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Design and Testing of Electric Tricycle using BLDC Motor

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ABSTRACT

The Main purpose of the Electric Tricycle Project is to bring increased mobility to disabled persons in Maharashtra, India. Presently, hand-powered tricycles are used by many of the disabled in this community, but some current users of the hand-powered tricycles do not have the physical strength or coordination to propel themselves on the tricycle with their arms and hands. The aim of this project is to add an electric power train and control system to the current hand-powered tricycle to provide tricycle users with improved levels of mobility, facilitating freedom in travel and contribution to the community and functional. In response to the request from a SIM missionary at the Handicap Center in Pune, committed to designing and supplying a kit to add electric motor power to the current tricycle design, and we, MD PATIL, Sunny, Santo, AJ, MP, Sujya partnered with their commitment.

Keywords : BLDC hub motor, Electric Tricycle, Controller, Battery, Charger, Throttle.

I. INTRODUCTION

The regular tricycles are presently being used to provide mobility for disabled persons in a rural community in Maharashtra, India. Below is a photograph of a boy in Maharashtra on his hand-powered tricycle. The map on the right shows the location of Maharashtra. With this project we designed and manufactured a system to convert the hand powered tricycle to an electric motor powered version. We essentially created an affordable, rugged electric wheelchair for use in a developing country. We have worked to make our design appropriate to the culture where it will be used. This meant designing for the use of locally available parts and manufacturing capabilities. The result is a system that can be almost entirely replicated, with the exception of the motor and motor controller, with familiar parts, tools, and processes. Using the hand-powered tricycle as the basis for our design made the Electric Tricycle more of an appropriate technology because it uses a familiar, locally available platform as a starting point. In Maharashtra there are currently four potential users of the Electric Tricycle.

OBJECTIVE

i. To develop a vehicle that uses environmentally friendly and cheap.
ii. To develop low speed tricycle, but for a longer distance.
iii. Review various literatures about the tricycle designs, function and its components.

II. METHODS AND MATERIAL

BATTERY

Given the current market, lead-acid is the only viable battery technology for electric vehicle conversion. The following is a list of criteria to use in selecting an electric vehicle battery. Li-ion battery 36 V, 4.8 Amp.

Fig 1. Battery

MOTOR (BLDC)

The BLDC motor can be configured in 1-phase, 2-phase, and 3-phase. The structure of a BLDC motor is divided into two parts:

1. Moving part called the rotor, represented by permanent magnet
2. Fixed part called the stator, represented by phase windings of magnetic circuit

Fig 2. Assembly of Motor

THROTTLE

An electrical signal accelerator works on the principle of Hall Affect generator, which produces speed controlling signals based on the rotation of the actuator. The throttle cable has almost become redundant on today's motor vehicle.

Fig 3. Throttle

III. RESULTS AND DISCUSSION

Actual project design

Fig 4. actual project.

Testing of project

Motor Specification

1. Power=250 watt
2. Voltage= 36 volt
3. Max Current capacity=5 Ah
4. Speed in rpm=336.0 rpm

Battery Specification

Li-ion Battery with 36 V and 4.8 amp-hour rating are used .The selection of battery depends on its voltage, ampere and wattage rating etc. The total power of fully charged battery in two hours is 175 Watt-hours.

1. Power =175 watt
2. Voltage =36 volt
3. Current =4.8 Ah

Controller Specification

1. Power output=250w
2. Voltage output=36v
3. Current output=3A

Table 1. Testing of project

Revolution(rpm)	Distance(km)	Voltage(V)
100	1	40.1
200	3	38.5
300	6	37.5
360	10	37
350	15	36.5
350	20	36.00
300	22	32.5(discharge)

ADVATAGES

1. Adding a power assist unit to a three wheel base chair will increase the weight and may offset the distribution of mass or balance and center of gravity possible making it more difficult for the user to propel when power assist is disengaged, the present innovation eliminates all these and simplify the propulsion.
2. This unit can be used for handicap and normal people also.
3. Individuals who have lower extremity weakness, paralysis, or amputation making walking unsafe or difficult, patients, can use this propulsion which is easy to operate and will be not require more effort.
4. This is inexpensive, portable unit, light weight and easy carried or shifted.

APPLICATION

1. It can be used in the campus for the drive for the normal persons, to move within the campus in the smooth road.
2. It is best useful for the small city drive for anybody including the handicap.
3. It can be used for material transportation without using fuel propulsion.
4. It can be used by the handicap for the normal transport and even for the self-employed handicap persons for their daily livelihood.

IV. CONCLUSION

We would say our project has been a success considering the changes we had to make in the spring once we actually found out who the electric tricycle was for. We achieved four out of five of our objectives, and we believe that we have a system that will be effective in providing mobility for persons. One of the major lessons we have learned is that designing an appropriate technology is a huge challenge. Appropriate is more than just availability for replication, it considers longevity, reliability, and efficiency.

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