International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 7 July 2021, pp: 3003-3009 www.ijaem.net ISSN: 2395-5252

Motorized Wheelchair

Vyenkatesh Shinde, Rishikesh Mhase, Ajit Aher, Sourabh Jadhav
Professor Allulkar Sir

Automobile Department DPCOE - DHOLE PATIL COLLEGE OF ENGINEERING PUNE
Dhole Patil, Survey No 1284, Near EON IT Park, College Road, Vitthal Nagar, Kharadi, Pune, Maharashtra 412207

Submitted: 10-07-2021 Revised: 23-07-2021 Accepted: 26-07-2021

ABSTRACT: The motorized wheel chair for disable person is automatically controllable wheelchair will be designed to have help themselves with assistance of the operator's command with its accessibility. This will be going to reduce the physically challenged person's effort & force to operate the rear wheel of the wheel chair as sated that this is a wheel chair which is automatic one. Furthermore, it conjointly provides a chance for physically disable persons to manoeuvre from a place to a different place with an ease of human comfort. Sensible chair has gained various interests within the recent times as compared to the ancient years. These devices square measure helpful particularly in transportation or we can say easily commutable from one place to a different place. The machines may be utilized in prime of life homes everywhere the maturity persons have problem in their movements or he/she cannot make his/her movement on his/her own. So, this wheelchair would be very useful to the person who is challenged physically. Differ kinds of sensible chair were developed within the ancient time however the latest generations of wheelchairs square measure being developed and used that opting the employment of latest technology and hence leaves a bit to tinker on the point of the user. The project conjointly aims to create a best and an analogous wheel chair at low cost which and helps the user his/her movement.
Differently disabled individuals face several hardships in life, having to be hooked in to a 3rd person to manoeuvre from place to put. The motorized chair is an implementation and experimental platform of a cheap intelligent chair for the disabled. To produce them with a helping hand, several researchers are drudging aimed at an extended time. The discovery of motorized wheel chair could be a nice boon to them, however these kind of things limits its motion. This development of automatic wheelchair supposed to providing them with eco-friendly and value real answer within options of an electrical wheel chair.

I. INTRODUCTION

In society we all see handicapped people. They are facing so many difficulties during their day to day life. They always need help from others. They are not independent. Our purpose of doing this project is to help them in such a manner that they can feel independent. To accommodate this population, several researchers have used technologies originally developed for mobile robots to create "smart wheelchairs." A smart wheelchair typically consists of either a standard power wheelchair to which a computer and a collection of sensors have been added or a mobile robot base to which a seat has been attached. Smart wheelchairs have been designed that provide navigation assistance to the user in a number of different ways, such as assuring collision-free travel, aiding the performance of specific, and autonomously transporting the user between locations.

We are aiming to use the normal manual wheelchair which is easily available in local markets and customize it into motorized wheelchair. This will help us to reduce the cost on research and development of wheelchair and its other parameters.

1.1 Manual Wheelchair:

A self-propelled manual wheelchair incorporates a frame, seat, one or two footplates (footrests) and four wheels: usually two caster wheels at the front and two large wheels at the back. There will generally also be a separate seat cushion. The larger rear wheels usually have push-rims of slightly smaller diameter projecting just beyond the tyre; these allow the user to manoeuvre the chair by pushing on them without requiring them to grasp the tyres. Manual wheelchairs generally have brakes that bear on the tyres of the rear wheels, however these are solely a parking brake and in-motion braking is provided by the user's palms bearing directly on the push-rims. As

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 7 July 2021, pp: 3003-3009 www.ijaem.net ISSN: 2395-5252

this causes friction and heat build-up, particularly on long downslopes, many wheelchair users will choose to wear padded wheelchair gloves. Manual wheelchairs often have two push handles at the upper rear of the frame to allow for manual propulsion by a second person, however many active wheelchair users will remove these to prevent unwanted pushing from people who believe they are being helpful.

