

Generation of Electric Power Using Two-Wheelers



R. Ramya, T. Anitha, M. Nagarajapandian, K. Srinivasan, K. Pooventhan

Abstract: In the recent years power generation is also a challenging task. Mostly the power can be generated by coal mines, wind mill, etc. The proposed method involves the alternating source for generating power. Bike powered generator is a device that uses a prime mover to produce electricity in contact with a roller for charging a battery. Here an alternator is used as the electricity generator. The alternator is coupled to a pulley which is rotated by a belt and drive system. The input power is given to the paddle and final rotational speed is achieved in the alternator rotor. Therefore, mobility of equipment is of great importance. This innovation brings together the resourcefulness of power generation with the transportation feasibility of a motor bike frame.

Keywords : Alternator, Battery, Motor Bike

I. INTRODUCTION

Bike powered generators have been of interest at many places where no other alternative electricity generator has been viable. While using this method it is not a new concept in itself, it has not been successfully used on a wider scale. This powered generator is a device that uses the prime mover (i.e. rear wheel) produce electricity for charging a battery. Here an alternator is used as the electricity generator. The alternator is coupled to a pulley which is rotated by a belt and drive system. The input power is given to the mover and final rotational speed is achieved in the alternator rotor. Most components of the portable power generator are based upon existing inventions, both recent and historic. The real innovation behind this power generator is movableness. University groups often organize events around and off

campus. Therefore, mobility of equipment is of great importance. The integrated unit will generate needed electricity on-site, and transport it to the site with moving power. During transportation, the unit can also capture energy used in braking and coasting. A electrical phenomenon panel may more the energy production whereas demonstrating the transportable potential. We think our pedal-powered device can inspire students and also the public to admit the realities of energy production, which can spark new energy answer. By using this powered generator, different types of equipment, such as, TV, radio, CD player etc. This generator is very useful to those areas, which areas do not have electricity connection. This power generator stores energy to a battery which provides electricity in DC form, if AC type of electricity is required, an inverter is connected.

II. BLOCK DIAGRAM

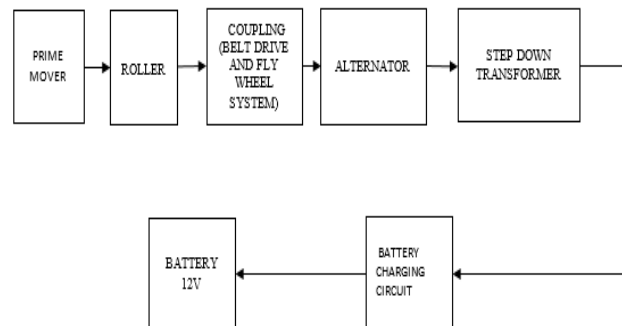


Fig.1. Block Diagram of Proposed Work

The entire setup works in three steps. First, the rotation of wheel is takes place. This Mechanical energy is represented in the form of rotation of chain sprocket system. Second, the mechanical energy in the form of rotation is converted to electrical energy by the alternator which is connected to the chain-sprocket and belt-pulley system transmission

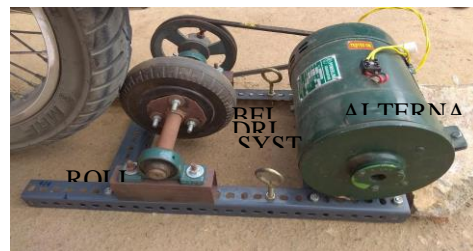


Fig.2. Hardware representation with roller system by means of pulley.

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At the third stage the electrical energy is converted and the appliances are worked. Then the AC supply from the alternator is connected to the step down transformer for stepping down the current. Finally the supply is given to the battery charging circuit and finally a 12V battery is charged and the charge is stored.

III. EXPERIMENTAL MODEL AND CONTROL DESIGN

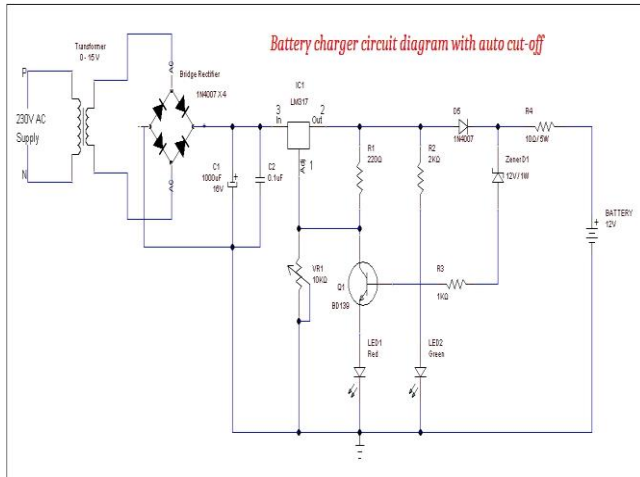


Fig.3.Circuit Diagram For Battery Charging System

In this paper, These types of diodes allow only the flow of electrical current in one direction. So, it can be used for the conversion of AC power to DC. 1N 4007 is electrically compatible with different rectifier diodes and might be used rather than any of the diode happiness to 1N400X series. 1N-4007 has different real life applications e.g. free wheeling diodes applications, general purpose rectification of power supplies, inverters, converters etc. A rectifier diode is used as a one-way check valve. Since these diodes only allow electrical current to flow in one direction, they are used to convert AC power into DC power. When constructing a rectifier, it is important to choose the proper diode for the job; otherwise, the circuit might become broken. Luckily, a 1N4007 diode is electrically compatible with different rectifier diodes, and might be used as a replacement for any diode in the 1N400x family.

