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Implementation of E-Bicycle Using Old Alternator

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ABSTRACT

In today's interconnected world travelling has become vital for us. In order to live in this fast forward world we must able to travel from place to place. It is very important that time taken for travelling should be less and it should be economical and easily available. With the fast depleting resources of petrol and diesel there is a need of finding alternate sources. One such source is electricity. Hence we have selected electric bike as our project topic.

Electric bike is driven with the help of electric motor and powered by battery. Battery used is rechargeable and can be charged with the help of external power source. In this project we have used electronic speed controller to control the speed of electric motor and acceleration and deacceleration of bike will be efficiently and smoothly control. The project thus aims to reintroduced the bicycle with more user friendly and low cost features.

This study aims to modify the previous Car Alternator as a DC voltage generator and then convert it to a motor as a water pump drive with DC voltage input.in the modification of the Car Alternator there are several components that are removed including Diodes and ICs, so that only the Rotor and Stator Coil are used. At the time of testing, the stator coil is inserted 24 Volt DC voltage, while in the rotor coil the voltage is varied.

Keywords: DC voltage, Car Alternator, Rotor and Stator Coil

I. INTRODUCTION

E-bike is an electric and power-assisted bike which is one of the fastest-growing technology ofthe bicycle industry. This bicycle uses an electric motor which is converted form the alternatorto help you along. So you can ride it like a normal bicycle, but with less effort. There are two main types of E-bike- throttle assist and pedal assist. An E-bike motor works by automatically switching on the (quiet) motor when you pedal or throttle.

A pedal-operated E-bike is the most popular option. As you pedal the bike, the motor gets powered, and it works. In comparison, a throttle-assist E-bike is similar

to a normal motorbike.It operates as you accelerate the throttle.

Electric bicycles are available in many styles, from commuter bikes to full-suspension mountain bikes.
The power output of these pedal-operated motors is typically governed by regulations. Mostly, they are available with an output power of around 250 watts.
Bikes fitted with a throttle based motor system has slightly different output regulations. It canbe available with a maximum power of around 200 watts, while speed remains limited to 25 kmph.

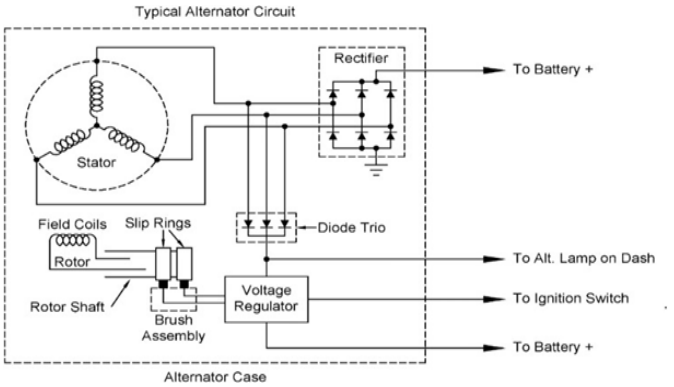
II. ALTERNATOR

An alternator can be defined as an electrical generator that converts mechanical energyinto electrical energy. The work is done in the form of an alternating current. The electrical components consist of a rotating magnetic field with a stationary armature, making it design less complex and cheap.

An automotive charging system consists of three major parts that include batter, voltage regulator and alternator. Without any, these three, charging system is incomplete, though alternators now carry voltage regulators. The alternator works with the battery to generate power the electrical components of the vehicle like the interior and exterior lights, etc.

Well, alternators get their names from the term alternating current (AC) as they producepower through electromagnetism.

The primary function of an alternator is to charge a car battery so that other electrical components in the car can be powered.



The charged battery provides the electricity needed for the starter motor to start the car.And when the car is running, alternators generate energy to feed the electrical system and the battery.

Alternators function as generators as they work the same ways. The pulley turns and creates direct current (DC). During the rotation, an alternating current (AC) passes through a magnetic field that creates the electrical current.

