DEVELOPMENT OF MULTIFUNCTIONAL AUTOMATIC WHEELCHAIR

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Keywords:

1) Multifunctional: Highlighting the diverse capabilities of the wheelchair.
2) Automatic: Emphasizing the automation and ease of use.
3) Assistive Technology: Referring to the technology designed to assist users.
4) Mobility Aid: Describing the primary function of the wheelchair.
5) Accessibility: Focusing on making spaces and services accessible.
6) Smart Wheelchair: Denoting the incorporation of smart features.
7) User-friendly: Ensuring ease of use for individuals with disabilities.
8) Ergonomics: Highlighting design considerations for user comfort.
9) Autonomous: Focusing on the self-operating capabilities.
10) Safety Features: Emphasizing built-in safety mechanisms.
11) Battery Life: Referring to power and operational duration.
12) Innovation: Highlighting the innovative aspects of the design.
13) Integration: Mentioning compatibility with other technologies or systems.

Introduction / background:

Wheelchair has become a boon for most of the movement of physically challenged individuals. Many times, during epidemics or when there is a sudden rise in no. of patients in hospital shortage of beds occurs. To overcome this problem, we have designed wheelchair cum bed. At such times this designed wheelchair cum bed can converted in wheelchair or bed as required. The disabled patients resting on their bed for long duration of time often wheel loneliness & mentally sick. A wheelchair cum bed to facilitate the disabled

patient's mobility and to provide noble medical equipment for use.

Objectives:

- To develop a Model of Automated Wheelchair cum Bed by variating the angular position of the rests.
- To design the support structure by considering variations over different areas.
- Integration of electrical and mechanical system, all the operation can be made to run at a fingertip with the help of assisting keys or an actuating mechanism.
- The provide ease use of control switches which must be simple so that the device can be easily handled by a bed ridden patient.
- Convert the modes of positions with much smooth and linear moment with the help of actuators.
- People with persistent vegetative state, paraplegia, stroke, and spinal cord injuries can make use of this technically sound project.

Methodology:

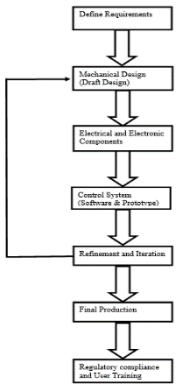
The methodology for developing an automatic wheelchair to bed converter involves needs assessment, conceptualization, detailed design, prototyping, safety testing, integration, user training, manufacturing, deployment, and continuous feedback collection. Iterative design, rigorous testing, and user-centric approach ensure functionality, safety, and usability in real-world scenarios.

- Components used:

1) Frame body.
2) DC motor.
3) Rack and Pinion.
4) Small Sprocket.
5) Big Sprocket.
6) Wheel.
7) Battery.
8) Controlling switches.

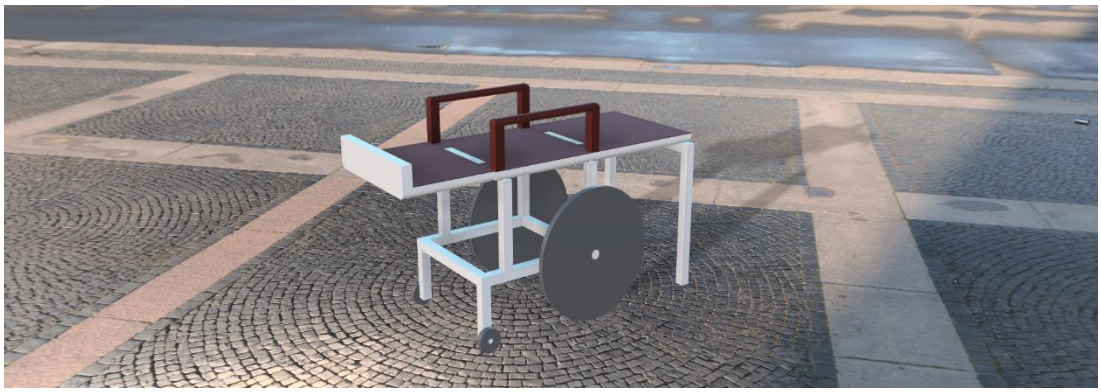
The design of Chair cum stretcher is based on ergonomic consideration of human body. Generally, the width of human body is 914 mm and the back portion from

