© May 2019 | IJIRT | Volume 5 Issue 12 | ISSN: 2349-6002

Battery Operated Vehicle

Ramdayal kumawat[1], Deepak Joshi[2], Bhawani Shankar Joshi[3], Kuldeep Singh Rao[4]
[1]*Asst. Professor, GITS, Dabok, Udaipur*
[2,3,4] *B.tech Student, GITS, Dabok, Udaipur*

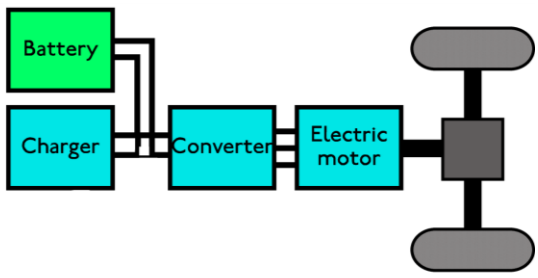
***Abstract*- The objective of the subject is to make new design of Battery Operated Vehicle and Analysing its working. Fully electric vehicles are being introduced to the passenger car market in addition to the already popular hybrid vehicles. There are existing and proposed standards for the design of these vehicles to reduce the risk of occupants and rescue personnel being exposed to hazards such as corrosive chemicals, toxic fumes, fire and electric shock in the event of a crash. Some manufacturers are understood to be working with rescue organisations to develop appropriate procedures for dealing with these crashes.**

Index Terms- Electric Vehicle, BLDC Motor, Controller, Charger, Battery, Throttle

INTRODUCTION

Electric Rickshaws popularly known as e –rickshaws or electric tuk-tuks had posed itself as a convenient and cheap mode of transportation promoting a pollution free and healthy environment. The word rickshaw's origins lie in the Japanese language, and it literally translates to "a human powered vehicle". The most recent modification called the battery operated e-rickshaws (Referred as battery rickshaws subsequently in the study) was introduced in the city of New Delhi during the Commonwealth Games 2010, with the plan to eventually phase out the physically taxing cycle rickshaws in the city, but did not account for its adverse effects. Initially e-rickshaws were imported from China but since the export was in large numbers which eventually resulted in problems resulting into gradual shift to Indian manufacturers. Today, the entire e-rickshaw, along with the body, handle and batteries are manufactured in India, leading to the growth of an entire small scale industry in the eastern and western parts of Delhi. Battery driven rickshaws today are a complementary transport for the low income group but are widely gaining popularity near thickly populated areas and metro stations. Electrical vehicle (EV) based on electric propulsion system. No internal combustion engine is used. All the power is based on electric power as the energy source. The main advantage is the high efficiency in power conversion through its proposition system of electric motor. Commercial vehicle is also available. Many countries have provided incentive to users through lower tax or tax exemption, free parking and free charging facilities. On the other hand, the hybrid electric vehicle (HEV) is an alternative. It has been used extensive in the last few years. Battery-powered electric vehicles have the possibility to be one of the most disruptive technologies of the early 21st century and can potentially alter two of the largest and most influential industries of the world economy: automobile and petroleum. The greatest challenges for widespread adoption of electric vehicles are twofold. First, the cost and energy density of battery technology prevents electric vehicles from being comparable to internal combustion engine vehicles. Second, driver's perceptions and fears of the limitations of electric vehicles need to be skillfully finessed. This paper will explore the history and current state of vehicle battery technology and its deployment, the current use of batteries in vehicles, and different battery chemistries currently utilized. The benefits and challenges of current battery technology will be assessed considering performance characteristics and safety concerns.

1) THE KEY COMPONENTS IN BATTERY OPERATED VEHICLE



Line Diagram of Battery Operated Vehicle

Battery: Battery is a collection of one or more electrochemical cells in which stored chemical energy is converted into electrical energy. Each cell consists of two half cells connected in series through an electrolytic solution. One half cell houses the Anode to which the positive ions migrate from the Electrolyte and the other houses the Cathode to which the negative ones drift. The two cells are may be connected via a semi permeable membranous structure allowing ions to flow but not the mixing of electrolytes as in the case of most primary cells or in the same solution as in secondary cells.

