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DESIGN OF HARDWARE SETUP FOR POWER GENERATION USING GEAR WITH DYNAMO

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Abstract- In this study, the speed of the two-wheeled vehicle is employed to produce power that may be stored in a battery for later use. The new, revolutionary car that will take its place during a power outage is the self-power-producing one. The battery that powers the inverter circuit is used to store the power produced by the synchronized dynamo used in applications with minimal AC power. Battery power consumption is only appropriate in the event that the grid-connected residences' power source fails. As a result, this system will improve its characteristics and be more beneficial in rural regions.

Keywords: IC engine, Planetary Gearbox, Synchronized Dynamo, Lead Acid Battery.

1. INTRODUCTION

An inverter circuit is used to convert a 12V DC battery's output from DC to AC. A DC synchronized dynamo that is linked with the planetary gear charges the battery. A bicycle chain sprocket is attached to the planetary gear train using a free wheel that has the input of the planetary gear box soldered to it. A belt drive connects the gearbox's output to the DC dynamo. The charging device and a 12V DC battery are linked to the synchronised dynamo. An inverter circuit receives battery power to convert 12V DC to 12VAC, which is subsequently used for a low load. Applications.

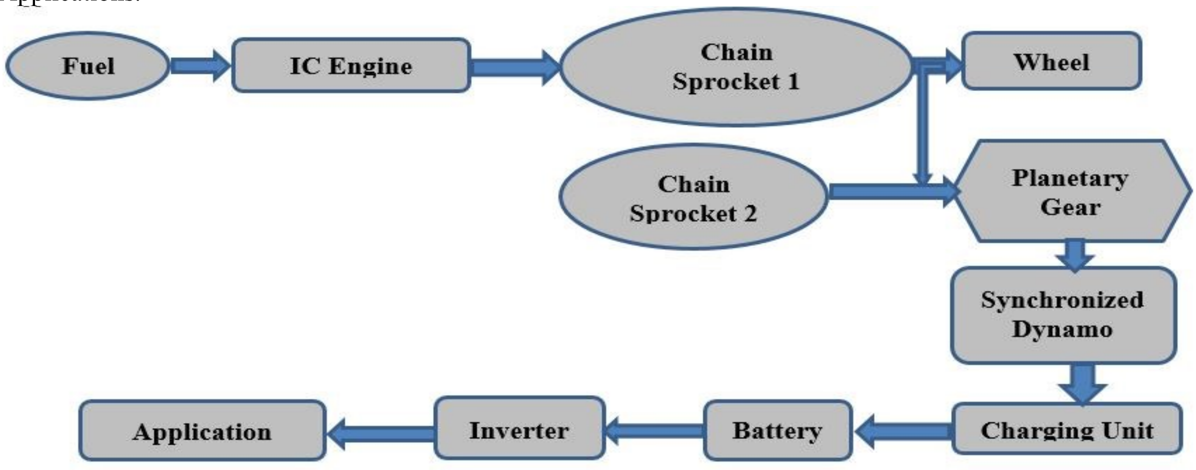

Fig. 1.1 Block Schematic of the Gear and Dynamo System

2. COMPONENTS AND FUNCTIONS

With the use of external components, the power is generated by using the vehicle's speed as a gauge. To finish the machine's functioning, the following parts are necessary.

2.1 Engine

Motorcycle engines use a piston that rotates a crankshaft in response to periodic linear motion created by the piston, which is linked to the crankshaft by a piston rod. An upward thrust enhances the piston's motion during the ignition stage. The crankshaft acts as a flywheel during each of the three stages—exhaust, intake, and compression—rotating the piston. Fuel's main ingredient is hydrocarbons. In hydrocarbons, the proportion of carbon and hydrogen atoms is greater. They are useful as fuel because two hydrogen atoms can combine with one oxygen atom to generate water (H2O) and one carbon atom can react with two oxygen atoms to form carbon dioxide [3]. In reality, in addition to carbon dioxide, carbon monoxide (CO) may be formed when a single carbon and oxygen atom combine. More oxygen may then be added, when carbon dioxide may be produced. Our piston descends as a result of all these reactions releasing energy. The valve train is one of many parts of an engine that also includes pistons and a cylinder block head. An emission of a fuel-air combination that has been begun by a flash propels the pistons in the cylinder block in a to-and-fro motion. The valves are opened and closed in order to let the air-fuel combination into the combustion chamber. As the pistons move back and forth, the energy transfers from the pistons to the crankshaft as the crankshaft begins to rotate. The motorcycle's front wheel receives torque from the crankshaft's rotation through the gearbox[1].