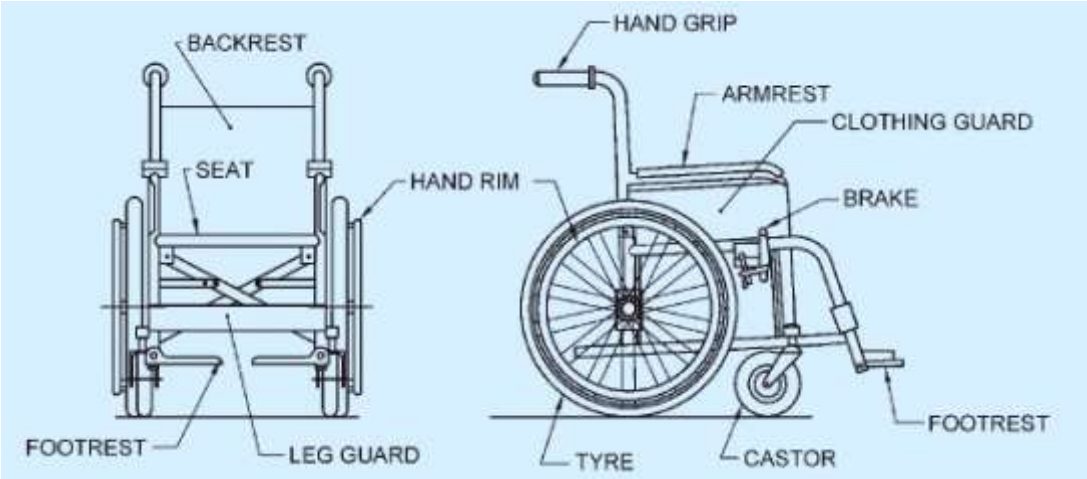

Fig 1. Manual Wheelchair

Everyday manual wheelchairs come in two major varieties, folding or rigid. Folding chairs are generally low-end designs, whose predominant advantage is being able to fold, generally by bringing the two sides together. This is an advantage for people who need to store the wheelchair frequently or to put it in a small vehicle. Rigid wheelchairs have permanently welded joints and many fewer moving parts. This reduces the energy required to push the chair by eliminating many points where the chair would flex and absorb energy as it moves. Welded rather than folding joints also reduce the overall weight of the chair. Rigid chairs typically feature instant-release rear wheels and backrests that fold down flat, allowing the user to dismantle the chair quickly for storage in a car. A few wheelchairs attempt to combine the features of both designs by providing a fold-to-rigid mechanism in which the joints are mechanically locked when the wheelchair is in use.

All major varieties of wheelchair can be highly customized for the user's needs. Such customization may encompass the seat dimensions, height, seat angle, footplates, leg rests, front caster outriggers, adjustable backrests and controls. Various optional accessories are available, such as anti-tip bars or wheels, safety belts, adjustable backrests, tilt and/or recline features, extra support for limbs or head and neck, holders for crutches, walkers or oxygen tanks, drink holders, and mud and wheel-guards as clothing protectors.

Light weight and high cost are related in the manual wheelchair market. At the low-cost end, heavy, folding steel chairs with sling seats and little adaptability dominate. Users may be temporarily disabled, or using such a chair as a loner, or simply unable to afford better. These chairs are common as "loaners" at large facilities such as airports, amusement parks and shopping centres. A slightly higher price band sees the same folding design produced in aluminium. Price typically then jumps from low to mid hundreds of pounds/dollars/euros to a four figure price range, with individually custom manufactured lightweight chairs with more options. The high end of the market contains ultra-light models, extensive seating options and accessories, all-terrain features, and so forth. The most expensive manual chairs may rival the cost of a small car.

1.2 Objectives:

The aim of this project was to design a Motorized Wheelchair as follows;

- To customize manual wheelchair into motorized one.
- To provide smooth speed and movement control.
- To make the project as cost effective and less weight as compared to other electric wheelchairs in market.