comb to neck is of 762 mm from comb to leg joints are of 351 mm and from leg joint to fit the length is of 655 mm. So, in the present work the three plates of dimensions of 914 mm X 762 mm, 914 mm X 351 mm and 914 mm X 655 mm are considered respectively.



Flow chart of the methodology

Rendered images showing the conversion of wheelchair to bed and vice-versa.



Orthographic projections of the Wheelchair

Results and Conclusions:

We conclude that, on basis of our hospital, old age home and market survey, we made a best design of wheel chair and bed for disabled people. The mechanism is designed and developed in order to reduce the human fatigue. Wheelchairs are now considered not only means of transportation but also as a way to allow user to express their individuality.

Also allow the helper or nurse to easily handle the patient. The stresses which are developed in body of patients while transferring from wheelchair to bed or vice versa are reduced or eliminated. There are many scopes for future improvements. Wheelchairs ar currently thought-about not solely suggests that of transportation however additionally as how to permit users to precise their individuality. Once the patient is needed to transfer from bed to wheel chair from one place to hospital or the other place it becomes terribly tough by nursing employees further as patient additionally. Because of the transferring from bed to wheel chair or contrariwise, stresses ar developed within the body of patient and further as nursing. The higher than issues that ar generated at the temporal arrangement of patient transferring from bed to wheel chair will be eliminated by developing new style of stretcher humor chair i.e. providing the chair humor stretcher with a clastic stretcher which might operate simply further as used as a self-propelled vehicle once required. the price of this style could also be very little over the common chair, however this style has more options which will be useful for the patient further because the nursing staffs. Additionally, we've understood that there ar several scope for future enhancements.

1. What is the innovation in the project?

   The innovation in our Development of Multifunctional Automatic Wheelchair project lies in its seamless integration of multiple functionalities through a well-coordinated motorized mechanism. This design addresses a critical need in healthcare settings by offering a versatile mobility solution that transitions effortlessly from a wheelchair to a stretcher. The use of three distinct motors, each with dedicated switches, allows for precise control over the conversion process and individual wheel movements, enhancing maneuverability and user autonomy. This innovation significantly improves patient transfer efficiency, reduces the physical strain on caregivers, and ensures better patient comfort and safety. Additionally, the ability to control each motor independently offers flexibility and adaptability in various medical scenarios, making this a noteworthy advancement in medical equipment design.

2. **Scope for future work:**

   - **Automation and Smart Technology Integration**: Incorporate sensors and AI for automatic transitions and add voice control and remote operation for ease of use.

   - **Enhanced Mobility Features**: Develop all-terrain capabilities and improved stability for use in various environments, including outdoors and uneven surfaces.

   - **Lightweight and Compact Design**: Utilize advanced materials to create a lighter, more compact design for easier transport and storage without sacrificing durability.

   - **Advanced Safety Mechanisms:** Integrate automatic braking, anti-tipping features, and real-time health monitoring to enhance user safety and provide critical data to caregivers.

   - **Customization and Comfort**: Offer greater customization with adjustable cushioning, ergonomic designs, and adaptable sizing to improve comfort and usability.

   - **Integration with Healthcare Systems**: Connect the device to healthcare management systems for seamless data exchange and improved patient

care coordination.

- **Sustainable and Eco-Friendly Materials**: Use sustainable and eco-friendly materials to reduce environmental impact in production and disposal.

- **Expansion to Emergency and Disaster Relief:** Adapt the device for emergency and disaster relief, providing versatile patient transport solutions in challenging conditions.