

A Review on Design of an Electric Trolley

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Abstract— As we know that the prices of fuel are increasing and also there is possibility that fuel sources are sought after in future. Also the pollution is increasing day by day worldwide, in which the major contribution to increase air pollution is use of conventional vehicle. Therefore, the many more use of renewable energy is to be preferred. According to this solution, here we are representing the Electric Trolley/Loader based on the concept of electric vehicle. The objective of this work is to design and build an electric vehicle that will reduce the time and human effort. Electric Trolley is a green solution with no petrol, no diesel and no CNG Gas requirements. There are 3 wheelers pulled by an electric motor (BLDC) and consists of gear mechanism at rear wheels. Basically these vehicles have a mild steel tubular chassis with storage facility for loading. Here, we will introduce the product. While doing the project we also found out merits and demerits with the fields of application.

Keywords— Green Transportation, BLDC Motor, EV, DC Motor, E-Trolley, CCTV.

I. INTRODUCTION

Today, as fuel prices rise and the overall supply of petrol, diesel and oil decreases worldwide. With the advance research and improvement in electric vehicle and advancements in battery technology, the electric vehicle has a bright future ahead. The vehicle will operate in a similar capacity to the average of conventional vehicles so as to maintain familiarity to consumers.

India prepares to shift towards EVs by 2030. The government is examining the battery substitution option model to overcome the challenges in EV adoption. The Government of India has announced that all vehicle (probably car and two wheeler) need to be electric by 2030. Therefore, to make option of battery operated model we done this work.

Electric Trolley need minimum maintenance and it can be serve as a solution to the problems of shortage of fuels and increase of pollution. Apart from contributing to clean environment; it can also lead to empowerment of people from lower socio-economic backgrounds. These vehicles will have increased much popularity due to the comfortable and economic mode of transport they provide to the fellow customers.

Electric Trolley is loader vehicle, with three wheels and use electric power from batteries to run. It use an electric motor as engine which draws electric power from the rechargeable batteries installed in the trolley body. These batteries operated vehicles are perfect for both small and large distant transport, both cargo and people. Main advantage is that they are perfect for running on narrow streets because of their small size. But the biggest reason for their popularity is low operating cost and zero pollution. It is like normal trolley or loader but powered by electric motor instead of petrol or diesel motor. It is best for pollution free, environmental friendly transport system.

It is one of the preferred modes of transport because of its low maintenance cost, low fuel cost, eco-friendly, no noise pollution, easy to drive and last but not the least livelihood. Without putting much physical efforts that's manpower and without investing much amount of money, the earning is quite good for an electric trolley driver and hence it is an important means of livelihood for many

The vehicle will be powered by independently controlled Motors that waive typical mechanical power transmission devices. Battery run trolley could be a low emitter complementary transport for the low-income people, who suffer most from a lack of transport facility, if introduced in a systematic manner according to experts.

Electric trolley have the potential to reduce the fuel oil consumption for transportation which may lead to both economic and environmental benefit. Electric trolley are energy efficient than other forms of motorized public road transport vehicles in the country.

II. DESIGN & WORKING

The design and working of trolley/loader using electrical power to transfer luggage from one place to another reduces time or human effort. The present work is expressing the same concept denoting a mechanical device which is electrically operated.

A growing number of applications depend on a Brushless DC Motor, extending from automotive to industrial applications. Moreover, BLDC motors are used in medical equipment, home appliances, building controls and industrial automation. A BLDC motor is

chosen for the numerous advantages it offers, including: Highest Torque, Highest efficiency, Small motor size, Light weight, Longer lifetime, No maintenance, No sparking, Steady operation, Variable speed etc. Therefore, here we are using BLDC motor which is consider to be main component in this project.

The Electric Trolley/Loader uses a Brushless DC Motor with a gear mechanism at rear wheels. Some variants made in fiber are also in use due to their strength and durability, resulting in low maintenance. It consists of the controller unit. The battery used is mostly Lead acid / Li-ion battery. Deep discharge/cycle batteries designed for EVs are mostly used. These Electric Trolley constitute of leaf spring suspension. It is essential that

manufacturers use the superior quality battery to get the best performance and takes care that the batteries don't get overheated very fast.

The working of Electric Trolley is based on DC Motor, battery and suspension system. The power is supply from battery to controller. Controller regulate the power and give supply to the motor. The other elements like Throttle, Speedometer, Electric brake, Headlights, Indicator, Key lock, forward/reverse switch etc. connected to controller. The speed of the vehicle can be handle by throttle. And direction can be changed by the use of handle connected to front suspension. The speedometer shows the speed of the motor and indicate the charging level of battery.

