

HYBRID ELECTRIC BIKE

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Abstract

A hybrid electric bike that works not only on internal combustion engine (ICE) but also works on electric motor (BLDC). The combination of electric and petrol makes the vehicle more futuristic. It gives owner with advantages of fuel economy and environmental impact over conventional automobiles. A Hybrid Electric Vehicle that combine with electric motor, battery and power system with an internal combustion engine to achieve battery fuel economy and compare with other bikes less toxic in emissions.

Keywords: Hybrid bike, bldc motor, electrical and mechanical combine throttle.

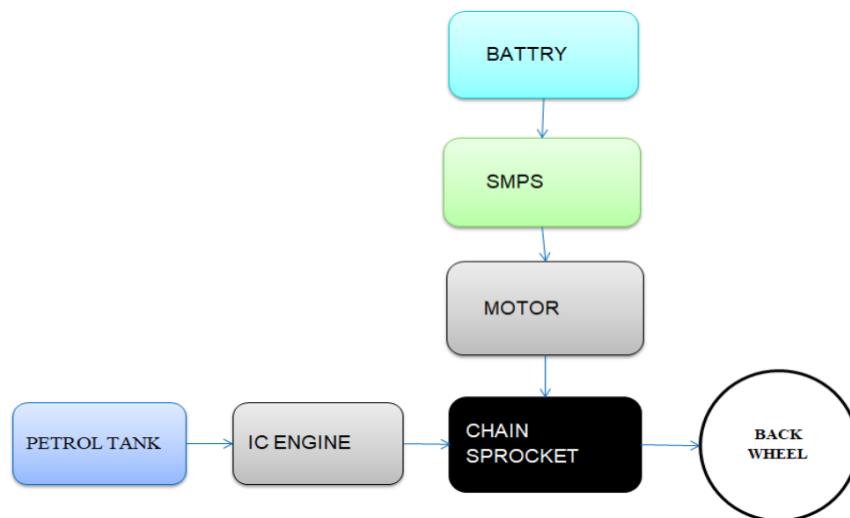
INTRODUCTION

A hybrid bike with multiple energy sources which can be works separately or simultaneously operated to propel the vehicle. Many hybridization configurations such as fuel cell, gas turbine, solar, hydraulic, pneumatic, ethanol, electric and many more are proposed over the years. Among those hybrid electric vehicles, integrating to technically and commercially proven and well established technologies of electric motors and I.C. engine. Allowing drawing upon their individual benefits have been widely accepted by the technologies and users.

The hybridization of a conventional combustion engine vehicle with a electric motor drive it may greatly incurs the general efficiency and achieve good fuel economy with reduced emissions. Considering the cruddy status in India, a well-organized and fuel-efficient bikes has to be developed. Hybrid cars are the vehicle with more than two energy sources are present. The challenges for Hybrid Electric bike designing are managing multiple energy sources, for motor we won't battery its disicult to mount in bike because of its sizing. The increasing numbers of petroleum vehicles the need for petroleum products is reaching its peak point. Although the concept of electric bike is not new, it has not been completely explored.

By observing today's scenario everyone is focused to environment and it seems that the demand for cleaner alternatives for fuel has become critical. The increasing demand for pollution-free transportation has boosted the utilization of electrical power for transportation thereby reducing pollution of vehicles.

System Design



Electric Mode:-

(S1) We use battery's to give supply power to the electric motor, and it connects with smps that is nothing but the motor controller it control by the electrical throttle, it further connects with BLDC motor and it also connects with chain sprocket of the bike and it helps to move the rear wheel of a bike

Petrol Mode:-

(S2) Simultaneously we use petrol tank that connects with IC engine that is nothing but the internal combustion engine it's further connects with chain sprocket and it helps to move the rear wheel of a bike.

In this mode the BLDC motor mounted Chain sprocket in parallel with ic engine motor will run and recharge the battery which control by the charging cut off sensor

Hybrid Technique:-

A switching in between ev mode and petrol mode we have key switches, It works Simultaneously, get ev mode we want to stop bike or ic engine gets in neutral condition, then on electric key to start motor and run bike in ev mode.





Component use in hybrid bike:-

IC engine:-

Conclude date: March 2020 ,Battery: 12 V 4 Ah VRLA Maintenance Free Body frame, design: Double Cradle Down Tube Frame, Body style: Roadster Bore: 56 mm

SMPS Controller:-

Specifications of motor controller (SMPS): Voltage: 48V. Wattage: 750W Motor. Combine Throttle mechanical as well as electrical: 1-4V. Short voltage protect: $31.5 \pm 0.5V / 42 \pm 0.5V$. Colour: silver. Dimension: 105 x 65 x 32mm/4.13 x 2.56 x 1.26".

