SOLAR E – BIKE

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Abstract:

The face of the automotive industry is being reshaped by concerns over oil supplies, international policy and fuel costs. The solar vehicles and rechargeable batteries, one of the oldest alternative energy transportation, has many applications to the emerging electric vehicle market. The development of a telemetry system for a solar portable bike aids in a better understanding of the energy usage of a vehicle and the aspects applicable to electric vehicles as a whole. This project can gives us better option for personal traveling, with easy handling of bike as a bag which is light weight and it has also storage space for caring wants. It helps to become green India and gives eco-friendly option to traveling and compact vehicle. The basic principle of solar bike is to use energy that is stored in a battery during and after charging it from a solar panel. The charged batteries are used to drive the motor which serves here as an engine and moves the vehicle.

Problem Statement:

parameters which can improve performance of electric vehicles are Battery, Motor design, transmission etc. The main problems regarding them are battery charging on grid, electricity bills and high infrastructure investment.

Vehicular Pollution Problem in India:

High vehicle density in Indian urban center, Carbon monoxide is a colorless, odorless, poisonous gas Groundlevel. Ozone is the major component in what we know as smog with nitrogen oxide Sulfur dioxide exposure constricts air passages, creating problems for people with asthma and for children have week lungs need to more care than adults' lungs. The effect of NOx exposure on the respiratory system is similar to that of ozone and sulphur dioxide. Lead poisoning can reduce mental ability, damage blood, nerves, and organs, and raise blood pressure. Formaldehyde and Benzene from automobile emissions are known to cause are causing cancer, birth defects, genetic mutation or other serious illnesses in people. The chemicals can be inhaled directly or carried by small particles (dust or lint) into the lungs.

INTRODUCTION:

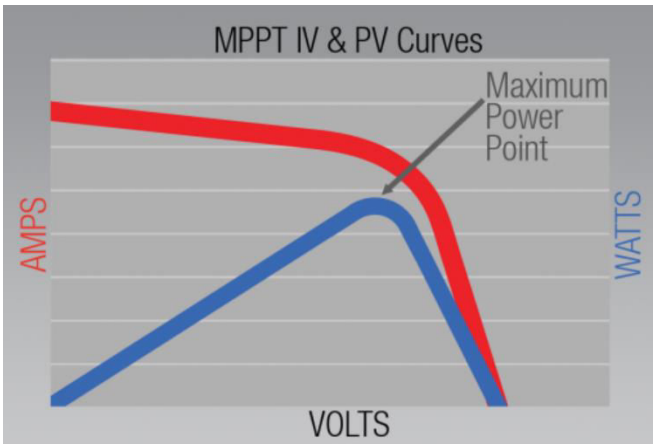
In today's industrially advanced era, energy demand is increasing day by day. Few years ago, most of our energy requirements were fulfilled by oil and coal. Along with this, it is found that the world is knocking the energy crisis. With the same rate of consumption, the future scenario will lead to exhaust these resources. While transportation is one of the sector which consumes largest share of energy in the world. Thus continues growth of energy consumption resulting into carbon dioxide (green house gas) and energy crisis. Hence, more research is turned to harness wind and solar as clean renewable energy sources. For this, one of the intelligent solution is electrification of transportation sector and EV vehicles are designed to serve the need. Electric vehicles comprise of battery chargers and charging stations which are to be developed, again these chargers lead to increase in electricity bills, space consumption and also high initial development cost. Our solution to the problem is a solar incorporated vehicle that can charge its own EV battery anywhere, while running, and also increase mileage in KM s/charge. Kit also includes 48 v 5

Emissions from IC Engine can cause immediate and lon

ampere solar panels, buck-boost converter, EV vehicle, MPPT based controlled charger unit. This will overcome all the limitations and provide us a feasible product.

MPPT Charge Controller:

MPPT stands for Maximum Power Point Tracking, and it relates to the solar cell itself. Each solar cell has a point at which the current (I) and voltage (V) output from the cell result in the maximum power output of the cell. In the diagram below the curve is an example of the standard output expected from a solar cell, the Maximum Power Point is at the position marked on the diagram.