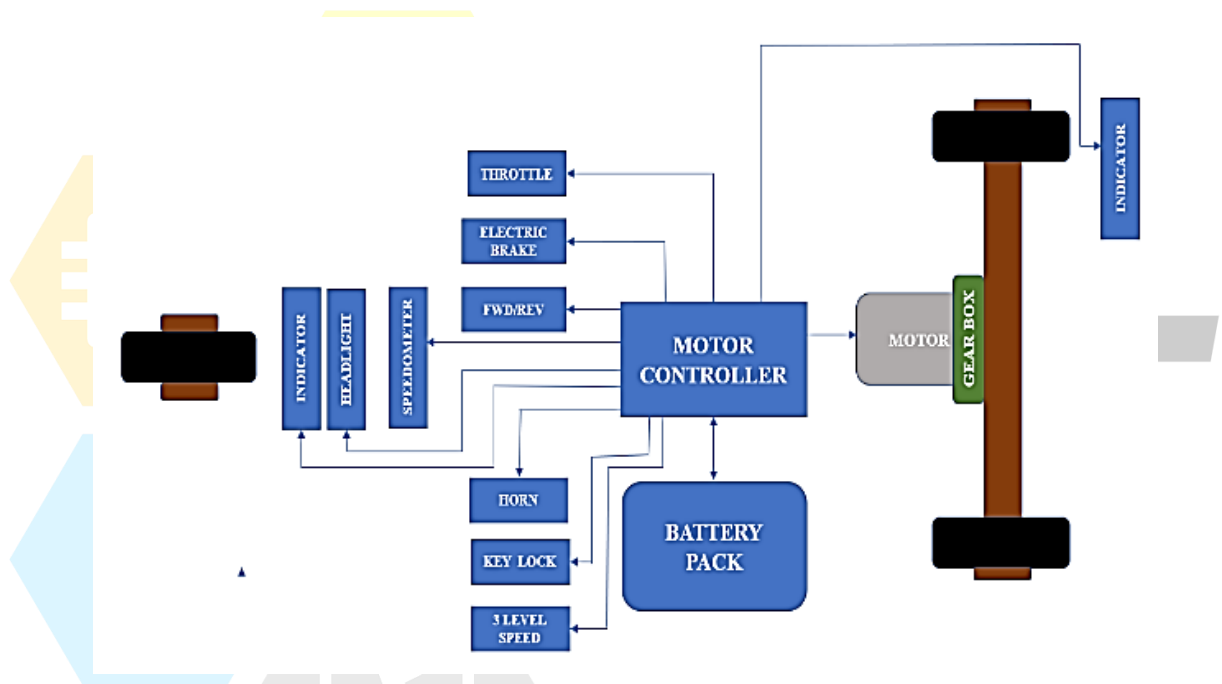


Fig 1. Typical Configuration of the Electric Trolley

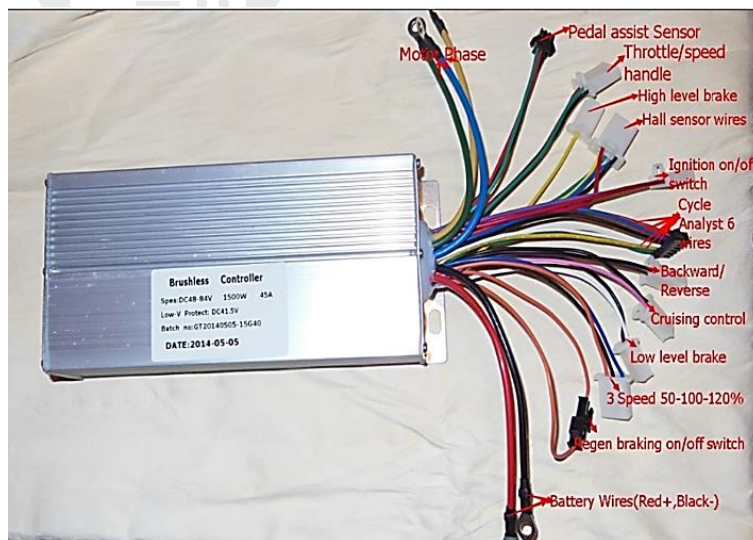


Fig 2. Pin Connection of Controller

A typical configuration of the Electric Trolley is shown in figure 1. In that we can get small idea about the position of the elements. The arrow showing the connection from battery to controller and then controller to other elements. The Figure 2 shows the pin connection of controller which is used to connect the other essential elements. In that Throttle, Speedometer, Electric brake, Headlights, Indicator, Key lock, forward/reverse switch, 3 level speed is going to be connect as shown in figure. There is also one more pin which is use sometimes that connected to pedal assist sensor.