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 7 July 2021, pp: 3003-3009 www.ijaem.net ISSN: 2395-5252

II. EQUIPMENT AND SPECIFICATIONS

2.1 Motor:

MY1016 250W 24V 2650rpm DC Brushless Motor with 11 tooth and four bolt mounting.

This DC motor is capable of rotation in either the clockwise or counter clockwise direction by just reversing the battery polarity to the motor and can be speed controlled.

Fig 2. Motor

Operating power	250 w
Operating voltage (v dc)	24
Rated current (a)	9 ~ 11
Rated speed (rpm)	2650
Rated torque (n-cm)	100
No load current (a)	≤2.2
Shaft diameter (mm)	12.2
Weight(g)	1900
Cable length (cm)	25

Table 1. Motor Specifications

2.2 Controller:

Brushless controller 35a DCis a plug and play, upgrade to increase the acceleration. This is easy to connect with battery as well as motor.

Specifications:

- The display can show the speed, single range and accumulated range.
- Can set speed, protection voltage and current for the controller.
- Can view the history speed, range and time.
- Password can be set.
- Plug and play module.
- Cable length is 60cm
- Dimensions are 109*67*20.4mm

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 7 July 2021, pp: 3003-3009 www.ijaem.net ISSN: 2395-5252

Fig 3. Controller Unit

2.3 Battery:

Lifepo4 12 v 20 ahprovides 2500 - 7000 cycles & a 10 years' lifetime compared to 200 - 500 cycles & a 3 years' lifetime in typical lead acid chemistry.Battery's flat discharge curve holds above 12v for up to 95% of its capacity usage providing astronomical boosts in run-time compared to only 50% in lead acid. Battery is only a 1/3 of the weight of lead acid which makes it the disputable choice for rv's, marine and off-grid applications when towing or mobility is in the consideration. The lithium battery's unique built-in battery management system (bms) protects it from overcharge, deep discharge, overloading, overheating and short circuit, and excessive low self-discharge rate ensuring up to 1-year maintenance-free storage. Built-in low-temp cut off prevents charging under -5 °c.

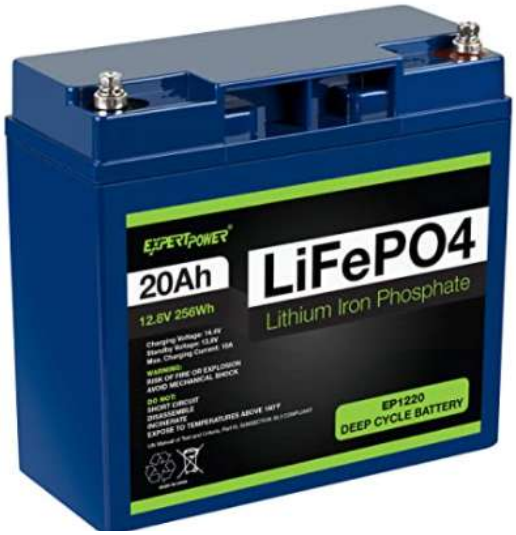

Fig 4. Battery Lifepo4 12 v 20 ah

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 7 July 2021, pp: 3003-3009 www.ijaem.net ISSN: 2395-5252

Specifications:

- Nominal voltage: 12.8v
- Charging voltage: 14.4±0.2v
- Rated capacity: 20ah (0.2c, 25°c)
- Terminal type: f13/m5
- Dimensions (l x w x h): 7.1 x 3 x 6.6 (h + terminal: 6.8) inch
- Weight: 5.8lbs
- Max. Continue discharge current: 30a
- Max. Permanent discharge current: 80a 10sec.
- Max. Continue charge current: 10a
- Operating temperature: discharging: -4°f to 140°f; charging: 32°f to 140°f

2.4 Intelligent joystick:

This is a heavy-duty joystick very similar to the ones in claw arcade games. Directional movements are momentary limit switches - one for each direction. This joystick also has a select button that is actuated when the red button is pressed down.

