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DESIGN AND FABRICATION OF SELF CHARGING ELECTRIC VEHICLE

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Abstract—Now days the automobile industry become more competitive the vehicles can get the energy from petrol or diesel engine for its drive .the recent years e-bike became more attractive and less maintenance cost. But only drawback of e-bike is requires frequent charging form EB supply. In this paper is based charging arrangement on the e-bike. The motor is use the electric energy from battery and battery can receive electric energy from dynamo .this energy is stored in battery. Market available e-bike batteries are designed to spent 6-8 hours/charge by using EB supply. This e-bikes running cost is very low, when compare to other sources of energy. Today available e-bike are use 3-4 no' s of 12v batteries. But in this paper we use only one 12v battery, so battery cost is reduced. Then these batteries are charged by dynamo. So electric supply cost also reduced.

Index Terms— Dynamo, BLDC Motor, Battery.*(key words)*

INTRODUCTION

This course will deal primarily with electric vehicles used for personal transportation where the internal combustion engine is replaced by a battery and electric motor drive. This course is devoted to providing you with information on how to convert a conventional automobile to an electric vehicle. The principles of alternating current, direct current, motors, speed controls, batteries, relays, battery chargers and provided to you. Components including chassis, transmissions, wheels and brakes are presented. Information will be basics for design of the conversion .electrical hazards of batteries, and high ampere and high voltage wiring will be presented. These e-bikes are differing from type of battery used and these e -bikes are designed based on the power of the motor and weight motor power rating. E-bikes use 3-4 no' s of 12V battery for different power of motors. These batteries are connected in series, so voltage built up to 3 batteries in 36V and 4 batteries in 48V.main weight of vehicle is battery. Then battery recharged by separate EB AC supply. This recharged time approximately 6-8 hours/charge. The market available e-bike use BLDC motor for drive purpose. Our paper will improve the performance of bike by using dynamo and speed regulation of motor.

Line diagram

Fig.1

Hub motor:

Hub Motor Principle: (Fleming' s right-hand rule):

" A rule stating that if the thumb of a right hand is oriented along the same axis as the current flow through a conducting wire, that the fingers of this hand will curl along the same direction as the magnetic field produced by the wire. For a conducting wire moving through a magnetic field, a rule stating that if the middle finger, index finger, and thumb of a left hand are extended at right angles to each other, that the middle finger will indicate the current flow, the index finger the direction of the magnetic field, and the thumb will indicate the direction of the movement of the wire. This rule also applies if the conducting wire is substituted by an electron beam."

Working and Operation Of Hub motor:

The **wheel hub motor** (also called **wheel motor**, **wheel hub drive**, **hub motor** or **in-wheel motor**) is an electric motor that is incorporated into the hub of a wheel and drives it directly. In a typical DC motor, there are permanent magnets on the outside and a spinning armature on the inside. The permanent magnets are stationary, so they are called the stator. The armature rotates, so it is called the rotor.

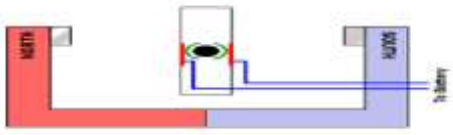

Fig.2 Working and Operation Of Hub motor)

Specification Of Hub Motor:

- Power : ½ hp motor
- Volts : 48 V
- Amps : 7 Amp
- Speed : 1500 rpm
- Type : brushless motor
- Poles : 4
- Weight : 15kg

Lithium-Ion Battery

A type of a battery composed of Lithium, the lightest metal and the metal that has the highest electrochemical potential. Lithium, however, is an unstable metal, so Lithium-Ion batteries are made from Lithium ions from chemicals. Because of its lightness and high energy density, Lithium-Ion batteries are ideal for portable devices, such as notebook computers. In addition, Lithium-Ion batteries have no memory effect and do not use poisonous metals, such as lead, mercury or cadmium. The only disadvantage to Lithium-Ion batteries is that they are currently more expensive than NiCad and NiMH battery packs

Fig.3 lithium-ion battery

Principle And Working Of Lithium-Ion Battery

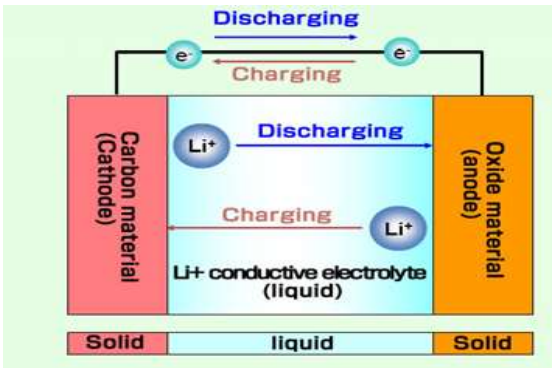

Fig.4 Operating principle of Lithium-ion Battery

The working principle of lithium-ion battery is that its charging and discharging. When charging the battery, the battery on the positive ion generation, generation of lithium-ion movement through the electrolyte to the cathode. As the carbon cathode layered structure, it has many pores, to reach the negative electrode of lithium-ion embedded in porous carbon layer, the more embedded

lithium-ion, the higher the charge capacity. When the battery discharge, embedded in the negative ion of carbon layer prolapsed, and movement back to positive. Back to the cathode of lithium-ion more discharge capacity is higher. Commonly referred to as battery capacity refers to the discharge capacity. Lithium-ion battery charge and discharge process is positive→ negative→ positive.