Fig 3. Overview of Electric Trolley

In figure 3, the overview or look of the electric trolley/loader is shown. As seen in the figure it is clearly conclude that on the basis of this design we can make it in from small to large size as per requirement and based on that the rating of motor, battery and controller is selected.

The best part of this trolley/loader is that they need minimum maintenance. Although it is important that at regular intervals the vehicle must be taken to the service centers. Any misuse with the vehicle might be affect the entire system. Also, wrong adjustments with the brakes might also affect the motor and other essential elements.

III. MERITS & DEMERITS

Every product has both merits and demerits, however, it is important to keep modifying the design for the best condition keeping in mind that the utility of the same for various fields of application.

A. Merits:

- Green mode of transport.
- Affordable service for users.
- Best alternative for conventional loader vehicles.
- Low maintenance cost.
- Source of employment.

B. Demerits:

- More electricity consumption as it need store charge daily.
- Maximum speed is less than other forms of vehicles.

IV. APPLICATIONS

Every product designed and every idea conceived by an engineer always should have a vast area of utilization. At times the fields are not similar but they are always related. With high loading capacity and low maintenance, this Electric Trolley has the potential of serving many tasks. Due to its size and weight, this electric vehicle is ideal for carrying goods through narrow streets also.

The main application is that its use for loading purpose of any material. This Electric Trolley is used for:

- Carries Cartons
- Carries Cylinders
- Carries Water Bottles
- Top up ice cream shop
- On construction site for lifting the materials
- For delivering the things like foods, parcels etc.

V. CONCLUSION

Electric trolley is energy efficient than other forms of motorized public road transport vehicles in the country. This project has the potential to reduce the fuel oil consumption for transportation which may lead to both economic and environmental benefit.

The technologies are day by day implementing in the next generations of automobiles. Still there are a lot of technology challenges to overcome, particularly in conventional vehicles. The issues like manufacturability, reliability, safety and the most important is the value to the customer as a function of the cost. Progress have to make in the manufacturing of power electronics and rotating machines to reduce the cost and improve the efficiency of the system. The cost of the power electronics and the motor drive system is being reduced more to make the electric vehicles. The introduction to a "More use of Electric Vehicle" depend on the economics, not much on the technology. So, the awareness about more use of electric vehicle to people is required to be improved.

VI. FUTURE SCOPE

Any product developed always have future scope to improvise for better utilization. The changes can be incorporated in design to improve the efficiency, utility and economy.

- We can use high rating motor as per our requirement.
- Design Charging Station like conventional fuel stations.
- The E-Trolleys can be equipped with digital gadgets like CCTV cameras.
- Awareness of sustainable program among citizen to encourage people to use public transport and provide first and last mile connectivity.
- Providing economic stability to drivers giving cheaper / subsidized loans, rent fixation, optimum fare structure, setting up local repair workshops, higher revenue through advertisement and social security under different schemes.

We can imagine whole India run on renewable energy and we look forward that India will be a role model country for countries with growing economics in Renewable Energy Based Transport as per the effort government are taking.

REFERENCES

- [1] T. Kubo, "Dual mode operation of electric vehicles with a potential type trolley pole catcher," ICEE The International Conference on Electric Engineering, EM-3, pp. 230-233, July 2012.
- [2] Y. Fujimoto, Y. Okumi, Y. Yamashita and T. Kubo, "Dual Mode Operation of Electric Vehicles Using an Active Trolley Pole with an Optical Sensor at the Top," ICEE The International Conference on Electrical Engineering, vol. 4, No. 07, p. 90195, July 2016.
- [3] Xiyou Chen, Jianhui Chen, Guanlin Li, Xianmin Mu and Chen Qi, "Electric-field-coupled single-wire power transmission — analytical model and experimental demonstration," in 2017 International
- [4] A Study on the Adoption of Electric Vehicles in India: The Mediating Role of Attitude, Volume: 24 issue: 1, Page(s): 23-34
- [5] Zhai Yuan, Sun Yue, Dai Xin, "Modeling and Analysis of Magnetic Energy Mode Wireless Power Transfer System," in Proceedings of the CSEE, vol. 32, pp. 155-160, 2012.
- [6] K B Sai Kiran, M Kumari, R K Behera, "Analysis and experimental verification of three-coil inductive resonant coupled wireless power transfer system," in 2017 National Power Electronics Conference (NPEC), pp. 1218-1220, India, 2017.