

A MECHANISM FOR MANEUVERING A WHEELCHAIR

IITM Technology Available for Licensing

Problem Statement & Unmet Need

- A wheelchair usually involves a chair with wheels, used when walking is difficult or impossible due to illness, injury, age-related problems, or disability.
- These wheelchairs can be broadly classified in three categories-
 - (1) **products which employ a ramp/belt**, are suited only for flat surfaces, ramps and stairs. They do not offer comfortable movement over uneven surfaces and terrains.
 - (2) **products that use clustered wheels**, have the major disadvantage of using a mechanism involving 20 wheels, which hinders easy movement.
 - (3) **products that employ a lifting mechanism**, are suited only for stairs and flat surfaces.
- Another limitation with all the designs mentioned above is that since **the height of the seat cannot be adjusted during movement**, the user might not be very comfortable while ascending and descending stairs.
- Hence, there is need for a **product which focuses on all terrain mobility for a wheelchair** along with comfort, safety and stability.

Technology Category/ Market

Category - Assistive Test Equipment and Design Manufacturing

Applications - Medical and Support Device

Industry - Assistive device, special needs, medical & surgical

Market - The global wheelchair market was valued at USD 5054 Million in 2023 and is projected to reach USD 7055 Million by 2028, and is expected to grow at a **CAGR of 6.9%** from 2023 to 2028.

TRL (Technology Readiness Level)

TRL – 3, Proof of concept stage.

Research Lab

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Intellectual Property

- IITM IDF Ref. 2104
- **IN 380498 - Patent Granted**
- **PCT/IN2022/050185**

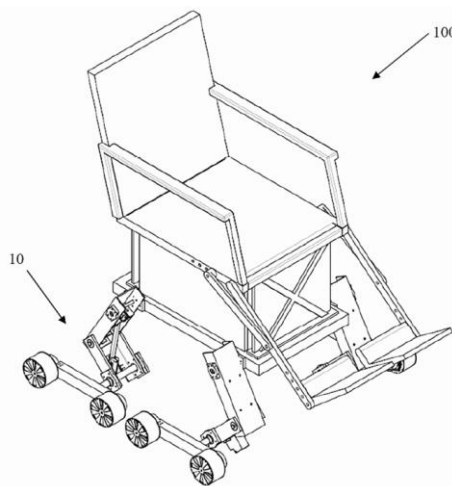


Fig. 1. illustrates a schematic view of mechanism for maneuvering a wheelchair.

Technology

- The present invention relates to a mechanism for maneuvering the battery operated wheelchair (Fig. 1).

The mechanism includes a first link, pivotally connectable to a frame, a second link is pivotally connected to the first link.

An actuator is coupled between the first and the second link to displace the second link relative to the first link.

Further, the mechanism includes a wheel mounting assembly consisting of a wheel receiving portion, and a shaft pivotally connected to the second link.

A pair of wheel assemblies are coupled to the wheel receiving portion and are operable to maneuver the wheelchair.

A stopper is positioned between the second link and the shaft to limit movement of the wheel mounting assembly relative to the second link within predetermined limit.

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Key Features / Value Proposition

1

• A novel mechanism for maneuvering a wheelchair that can traverse over flat surfaces, ramps, stairs, and rough terrain, using a combination of linear and rotary encoders for motion;

2

• Uses a mechanism to adjust the height of the front and back portions of the chassis separately, to keep the user from tilting forwards and backwards during movement;

3

• Has an even weight distribution between the front and rear parts to ensure safety;

4

• Allows freewheeling by disengaging the wheels from the motor shaft in cases where the wheelchair has to be pushed manually;

5

• Is compact with small wheels so as to be used in small spaces;

6

• Is battery operated and can be recharged;

7

• Has an intuitive controller placed on the armrest of the chair, which is used to input motion directions;

8

• Enables the user to operate it single-handedly, not requiring external assistance;

9

• Has an adjustable footrest to suit different body sizes;

10

• Has a backrest placed at a comfortable angle of 105° for user comfort;

11

• It can also be manually controlled, i.e. the wheels can be disengaged from the motor, if necessary;

12

• In addition, mechanisms are in place to adjust parameters like height and footrest angle as necessary.

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