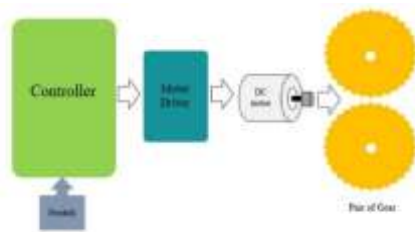


Fig.1 Block diagram of back Massager

Fig.2 A rack and pinion gear. It is a type of linear actuator that comprises a circular gear (the pinion) engaging a linear gear (the rack). Together, they convert between rotational motion and linear motion. Rotating the pinion causes the rack to be driven in a line. Conversely, moving the rack linearly will cause the pinion to rotate.



Fig.2. Rack & Pinion Gear

Fig.3 shows the image of the motor used to move the massager tool in upward and downward direction.



Fig.3 Motor

Fig.4 shows the power for the DC motors of the wheelchair is supplied by a battery. There are two types of batteries: rechargeable and non-rechargeable. The rechargeable one is also called a storage battery, accumulator, or secondary cell. This type of electrical battery can be charged, discharged during load, and recharged again several times.



Fig.4 Battery



Fig. 5 Transmitter



Fig.6 Receiver

For the Back Massager following components are used which is mentioned in Table 1

Table 1 Components used in Back Massager

Sr. no.	Components
1	Rack & pinion (Gear)
2	Battery
3	Wooden Board
4	Motor
5	Freewheel balls
6	Transmitter
7	Receiver

IV. ADVANTAGES OF BACK MASSAGE

1. Increased Circulation: Massage can stimulate blood flow, which can be beneficial for overall health and may help prevent issues like pressure sores.

2. Muscle Relaxation: Massage can help relax muscles, reducing stiffness and promoting better posture and mobility.

3. Stress Relief: A massage can be relaxing and can help reduce stress and anxiety, promoting overall well-being.

4. Pain Relief: Massage can help alleviate back pain, which is common among wheelchair users due to prolonged sitting.

5. Sensory Experience: Having a massage feature can enhance the overall sensory experience of using the wheelchair, making it more enjoyable and comfortable.

6. Convenience: With a built-in massage feature, you can enjoy the benefits of massage without the need for additional equipment or services.

V. FUTURE SCOPE

1. Smart Technology Integration: Integration of sensors and AI to monitor posture, movement, and health metrics, providing real-time feedback and personalized therapy plans.

2. Customization and Adaptability: Wheelchairs designed to adapt to changing needs, such as adjustable seating configurations and modular components.

3. Data Collection and Analysis: Collection of data on user activity, health metrics, and therapy adherence for personalized rehabilitation plans and outcomes assessment.

4. Environmental Interaction: Integration with smart home systems and mobility aids to enhance interaction with the environment and promote independence.

5. Sustainability and Accessibility: Focus on environmentally friendly materials and designs, as well as ensuring affordability and accessibility for all users.

VI. CONCLUSION

In concluding the words of our project, the wheelchair's design prioritizes user comfort and convenience, with the back massager seamlessly integrated into the overall functionality of the wheelchair. The integration of a back massager in the smart wheelchair aims to enhance user comfort and promote relaxation, contributing to overall well-being. The wheelchair's back massager can be customized to provide varying levels of massage intensity and focus, catering to individual preferences and therapeutic requirements.

VII. REFERENCES

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