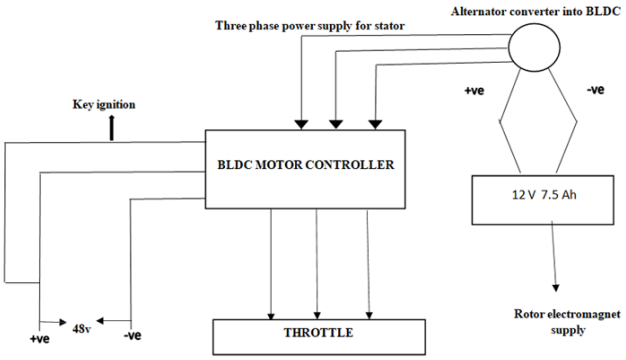
TVS LUCAS ALTERNATOR

The construction of an alternator consists of field poles placed on the rotating fixture of the machine. An alternator is made up of two main parts: a rotor and a stator.

An alternator is basically a type of AC generator. The field poles are made to rotate at synchronous speed Ns = 120 f/P for effective power generation. Where, f signifies thealternating current frequency and the P represents the number of poles.

SENSORLESS BLDC MOTOR

Sensorless BLDC motor control—sometimes called sensorless trapezoidal control of BLDC motors—uses back EMF (BEMF) for determining the location of the motor's rotor (the motor's rotating part) with respect to the motor's stator (the stationary part).



A voltage applied across a motor's winding forces the motor's rotor to turn. The movement of the rotor through the motor's magnetic field, however, is analogous to the behavior of a generator, and consequently the motor not only receives an applied voltage but also generates its own voltage.

III. MATERIALS REQUIRED

An electric bicycle is, first and foremost, a bicycle. It uses the same designs, geometries, and components as any other bicycle, but also includes an added electric motor. This is fueled by a rechargeable battery, which gives riders an extra boost of power and ultimately provides a smoother, more convenient, and less strenuous cycling experience. By eliminating many of the obstacles that keep people from cycling—obstacles such as headwinds, steep hills, and bike commutes that leave riders tired, messy, and sweaty—electric bikes help make the freedom, exhilaration, and satisfaction of cycling available and accessible to a wide range of potential cyclists.

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ELECTRONIC THROTTLE

Electric bike throttle is often a thumb button that turns on the motor and helps generate the boost of power you can feel every time you ride an eBike.

Electric bike throttle operates in a very similar way many motorcycles (or scooters) operate. As soon as you engage the throttle button, the motor is powered on and it propels your eBike forward.

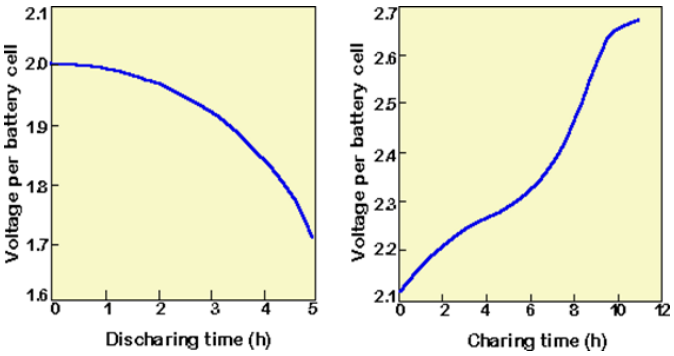
Most electric bike throttles can be adjusted to different power outputs, allowing riders to choose how much power exactly do they need.

LEAD ACID BATTERY

Lead acid batteries are the most commonly used type of battery in photovoltaic systems. Although lead acid batteries have a low energy density, only moderate efficiency and high maintenance requirements, they also have a long lifetime and low costs compared to other battery types.

A lead acid battery consists of a negative electrode made of spongy or porous lead. The lead is porous to facilitate the formation and dissolution of lead. The positive electrode consists of lead oxide. Both

electrodes are immersed in a electrolytic solution of sulfuric acid and water. In case the electrodes come into contact with each other through physical movement of the battery or through changes in thickness of the electrodes, an electrically insulating, but chemically permeable membrane separates the two electrodes.



IV. FABRICATION AND DESIGN

In the field of electronics, pulsed DC stands for pulsed direct current (PDC). This form of electric current possesses attributes of both alternating current (AC) and direct current (DC). The pulsed DC power supply delivers a current of a single polarity with a variable voltage. This rectified wave form is produced using either a half-wave or full-wave rectifier. While PDC current has similar attributes to both AC and DC currents, it is a completely different entity. In a traditional AC current waveform, the voltage is variable as it rises up and down along the wave. Pulsed DC shares this characteristic with AC current but, unlike AC current, the polarity of the current does not change. Like traditional DC current, pulsed DC maintains a single positive or negative polarity.