Three different criteria are used to categorise motorcycle engines: (i) how many valves per cylinder an engine has. (ii) How much space there is in the burners? The number of pistons changes over their power cycles (iii).
The motorbike being utilised here features a 97.2cc engine with initiating combustion and a tubular double cradle frame. The Honda Cub C100EX, with its 50mm bore and 49.5mm stroke [2], serves as the basis for this motor.
There are 11 litres (2.4 imperial gallons; 2.9 American gallons) of petrol and 1.4 litres (0.31 imperial gallons; 0.37 American gallons) of reserve.
Weight, dry: 109 kg.

2.2 Planetary gear

A gear ratio's epicyclical gearing system was quite complex; in particular, there are various methods in which an info revolution may be changed into a result spinning [5]. The epicycle gears consist of three fundamental parts:
Sun: The gearing part's central gear.
Carrier: All the planet gears are the same size, and they mesh with the sun gear, which may have additional gears of its own. An outer ring that, like a shark's mouth, has teeth that point in the direction f the planet's gears.
Two planetary gears that mesh with one another are used in epicyclic gear systems. The sun gear fits with one of these planets, while the ring gear fits with the other. The planetary gear produces this result in a variety of ratios.
The simple equation changes into:
$(R-1)\ \omega c=R\omega r-\omega s$ Where $R=Nr/Ns$
this result in:
$\omega r=\omega s(1/R)$when the carrier is locked,
$\omega r=\omega c(A-1/R)$when the sun is locked,
$\omega s-\omega c(R-1)$when the ring gear is locked
Gear Specifications:
Gear attached in engine= 100mm and 44 teeth
Gear attached in planetry gear box = 50mm and 22 teeth
Space between the two gear = 350 mm

Fig. 2.1 Synchronous Dynamo with Planetary Gear Arrangement

2.3 Dynamo

An apparatus known as a dynamo converts kinetic energy into electrical energy [4]. For the headlights and other equipment in the bicycle, energy is needed. The dynamos are typically tiny permanent-magnet alternators. An orbital body spinning on its axis in the same amount of time is explained by a synchronous dynamo. This Synchronous dynamo changes from a permanently rotating setup to a planetary gear arrangement for as long as one orbit takes. Planetary gears initiate the continual spinning of the dynamo. a test-based setup Fix a two-wheeler body on one stand. For the purpose of generating dc power, an experimental setup was designed with a chain sprocket in a certain operating state [6]. The battery stores the energy that is created. Once rectified, it may be kept in the battery. The amended voltage might be turned around and employed in many different utility applications.
An electrical signal is being produced by the dynamo. The interior components of the dynamo take into account spinning wire coils what's more, attractive fields to change mechanical curving into a throbbing direct current. Through a toothed belt drive, this dynamo and planetary gear system are linked. A stator, which is a stationary component that produces a constant magnetic field, is the foundation of a dynamo. The armature, a collection of whirling windings, revolves inside the stator's magnetic field. One or more permanent magnets, which are often referred to as field coils, may be used to provide the stationary magnetic field.

According to Lenz's law, the commutator is required to generate DC. When a loop of wire revolves, reversing polarity every half turn to produce a sinusoidal current, the potential is created in a magnetic field. Furthermore, sinusoidal current had no recognised uses in the early stages of executing scientific procedures. Direct current, such as that generated by lead acetate batteries, has recently found usage in the electroplating business. To combat the drawbacks of using batteries, the dynamo was created. When the external circuit potential changes direction, contacts on the commutator's shaft switch the winding connections to provide alternating current rather than pulsing DC.

Fig. 2.2 Hardware of Used Dynamo

The electric motor, the sinusoidal current alternator, and the rotary convertor were all originally used in industry as dynamos, which were first used to generate electrical energy [8].

Modern large-scale power production is influenced by the basic alternator because it is reliable, efficient, and affordable. A mechanical commutator is a drawback of a dynamo.

2.4 Rectifier and inverter

Most rectifiers' lower voltages and power conversion employ silicon diodes. Applications. The 12V (D.C.) Battery charging unit received the rectified source from the dynamo and sent it on to the rectifier circuit. Refilling the battery with solutions allows it to be used again. Inverter circuit with battery attached; inverter converts D.C. to A.C. The circuit in this article is for a 220 V inverter[7].