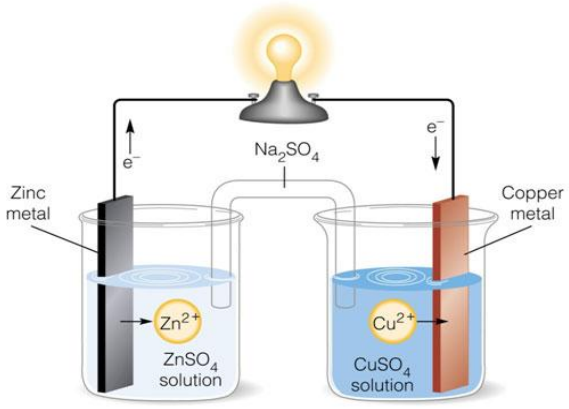


Figure Showing Working of a Cell

Types of Rechargeable Batteries Available

- Aluminum-ion battery
- Flow battery
- **Lead–acid battery**
  - Deep cycle battery
  - VRLA battery
  - AGM battery
  - **Gel battery**
- Glass battery
- Lithium-ion battery
- Magnesium-ion battery
- Metal–air electrochemical cells
- Molten salt battery
- Nickel–cadmium battery
- Nickel hydrogen battery
- Nickel–iron battery
- Nickel metal hydride battery
- Nickel–zinc battery
- Organic radical battery
- Polymer-based battery
- Polysulfide bromide battery
- Potassium-ion battery
- Rechargeable alkaline battery
- Rechargeable fuel battery
- Sand battery
- Silicon air battery
- Silver-zinc battery
- Silver calcium battery
- Silver-cadmium battery
- Sodium-ion battery
- Sodium–sulfur battery
- Solid-state battery [7]
- Super iron battery
- Ultra Battery
- Zinc ion battery

Lead–acid battery: The lead–acid battery is the most widely used, type of rechargeable battery. Despite having a very low energy-to-weight ratio and a low energy-to-volume ratio, its ability to supply high surge currents means that the cells have a relatively large power-to-weight ratio. These features, along with their low cost, make them attractive for use in motor vehicles to provide the high current required by automobile starter motors. As they are inexpensive compared to newer technologies, lead–acid batteries are widely used even when surge current is not important and other designs could provide higher energy densities. Large-format lead–acid designs are widely used for storage in backup power supplies in cell phone towers, high-availability settings like hospitals, and stand-alone power systems. For these roles, modified versions of the standard cell may be used to improve storage times and reduce maintenance requirements. Gel-cells and absorbed glass-mat batteries are common in these roles, collectively known as batteries. The electrical energy produced by a discharging lead–acid battery can be attributed to the energy released when the strong chemical bonds of water (H2O) molecules are formed from H+ ions of the acid and O2- ions of PbO2, Conversely, during charging the battery acts as a water-splitting device, and in the charged state the chemical energy of the battery is mostly stored in the acid.

Charger: A battery charger is a device used to put energy into a secondary cell or rechargeable battery by forcing an electric current through it. The charging protocol (how much voltage or current for how long, and what to do when charging is complete, for instance) depends on the size and type of the battery being charged. Some battery types have high tolerance for overcharging (i.e., continued charging after the battery has been fully charged) and can be recharged by connection to a constant voltage source or a constant current source, depending on battery type. Simple chargers of this type must be manually disconnected at the end of the charge cycle, and some battery types absolutely require, or may use a timer, to cut off charging current at some fixed time, approximately when charging is complete. Other battery types cannot withstand over-charging, being damaged (reduced capacity, reduced lifetime), over heating or even exploding. The charger may have

temperature or voltage sensing circuits and a microprocessor controller to safely adjust the charging current and voltage, determine the state of charge, and cut off at the end of charge.

