Design of Hybrid Bicycle

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Abstract— Nowadays travelling on petrol and diesel vehicle is costly. Due to increase the rate of crude oil. Also by using these vehicles an environment is pollute so badly. So Hybrid bicycle is totally new design bicycle for people those who can't afford the petrol and diesel vehicles for short and medium distance destination. Hybrid bicycle run on two energy sources one is solar energy and another one is by charging the battery by wall charger. Both of these sources are available free of cost or less cost. Our main purpose of making this bicycle is to increase the use of environment friendly vehicle and reduce the pollution from nature. Hybrid bicycle is also designed for those people who love to run bicycle outside and enjoy nature.

Key words: Hybrid Bicycle, Electric Bicycle, Solar Cycle

I. INTRODUCTION

Hybrid source means when we use more than one energy source .Hybrid bicycle is a bicycle which runs using the electric energy of battery to run the motor which eventually runs the bicycle .In monsoon season or on the day on which there is no sunlight then we can use this bicycle by charging the battery through wall charger or portable charger .Hybrid bicycle is not sold generally in our day-today life. However, there manufacturing can be increased to prevent environment pollution. Initially it is use as a practical project and after getting tremendous achievement in market sometimes it is also sponsored by government or some government agencies. Major source is solar panel which has number of photovoltaic cells. These cells convert solar energy into required voltage to charge the battery .In market various types of solar panels are available .Here we use polycrystalline for more efficiency .If one source is fail to operate then we can use wall charger for charging the battery .So hybrid bicycle is more efficient and affordable to each and every person in society.

II. METHODOLOGY

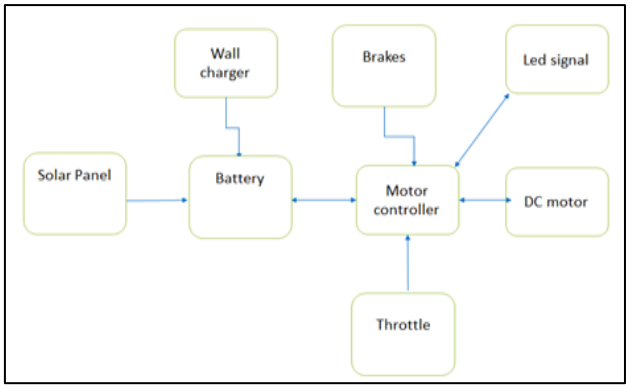

Fig. 1: Block Diagram of Hybrid Bicycle

Thope hybrid bicycle is consist of D.C motor , solar panel , battery , motor controller, throttle and electric breaks as a main component. Now Solar panel charge by the solar energy which is stored in the battery. We use lead acid battery which is rechargeable. Now battery is charged through the solar panel.

After that the supply is given to the motor controller. The main work of motor controller is give necessary supply to the motor, throttle, electric breaks. Motor controller control the supply from the battery .Motor controller gives supply to motor. Motor is connected through the chain drive to rear wheel. As the supply given to the motor the chain drive run and it runs the wheel. Throttle is for the controlling the speed of the motor.

III. DC GEAR MOTOR

The brushed DC electric motor generates torque directly from DC power supplied to the motor by using internal commutation, stationary magnets, and rotating electromagnets. Advantages of a brushed DC motor include low initial cost, high reliability, and simple control of motor speed. Disadvantages are high maintenance and low life-span for high intensity uses. Maintenance involves regularly replacing the carbon brushes and springs which carry the electric current, as well as cleaning or replacing the commutator.

Fig. 2: DC Gear Motor

Parameter	Corresponding factor
Type of Motor	Dc gear Motor
Power Rating	250w
Voltage	24v
Weight	3kg
Speed	150 Rpm
Torque	8 nm
Current rating	13.7 amp

Table 1: Specification of Motor

IV. SOLAR PANEL

As the title suggests the bicycle is operated by solar energy. The lead acid battery is charged with solar energy with the help of a solar cell. Solar cells convert the energy of sunlight directly into electricity through the use of the photovoltaic effect. The photovoltaic effect involves the creation of a voltage into an electro-magnetic radiation.

Fig.3:- Solar Panel

Solar cells are electrically connected and fabricated as a module with a sheet of glass on top to allow light to pass and protect the semiconductor from the weather. To obtain a desired peak DC voltage we will add solar cells in series, and to obtain a desired peak current, the solar cells are put in parallel position.

Parameter	Corrasponding factor
Max power	20 WP
Voltage at max power	16.8 V
Current at max power	1.20 A
O.C voltage	21 V
S.C current	1.33 A
Max system voltage	DC 600V
Electrical parameter tolerance	+3%
Temp. co-efficient	1.035 W/C

Tabel 2: Specification of Solar Panel

V. BATTERY

Lead acid batteries are very common in our day to day life. It is the most frequently used battery in electronics. Although it has lower energy density than the lithium ion batteries but since is very safe to use lead acid battery with proper precautions taken. It has many advantages like low cost, frequently available, and is also explosion free thus is the most frequently used battery in solar hybrid bicycles. Current supplied from battery it indicates the flow of energy from the battery and is measured in amperes. The higher the current rating the slower the battery will discharge. A battery is rated in ampere-hours & this is called the current rating. This project revolves around charging and discharging energy within a high voltage battery. Thus this project demands for a battery with longer running hours, lighter weight with respect to its high output voltage and higher energy density. Among all the available battery types the lead acid batteries are the most suitable ones to be used in hybrid bicycles. When we connect battery in series voltage will be double if we connect it in parallel then current is double.

Fig.4: Battery

Parameter	Corresponding factor
Number of batteries	2 No
Voltage	12v
Ampere hour rating	12ah
Connection	Series

Table: 3 Battery Specification

VI. MOTOR CONTROLLER

A motor controller is an important element of the solar hybrid bicycle or can be called as the brain of the vehicle. It controls the amount of power supplied to the D.C motor and also to the lights and horn if required. The motor controller performs the function of conversion of the DC voltage from battery to an alternating voltage with variable amplitude and frequency that drive the D.C motor at different speeds. It basically consists of MOSFET transistors and small microprocessor that vary from detecting any malfunctions with the motor hall sensors, the throttle, to protect functions against excessive current and under-voltage.

Fig. 5: Motor Controller

Parameter	Corresponding factor
Rated voltage	24V
Rated wattage	160- 300w
Rated current	10-30A
Dimensions	7.4cm x 4.9cm x 3.5cm
Efficiency	90%

Table 4: Specification of Motor Controller

VII. THROTTLE

The maximum speed of a bicycle is 20 kmph. It is required to vary the speed depending upon the road conditions & traffic. Therefore an accelerator or a throttle is necessary. Throttle allows us to drive the motor from zero speed to full speed. The throttle is fitted on right side of the handle bar and is connected to controller.

The throttle converts DC voltage from battery to an alternating voltage with variable amplitude and frequency that drives the hub motor at different speeds. It consists of MOSFET transistors and a small microprocessor. This throttle is technically referred to as a Hall Effect type. The throttle has three wires contains a black, red, and green.

The supply voltage is via red and black wires and is usually around 4 volts. Green wire voltage increases as the throttle is turned.

Fig. 6: Throttle

Parameter	Corresponding factor
System voltage	24v
Return voltage	4v
Max load output current	25A

Table 5: Specification of Throttle

VIII. CONCLUSION

Hybrid bicycle can be used as means of transportation. It runs with less effort and operated on electric battery hence reducing the use of non-renewable fuel and leads to a new step in keeping environment clean and pollution free.

A. Final Model of Hybrid Bicycle

Fig. 7: Modified Model of Bicycle

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