Block Diagram (Battery Power Supply

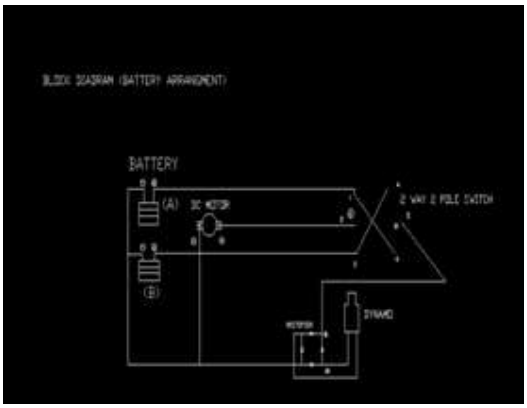

Fig.5 Block Diagram

Specification Of Battery:

- Volts : 12V
- Capacity: 7 amp per hours
- Weight :10kg

Working Of Dynamo In E-Bike

Mechanical energy is changed into electrical energy in case of dynamo. When a coil of wire is rotated in the vicinity of magnetic field then magnetic flux will be cut. This would cause an induced Emf in the coil and this phenomenon is known as electromagnetic induction.

The movement of another body is transmitted to a rectangular coil of wire that is inside a U-Shaped magnet. The motion of this coil of wire cuts the magnetic flux in the magnet. Faraday once stated that-Whenever there is a change in magnetic flux linked with a circuit there is an induced current and the strength of this induced current is directly proportional to the rate of magnetic flux-. So according to this rule when the magnet is in motion it is constantly cutting the magnetic flux, and as it does this there is a current that is induced (eddy currents). However a dynamo can either be A.C or D.C according to the brushes and number of commentators used (Flemings Right-hand rule). If we refer back to Faraday's rule it says that the strength of this induced current is directly proportional to the rate of magnetic flux. This rule can be seen practically in a bicycle that has a dynamo. The faster the rider rides the faster the change in magnetic flux and hence the brighter the light.

Dynamo is just the opposite/reverse action of motor operation. When a conductor is moved across a magnetic field, there induces an Emf (voltage) across conductor terminals so as it opposes the change of flux (Lenz rule). Dynamo is constructed with a cylindrical permanent magnet (which rotates at the center) amidst windings that we take the voltage output from. when the magnet rotates its flux path changes relative to the windings and across the winding there exists an electro-motive-force as a voltage.

Specification Of Dynamo

- Volts : 12v
- Amperes : 3-4 amps per hour
- Weight : 750grms

Electrical Breaking System

Electrical braking is used on automobiles to recoup some of the energy that is lost while the vehicle is stopping. This technology is used on hybrid vehicles that use both gas and electricity as sources of power. The energy that is recouped during braking is saved in a storage battery and used later to power the motor whenever the vehicle is using its electric power source. This generated electricity is fed into a chemical storage battery and used later to power the vehicle at city speeds. The technology employed during regenerative braking takes the energy that is normally wasted during braking and turns it into usable energy. A hybrid vehicle is not, however, a type of perpetual motion

machine. Energy is still lost through friction with the road surface and other drains on the system. The energy collected during braking does not restore all of the energy that is lost during driving. It does improve energy efficiency, however, and it assists the main alternator.

Indicator

A indicator is a device which gives information about a battery. This will usually be a visual indication of the battery's state of charge. It is particularly important in the case of a battery electric vehicle. Some automobiles are fitted with a battery condition meter to monitor the starter battery. This meter is, essentially, a voltmeter but it may also be marked with colored zones for easy visualization. Many newer cars no longer offer voltmeters or ammeters; instead, these vehicles typically have a light with the outline of an automotive battery on it. This can be somewhat misleading as it may be confused for an indicator of a bad battery when in reality it indicates a problem with the vehicle's charging system.

Fig.6 Indicator

Alternatively, an ammeter may be fitted. This indicates whether the battery is being charged or discharged. In the picture on the right, the ammeter is marked "Alternator" and the symbols are "**A" (charge) and "B" (discharge).** Click on the picture to enlarge it. Both ammeters and voltmeters individually or together can be used to assess the operating state of an automobile battery and charging system.

Pole-2 Way Switch:

Two way switch is a switch that is used when we **ON** or **OFF** an electrical device on two buttons.

Fig.7 Pole-2 Way Switch

A 2 way 6 pole switches is nothing but a switch, which is used to change the power supply from the alternate sources of energy. Here in our project 2 way 6 pole switch is used to supply energy from the alternate battery. Such as A and B

Rectifier:

A rectifier is an electrical device that converts alternating current (AC), which periodically reverses direction, to direct current (DC), which flows in only one direction. The process is known as rectification.

Purpose Of Rectifier In E-Bike:

The purpose of rectifier in our Electric – Bike is to convert the Alternating Current sourcing from dynamo to current to energies the battery.

Table.1 Test results:

Comparison	Commercial E-Bike	Our E-Bike
Max Speed	40kmph	40kmph
Mileage	50kmph	Nearly 75kmph (with a loop of 12v 7AH Battery)
Recharge	By Using EB supply	In our Bike should be Recharged by Dynamo
Motion	Recharge of	Recharge

	batteries possible at vehicle in motion	possible in vehicle is in at rest

CONCLUSION:

As a conclusion , comparing our project electric vehicle with the commercial electric vehicle. Our vehicle is efficient to run doubled the distance of ordinary electric vehicles. As a result, electric vehicle not only used for short range transportation, it can also be used long range transportation' s too. Though our electric bike is independent from external power supply it may be used for charger free transportation's and it payees better path towards pollution free atmosphere for our nation. In the coming future, it is fore thought that all the petrol bikes need to be replaced by the E-bikes as there is fuel energy crisis and also to save our mother earth. And also it made a low cost of transportation for the human being' s. This vehicle also give' s safety driving for human being' s because of it' s limited speed.

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