Controller: A motor controller acts as an intermediary between the motor and the battery system. A motor controller is a device or group of devices that serves to govern in some predetermined manner the performance of an electric motor. A motor controller might include a manual or automatic means for starting and stopping the motor, selecting forward or reverse rotation, selecting and regulating the speed, regulating or limiting the torque, and protecting against overloads and faults.

Motor: There are a number of motors available for electric vehicle: DC motors, Induction motor, DC brushless motor, permanent magnetic synchronous motor and Switched reluctance motor.

BLDC Motor: A brushless DC motor (known as BLDC) is a permanent magnet synchronous electric motor which is driven by direct current (DC) electricity and it accomplishes electronically controlled commutation system (commutation is the process of producing rotational torque in the motor by changing phase currents through it at appropriate times) instead of a mechanically commutation system. BLDC motors are also referred as trapezoidal permanent magnet motors.

Unlike conventional brushed type DC motor, wherein the brushes make the mechanical contact with commutator on the rotor so as to form an electric path between a DC electric source and rotor armature windings, BLDC motor employs electrical commutation with permanent magnet rotor and a stator with a sequence of coils. In this motor, permanent magnet (or field poles) rotates and current carrying conductors are fixed.

The armature coils are switched electronically by transistors or silicon controlled rectifiers at the correct rotor position in such a way that armature field is in space quadrature with the rotor field poles. Hence the force acting on the rotor causes it to rotate. Hall sensors or rotary encoders are most commonly used to sense the position of the rotor and are positioned around the stator. The rotor position feedback from the sensor helps to determine when to switch the armature current.

This electronic commutation arrangement eliminates the commutator arrangement and brushes in a DC motor and hence more reliable and less noisy operation is achieved. Due to the absence of brushes BLDC motors are capable to run at high speeds. The efficiency of BLDC motors is typically 85 to 90 percent, whereas as brushed type DC motors are 75 to 80 percent efficient. There are wide varieties of BLDC motors available ranging from small power range to fractional horsepower, integral horsepower and large power ranges

CONCLUSION

Thoroughly studied have been done on the design of battery operated vehicle and found that the cost benefit and viability of this kind of vehicle is possible. The progress that the electric vehicle industry has seen in recent years is not only extremely welcomed, but highly necessary in light of the increasing global greenhouse gas levels. As demonstrated within the economic, social, and environmental analysis sections of this webpage, the benefits of electric vehicles far surpass the costs. The biggest obstacle to the widespread adoption of electric-powered transportation is cost related, as gasoline and the vehicles that run on it are readily available, convenient, and less costly. As is demonstrated in our timeline, we hope that over the course of the next decade technological advancements and policy changes will help ease the transition from traditional fuel-powered vehicles. Additionally, the realization and success of this industry relies heavily on the global population, and it is our hope that through mass marketing and environmental education programs people will feel incentivized and empowered to drive an electric-powered vehicle. Each person can make a difference, so go electric and help make a difference

REFRENCES

[1] Digges K, (2009), Crashes that result in fires,Proceedings of 21st ESV, Stuttgart, Paper 90-0214.

[2] ECE (2010), Proposal for the 02 series of amendments to Regulation No. 94 (Frontal

collision protection), Submitted by the Working Party on Passive Safety, ECE/TRANS/WP29/2010/122, 4 August 2010

[3] http://www.toyota.com/prius, last visited 25 May 2004.

[4] Van den Keybus J., "Development of a universal power measurement and control platform for low-voltage grid-coupled applications in a deregulated electricity market", PhD dissertation, K.U.Leuven, December 2003.

[5] http://www.lynchmotor.com, last visited 25 May 2004.

[6] Bellis, M. (2006), "The Early Years", The History of Electric Vehicles, About.com, retrieved 6 July 2006