Operation:- 1. Blue/Black - cruise/ground. 2. White wire - self-learning (plug two white wire together). 3. White/Black - Brake (low)/brake (low). 4. Purple - Brake (high). 5. Red/Black/Green - throttle positive/throttle negative/throttle signal. 6. Red/Black/thin Yellow/thin blue/thin green - +5V//Earthling/Motor Hall lines. 7. Thin Blue - instrument. 8. Red/Blue/Black - +5V/Signal/Earthling (Pedal Assistant). 9. Thick Blue/thick Yellow/Thick Green - Motor phase lines. 10. Thick Red/thick Black/thin red - power positive/power negative/power lock. Package includes: 1 x Brushless motor control

Trotted System:- firstly we get normal thumb throttle to combine with ice mechanical accelerator by using mechanical accelerator cable to attach using connector clip and, that extra cable connect to thumb throttle .

Display Suitable for lead-acid:-

12V, 24V, 36V, 48V (8-70V) and 3.7V lithium series multi-platform, 2 string to 15 string

Voltage Range: 8-70V; please contact us after ordering, we can set voltage and send.

Power percentage and voltage are displayed in turn recurrently and automatically.

Dimension: app.61.3mmx33.3mmx13.5mm/2.41"x1.31"x0.53"; Cable length: app.30cm/11.81"

Specifications of motor controller (SMPS):-

Voltage: 48V. Wattage: 750W Motor. Combine Throttle mechanical as well as electrical: 1-4V. Short voltage protect: 31.5±0.5V/42±0.5V. Color: silver. Dimension: 105 x 65 x 32mm/4.13 x 2.56 x 1.26". Casing material: Aluminum. Note: It only fit for Motor with sensors.

Power cut off sensors that can be installed to brake levers:-

If you have an integrated shifter or hydraulic brakes then you may choose to install a brake sensor to your existing brake lever. The brake sensors include a magnet sensor, this sensor sticks to the base of the brake and the magnet sticks to the lever. As soon as you pull the lever the magnet splits from the sensor and it'll shut off the power. It's a slightly more difficult process to install brake sensors compared to the first option

Throttle Accelerator:-

Wuxing FT-21X Throttle Feature
Wuxing Brand High Quality, Long life, High Quality ABS Material,
For Electric Bicycle, Scooter, Razor

Motor specification:-NAKS 48V 750watt BLDC Motor / e bike Motor

Battery Charger:- 48V 6A Auto Cut-off E bike

Total Vehicle Weight Calculation:-

The total load applied to the BLDC motor is calculated based on the following weight of the vehicle and its accessories.

Actual vehicle weight	= 121 kg
Motor weight	= 6 kg
Battery weight	= 6 kg
Rider weight	= 70 kg
Accessories weight	= 5 kg
Total Load	= 137 kg

Mileage in petrol mode - In 1lit petrol bike goes in 42kmpl mileage

Battery Calculations:-

The watt hour of the battery is given by $wh = Ah \times V$

Where,

Ah = Ampere hour

V = Voltage

$48 V \times 18 Ah$ battery = 864 Ah

Since the battery produces 864 watts hour, which is higher than required voltage, we can use this battery.

Distance Calculation:-

The distance that can be travelled using this battery is given by $d = wh / F$

$d = 864 \div 13.43 = 64 km$

The road conditions may not be same during the whole journey, so we can recalculate the distance that can be travelled by increasing the force that is required to run the vehicle:

$d = wh \div F = 864 \div 20 = 43 km$

Charging Time Calculation:-

The charging time of a Lead Acid battery varies depending upon the charger used for it. The charging time of the battery is given by $T = Ah / A$

Where,

Ah = Ampere hour rating of battery

A = Current in amp (charger)

$T = 18 \div 3 = 6$ hours

Required Units of Current Needed for Full Charge:-

A 48 V & 18Ah Lead acid battery is used.

1 amp = 1.4 kVAh

$\therefore 18 \text{ amp} = 18 \div 1.4 = 12.85 \text{ kVAh}$

kW = kVAh \times Pf (power factor)

$\therefore 12.85 \times 0.174 = 2.23 \text{ kW}$ units are required.

Conclusion:-

Hybrid electrical bike is runs with two sources of power- petrol and battery. For city or also in daily application. battery drive is used whereas for high power and in emergency condition the (ICE) internal combustion engine is used. In Petrol mode the bike is good efficient at high speed drive. Thus HEVs both mode of operation occurs at their maximum efficiency. But in IC engine low speed or city traffic operations is not efficient. Therefore, it gives twice the mileage given by a normal vehicle. As this hybrid vehicle emits 75% percent less emission than normal vehicle it plays an important role for reducing pollution to certain extent. Thus it is most efficient in urban areas mainly in high traffic where IC engines are least efficient as the energy from PETROL is being wasted away and creates pollution.

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