A 3- Wheels Electric Car for Physically Disabled People

Arpit Mehra, Arindam Ghosal

Abstract— Electric cycles and scooter users have been identified as vulnerable road users by most of state road transport authorities. Motorized cycles and electric wheel chairs are increasingly used as an alternate form of transport for older people and for people with disabilities. Older peoples are using motorized cycle as an alternative form of transport no longer feels safe to drive a motor vehicle.[1]

In this paper, an attractive modern electric car also called Electro Handy has been designed for handicapped people. Electro Handy is a powerful car for disabled people powered by rechargeable battery.

Index Terms—Electro handy,Handicapped, motorized car,Prototype

I. INTRODUCTION

In this research work, the aims is to designing a convenient and affordable modern electric car for old and physically disabled people, for providing to these special peoples an opportunity to travel from one place to another place easily at negligible cost and safely[2]. The objectives of this research work as follows:

1. enhance the approach of the use of handicapped motorized car in India
2. provide a low maintenance and powerful vehicle
3. provide convenient and affordable drive for disabled people and
4. maximize safety
5. comfort.

Fig.1 First prototype of Electro Handy

Fig2, Handicap vehicles available in Indian market

Vehicles for handicapped constitute a market and no suitable product has hit the Indian market so far. Presently the intending customers largely go in far alteration of the normal two wheelers available in the market, particularly by adding additional wheels. The disadvantages in this case is that in the basic design it is not kept the specific requirements of the handicapped person in the view that the vehicles are designed for high-speed, which on one hand requires valid driving license, while on the other hand driving the vehicles at optimum speed, would generally difficult for the handicapped and these vehicles create pollution in environment also[3].

Fig.3, Some of the handicapped vehicles available in foreign market

'Pride Mobility Products Corporation' located in North eastern Pennsylvania, is the world's leading designer and manufacturer of personal vehicles, including the scooters for the handicaps. In **1992**, 'Pride' designed a scooter, to meet the personal tastes and preferences of potential customer.

Front-wheel drive is usually found on smaller scooters designed primarily to be used indoors or outdoors on flat, paved surfaces. The motor of the front-wheel drive scooter is located over the front wheel and drives only that wheel with the micro based controller. Most scooters use permanent magnet motors. Most scooters utilize 12- or 24-volt electric motor, generally with one or two 12-volt sealed lead acid batteries[4]**.**

Problems arises in existing handicapped vehicle in the market are explained here under;

1. The existing electric scooters have low ground clearance which can make it difficult to navigate certain obstacles.
2. These cars have longer length so more turning radius.
3. Existing Electric scooters are less comfortable.

Manuscript received April, 2014.

Arpit Mehra, Department of Mechanical Engineering, Dronacharya, Group of Institutions, Greater Noida, India.

Prof. Arindam Ghosal, Department of Mechanical Engineering, Dronacharya, Group of Institutions, Greater Noida, India.

II. DESIGNING OF ELECTRO HANDY

Fig4, manufacturing stage1

In this vehicle, outer frame has been specially designed to take impact load on Indian roads and to protect the fiber body. Hence effect during accidents can be avoided to a major extent. Magnetic steel material has been used to prepare this frame.

Fig5, vehicle is in manufacturing process

Special tiller steering mechanism has been designed to reduce upper body mobility and strength which leads to a comfortable driving posture. The steering also serves as dual purposes ex: both accelerator and brake has been provided on this steering handle, so that the handicapped persons (disabled with both the legs) can easily drive this vehicle.

Fig6, vehicle is in manufacturing process

Electric cars also have fewer options of body support and they are rarely designed for ease of patients. So this problem has also been kept in mind while designing the vehicle. A slab with channel and dismountable wheelchair has been provided to ease the direct transfer of handicapped person from wheel chair to vehicle.

Fig7, Final Prototype

Fig8, special designed wheel chair which can be set in the electro handy and can be used as seat of electro handy

III. MECHANISM USED

Permanent magnet brushless DC (250 W) motor with micro based controller has been used to drive one of the rear wheels. Chain driven mechanism has been used to drive and connect the rear axle of wheels with motor and to provide the required torque.

Accelerator has been provided through palm throttle.

Special wheel chair with comfortable and adjustable seat with hand and back rest has been designed to mount and dismount the disabled person directly from the vehicle.

48V-20AH sealed lead acid battery is used along with Dynamo to increase the efficiency .

IV. CONCLUSION

This Electro Handy has,

1. High ground clearance as compare to other vehicles in market.
2. Low turning radius
3. Palm accelerator has been provided.
4. Dynamo is used for increasing the efficiency of the vehicle.
5. Structural roof, which protects from sun, dust and rain.

REFERENCES

1. http://www.indiamart.com/unicornauto/handicapped-vehicles.html
2. http://www.abledata.com/abledata_docs/scooters.html
3. http://www.mobility-aids.in/car-for-physically-challenged.html
4. http://www.wheelchairindia.in/F34743/car_conversion_hand_controlled_car_for_physically_challenged.html