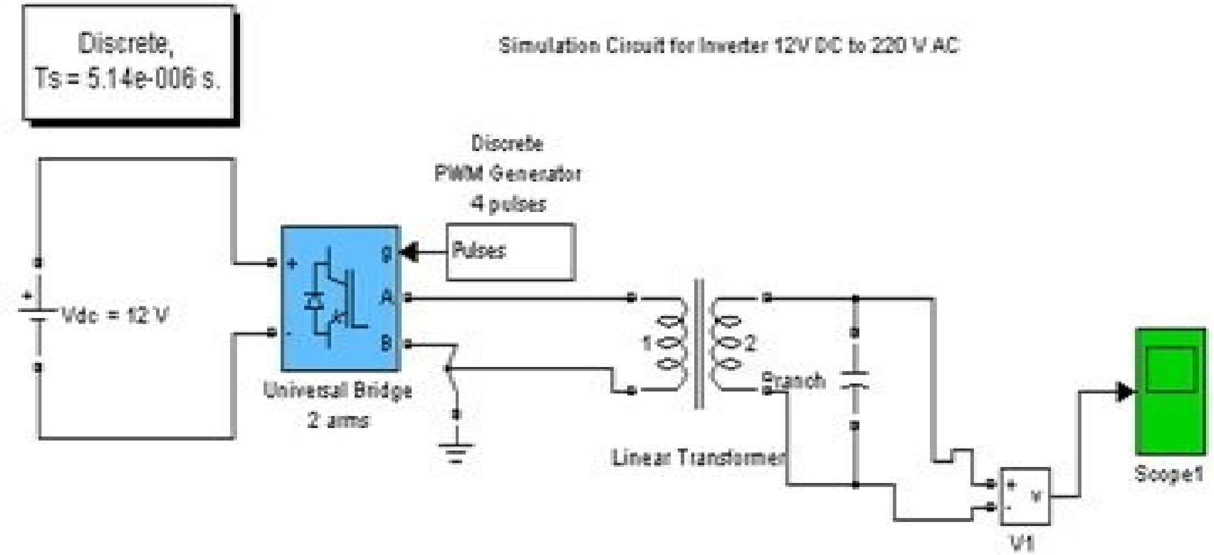

Fig. 2.3 Inverter Simulation Circuit Diagram

2.5 Battery

In this study, secondary type lead acid batteries are used [1]. The type is reusable. A battery is made up of several electrochemical cells that store chemical solutions and convert them into electrical current. Batteries, both primary (disposable) and secondary (rechargeable), are devices that performthis conversion from chemical to electrical.With this method, the price of the problem and the three main components required to generate the power.