CONVERSION OF ALTERNATOR

The humble automotive alternator hides an interesting secret. Known as the part that converts power from internal combustion into the electricity needed to run everything else, they can also themselves be used as an electric motor.

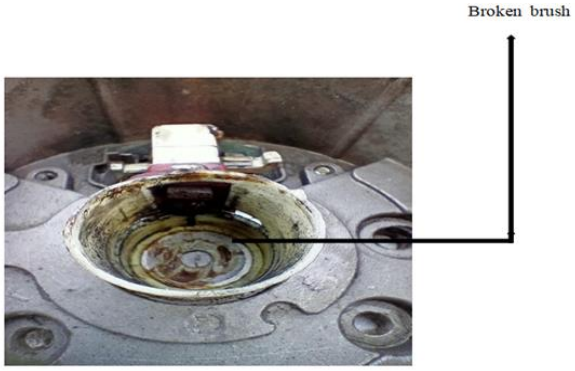
These devices almost always take the form of a 3-phase alternator with the magnetic component supplied by an electromagnet on the rotor, and come with a rectifier and regulator pack to convert the higher AC voltage to 12V for the car electrical systems. Internally they have three connections to the stator coils which appear to be universally wired in a delta configuration, and a pair of connections to a set of brushes supplying the rotor coils through a set of slip rings.

SI.NO.	STATOR VOLTAGE (in V)	SPEED (in RPM)
1		
2		
3		
4		
5		

V. PROBLEMS OCCURRED DURING FABRICATION

FAULT OCCURRED WHILE ASSEMBLING ROTOR WITH BRUSHES

First the new brush was assembled with the rotor ,and the size of the brush was 2 inch. While assembling the brush with the rotor, the brush got damaged due to following the improper method. And because of this improper method, no supply goes to the slip ring , this causes rotor to not behave like electromagnet and because of this rotor does not rotate.



VI. RESULT

Electric bicycle is an important solution to get rid of problem like air pollution and global warming and alternative to conventional fuel driven bike. The testing and making of the motor which is going to power the bicycle has been completed

COST ESTIMATION

SI.NO.	COMPONENT	QUANTITY	PRICE
1.	TVS LUCAS ALTERNATOR	1	5000
2.	SENSORLESS BLDC CONTROLLER	1	8500
3.	ELECTRONIC THROTTLE	1	700
4.	12V LEAD ACID BATTERY	4	4000
5.	CONNECTING WIRES	AS REQUIRED	700
	TOTAL		18900

VII. CONCLUSION

In this design and analysis work, I have covered introductory information of Electric Vehicles, with market survey. In addition to it, one can find sufficient information of the resistive forces acting on the vehicle while subject to different driving conditions, which in this work is being represented by standard and custom driving cycles. The model created in this work is quite simple to understand and gives a fine idea of different forces acting on the vehicle while in motion, and against the slope (gravitational pull). When going through observations obtained via simulations at different slope and at different driving cycles, we can see that battery's state of charge depends on speed, acceleration, deceleration and slope on which vehicle is subjected. The variations of slope although is quite prominent and also plays a significant role in determining the SOC of battery, therefore range of the vehicle.

VIII. REFERENCES

[1]. Yunus. Y, Sihana, Subekti. L, "Modification of Car Alternator to Generator 3 Phase 220 V 600 rpm", Annual Engineering Seminar, STTN Batan and UGM, 2012. (references) .

[2]. Faiz, M. R., Afandy, H. "Modification of the alternator of the car becomes a synchronous 3 phase generator beyond 220V / 380, 50 Hz". Techno, Vol. 19, Maret 2013. ISSN : 1693-8739.

[3]. Faizan, K. N., 2016, "Effect of alternator pulley diameter variation and motor power to current and 12 Volt battery charging process speed". Journal JEECAE Vol. 1. October 2016.

[4]. Deshpande, M.V. 1990, "Electric Motors: Applications And Control", A. H. Wheeler & Co.Ltd, India.

[5]. Austin Hughes, William Drury, "Electric Motor and Drives, Fundamental, Types and Aplications", Newnes. 2013.

[6]. R. D. Belekar, "Alternator Charging System for Electric Motorcycles", International Research Journal of Engineering and Technology (IRJET), ISSN: 2395-0056, Vol.4. Issue 4, April 2017

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