IV.HARDWARE REQUIREMENT

Hardware setup for alternator and roller mechanism

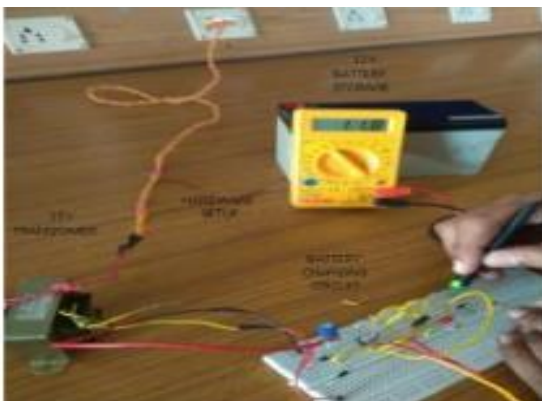


Fig.4.Hardware setup for battery charging system

A. Alternator

The alternator converts mechanical energy into electrical energy. It is mounted in the rear side of the set-up. The alternator shaft pulley drives the alternator through a belt. A regulator, typically on or within the generator, prevents the generator from manufacturing excessive voltage.

B.Alternator Principle

Alternators generate electricity using the same principle as DC generators, namely, when the magnetic field around a conductor changes, a current is induced in the conductor. Typically, a rotating magnet, referred to as the rotor turns at intervals a stationary set of conductors wound in coils on associate degree iron core, referred to as the mechanical device. The field cuts across the conductors, generating associate degree iatrogenic electrical phenomenon (electromotive force), because the mechanical input causes the rotor to show. The rotating flux induces associate degree AC voltage within the mechanical device windings. Often there are 3 sets of mechanical device windings, physically offset so the rotating flux produces a 3 part current, displaced by tierce of a amount with respect to each other.

C.Battery

An electrical battery is the phenomenon of conversion of chemical energy into electrical energy. Batteries can be classified into two types. Primary battery and secondary battery. Primary battery is that can be used once. Secondary battery is that it can be reused several times by charging. Battery size can vary from small size to large depend upon the application. Wet cells are made of liquid electrolyte and are commonly used as a learning tool for electrochemistry. Wet cells can also be classified as primary and secondary. Real time primary batteries used are the Daniel cell ,other primary wet cells are the Leclanche cell, Grove cell, Bunsen cell, Chromic acid cell, Clark cell, and Weston cell.

D. Belt-Pulley System

$$\text{Velocity ratio} = \frac{\text{diameter of driven pulley}}{\text{diameter of the driver pulley}}$$

If both, the velocity ratios and the input speed of a pulley system are known, the output speed is calculated using the following formula. The velocity ratio of a pulley system also determines the amount of turning force or torque transmitted from the driver pulley to the driven pulley. The formula is: output force = input force × speed magnitude relation

The Belt may be a coiled strip of versatile material, used to mechanically link two or more rotating shafts. They may be used as a supply of motion, to efficiently transmit [power, or to track relative movement. Belts are looped over pulleys. When a belt is employed for power transmission it's referred to as a belt drive. Belts are the cheapest utility for power transmission between shafts that may not be parallel. Power transmission is achieved by specially designed belts and pulleys. Belts run swimmingly and with very little noise, and cushion motor and bearings against load changes, but has less strength than gears or chains.

Advantages of belt as belt driver are as follows: they are cheap; they allow misalignment (parallel shafts), they protect from overload, they absorb noise and vibrations and needs little maintenance, and most importantly - High efficiency (90-98%, usually 95%. The disadvantages square measure as follows: speed magnitude relation isn't constant (slip & stretch, heat is accumulated quickly, speed is limited to 2000

SPEED (rpm)	VOLTAGE(volts)
0	0
850	12
990	25
1095	52.5
1110	170
2280	191.9
2999	210.5

m/min, power is limited – 700 kW. Belt transfers the force by friction of the belt over a block.

V. RESULTS AND DISCUSSION

Table. 1 Results obtained for Speed and Voltage

A permanent magnet generator is a better option than AC alternator. It requires only the rotation of the rotor, no extra power for the magnetic field. It can also provide instant power supply. But, It is rare now a days and one time use. Flywheel is the simple solution of maintaining uniform speed. But, balancing of a flywheel is a difficult task. So a heavy wheel can be used as a rear wheel of the cycle. A larger wheel can provide greater speed to the rotor. At the same time, if smaller pulley is used in the alternator speed can be increased. Permanent joint (welding, riveting) should be avoided for easy maintenance and transportation. It also gives opportunity to use the bicycle. An adjustable cycle frame can be used so that people at different ages and sizes can pedal comfortably. Power can be tremendously increased by connecting same arrangement in series. Rickshaw can be used instead of bicycle so that two rear wheels can take part in electricity production.

VI.CONCLUSION AND FUTURE SCOPE

The main outcome of this work is to produce electricity and to charge a battery successfully. But, during the work, many things are found that were not expected at the very beginning. A very complicated way was thought to establish the project. But at last, a readymade racing cycle was used for the setup. It provides the solution of many problems such as getting high speed at less time. Though multiple gear is used, but, user feels comfortable in the first gear. Large scale production can be possible by using larger battery and more

than one alternator. Electricity production depends on the number of users. If two setups operate at a time the production will be two times. Some performance test was done. The idea about efficiency can be assumed by those data. Production of electricity mainly depends on the rotor speed. Charging time depends on the battery size and user's ability. Most of the time result follow standard one but except sometimes they fluctuated.

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