This joystick is pretty beefy and very tall because of it. We built up an enclosure just to see what it would look like. Ideally, this joystick would be panel mounted, but actually reading the movement of the joystick is as simple as setting up the microcontroller to read five switches.

Fig 5. Intelligent Joystick

III. ASSEMBLY

This motorized wheelchair has both manual & power functions. And the joystick or controller can be interring changeable that you can change from left to right and right to left, 360 degrees free-direction turning, easy to operate. This motorized wheel chair is portable with folding structure removable battery box for convenient recharging, flip up armrest, adjustable and detachable footrest, rear wheels driven by two motors.

This is used for patients and aged people and the persons who cannot walk on their own. Reduces dependency on others and increases confidence. Power wheel chairs are generally used by those unable to propel manual wheel chair. It may also be used by those who want use for distances. This is propelled by electric motor rather than manual power. Any disabled person with a mobility, fatigue or cardio-vascular issues may find a power chair

Advantageous in some circumstances:

- Low centre of gravity, safe for driving
- Fold-able and portable
- Removable battery box for convenient recharging
- Flip-up armrest, adjustable and detachable footrest
- Controller can be exchanged from right side to left side for both hands use
- Rear wheel driven by two motors
- Easy to operate, dismantle and assembling.
- One-year service warranty only for the motors

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 7 July 2021, pp: 3003-3009 www.ijaem.net ISSN: 2395-5252

Fig 6. Motorized Wheelchair Scooter

Fig 7. Motor & Battery Arrangment

Specifications:

Model	Motorized Wheelchair Scooter
Driving range	15-20 km (depends on speed, road condition and loading weight)
Maximum speed	6 km/h
Net weight	45 kgs
Gross weight	52 kgs
Overall size	114x64x93.5 cm
Folded size	73.5x37x7.25 cm
Seat width	(l) 45 x (w) 43 cm
Loading capacity	100 kgs
Front wheel	8″
Rear wheel	12″
Motor	250 w x 2 pcs
Controller	35 a
Climbing ability	6°
Frame colour	Metal paint
Battery	12 v 20 ah 2 pc
Joystick	Intelligent joystick
Height between seat and ground	48 cm

Table 2. Motorized Wheelchair Scooter Specifications

Benefits:

- This can be used indoor and outdoor and can lead independent life without attendant.
- 20 ah battery gives more storage power and can use more time.
- Easy to carry in car, easy foldable
- It leads to more mobility of person and attend all his or her requirements.
- Can be converted to manual mode easily.
- Three-way adjustable joy stick left arm, right arm and also attendant controlled from back side.

IV. FUTURE SCOPE:

There are plenty of scope to upgrade this project by making it fully automatic by adding

features like voice & gesture recognition which provides ease of operation in this system that will be more users friendly. Gps tracking to find out user exact location. There are scopes to use solar panel for battery charging to support renewable energy scheme.

V. CONCLUSION:

This resulted into successful project which is cost effective & light weight. This minimized expense is pretty affordable for most of the medium class people & it can be even cheaper when taken for mass production.

This project can also be counted as a brilliant initiative for the betterment of physically handicapped & disabled people's lifestyle.

REFERENCES:

[1]. Humariasalmin, hafiz rakibul, pratikkumarkundu, b.m. Fahmidjahurshuvo, k.b.mnasiruzzaman&rahmanmd.Moshiour (feb.2014), international journal of multidisplinary science& engineering.
[2]. Preethikabritto, indumathi.j, sudeshsivarasu (2010), "automation of wheelchair using ultrasonic and body kinematics", national conference computational instrumentation.
[3]. Jobby k. Chacko, deepuoommen, kevin k. Mathew, noble sunny, n. Babu
[4]. Richard simpson, "the smart wheelchair component system"
[5]. Http://people.ece.cornell.edu/land/courses/ece4760/labs/f2013/lab4.html