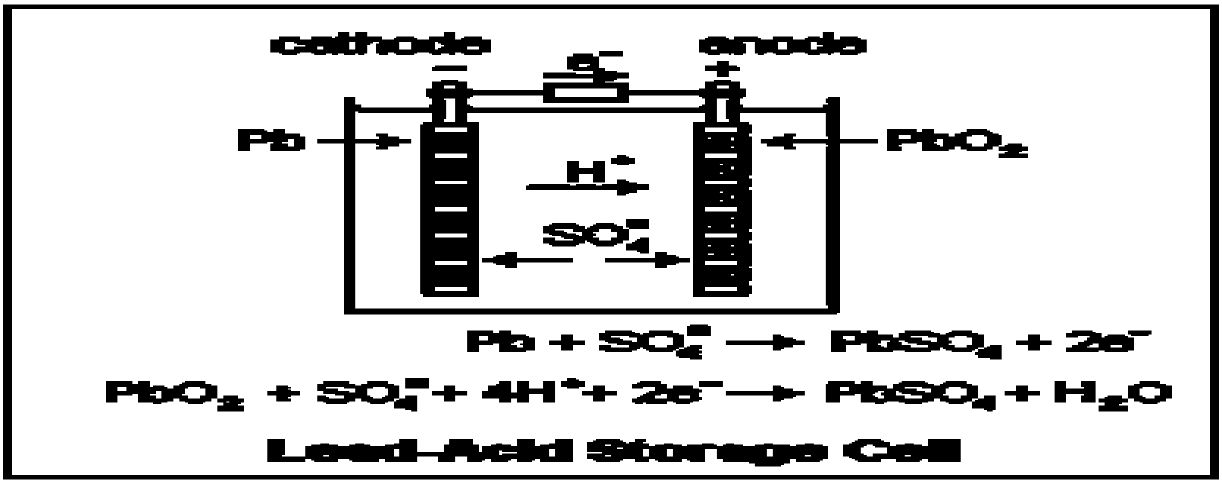

Fig. 2.4 Lead Acid Battery

3. EXPERIMENTAL SETUP SPECIFICATION

Planetary gearbox: 1:15 ratio speed
Synchronized dynamo: 5volt to 17 volt
Lead acid battery: 12 volt 9 A/hr
IC engine: 93 cc splendor + engine
Bike hero Honda Splendor
The fuel consumption based on bike
Initial: 3 to 5 volt
Starting: 5 to 7 volt
RPM: 700 to 7500 rpm, initial rpm =1000rpm
Battery: 12 volt to 9 Ah
Standing fan= 75 x 4= 200w
Lamp: =40 x 4= 100w
Mobile charge= 3 x 2= 10w
Total = 470w
Current = 470/230= 2.04 amps/hr
2.04 x 2= 4.08 amps
Computer= 250w
Home theater= 550w
Current= 550/230=2.39 amps
Current= 250/230= 1.08 amps (or) 1.5 amps
Battery rating

Calculation:

Power rating (watts) X No. of appliances at home
X Avg no. hour used per day 1000= Total per day in KWH.
Power rating (watts) X Hours use X 30 days = kwh 1000

Fig. 3.1 A Two-Wheeler, the Hardware Setup's Position Was Fixed

4. SIMULATION RESULTS FOR INVERTER CIRCUIT

The inverter circuit is shown here as a result of a simulation. The inverter circuit took the battery's 12 V DC and turned it into 220 V AC. The following are the components included in an inverter circuit board.
IC SG3525
MOFFETS IRF Z44 x2
Resistors (22,10K,56K,12K,470,33x2,)
Resistors (220x4 ½ watt)
Capacitor (0.01uFx3, 1000uF/25V, 2.2uF/25V, 1K100K,102K 47uF/25Vx2)
Transformer (we use as inverted).

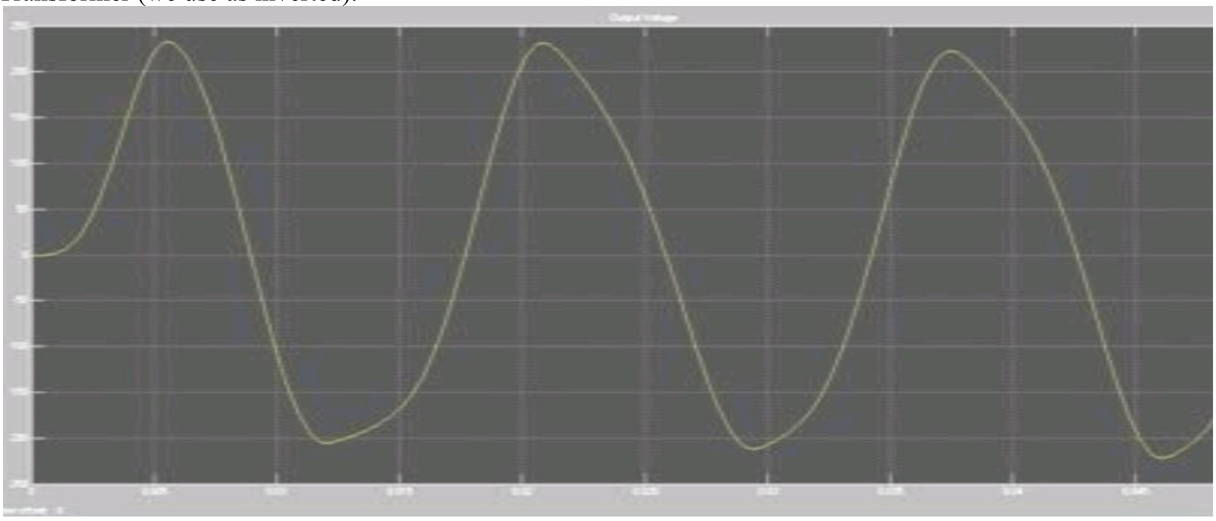

Fig. 4.1 Waveform from Inverter Circuit Simulation

CONCLUSIONS

This research examines how power outages affect the two-wheeler connections and inverter circuits that we use to use electricity during these times. Planetary gear arrangement, synchronized dynamo, and chain sprockets are some examples of the components. In this article, an experimental setup was utilized to determine the potentials of the technologies when paired with other devices, with the goal of maximizing the cars' potential energy efficiency. It is used in the production of the current for the vehicle speed unit. When compared to the current development model, this model's presented is extremely effective.

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