A Maximum Power Point Tracking solar regulator will simulate the load required by the solar panel to achieve the maximum power from the cell. The regulator will work out at which point the cell will output the maximum power and derive from this the voltage and current outputs required for maximum power to be achieved. It will then calculate the load that it must simulate based on these voltage and current levels R=V/I. The regulator, now receiving the maximum amount of power in, will then regulate the output according to what it is designed for. MPPT ensures that you get the most power possible from your solar panels at any point in time.
It is particularly effective during low light level conditions. These calculations result in an output that delivers maximum current at the required voltage at any point in time. During low light level situations it will compensate for the low light level and find the new point at which the solar cell delivers its maximum power output.

Working Principle:

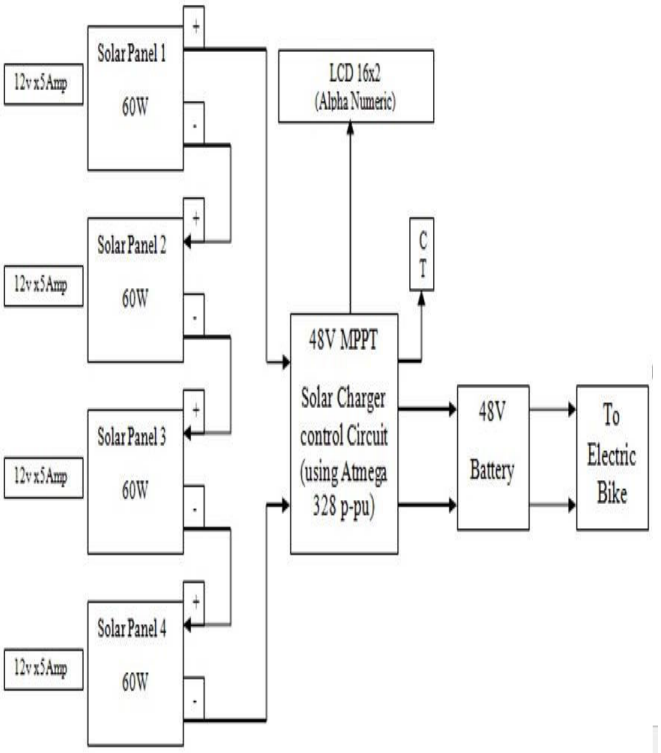


Figure 1: Basic Block Diagram

Our solution to the problem is a solar incorporated vehicle that can charge its own EV battery anywhere, while running, and also increase mileage in KM s/charge. Kit also includes 48 v 5 ampere solar panels, buck-boost converter, EV vehicle, MPPT based controlled charger unit. This will overcome all the limitations and provide us a feasible product.

Mathematical calculations for selection of solar:

- For electric vehicles: 48V x 6A: P = 288W x 4h = 1.152kW ~1.2units

  thus, per 60km~40units=200rs.

- For fuel vehicles: per 60km, assume fuel=1L

  30 x 75=2250rs.

- For solar vehicles: 60W x 4=240W x 20rs =4800 + 2000 = 6800/25 `~ 272 (25 yrs.)

  thus, 272/12 ~ 23rs.

Selection of Battery:

Two lead acid Battery with 12 V and 12.5 amp-hour rating are used .The selection of battery depends on its voltage, ampere and wattage rating etc. The total power of fully charged battery in 8.5 hours is 300 Watt-hours.

Selection of Motor:

A Brushless D C Hub Motor (BLDC) motor for 350 Watts power with electronic commutation system is selected. Brushless DC Motors (BLDC) have many preferred compared to mechanically commuted DC motors because BLDC motors have permanent magnet, electronically commuted, No winding on rotors, frictionless operation, less noise and more uniform torque.

Assembly of solar panel and power transmission system:

The fabrication process involves fixing the different components to the frame of the bike. The motor is fixed to the rear wheel shaft with proper alignment so that the weights are perfectly balanced. A battery casing in which 2 Pb batteries of 12 V, 12.5Ah are fixed to frame and wirings are drawn from battery to motor so as to transmit power from battery to motor. Also wiring for speed control is also incorporated. The solar panel is mounted on top of battery casing. A DC voltage booster is placed below solar panel. Appropriate wiring is done to charge the battery through a jack for AC charging. This makes it possible to charge the battery either by solar power or by electrical charging. The speed controller mounted in the center which cuts off the power supply to the motor and stops it. The same brake stops the bike with conventional friction brake. The braking system stops motor as well as bike simultaneously.

Results and discussion:

The bike was placed in sun light and was found that it requires 7 hours for fully charging the battery. But with electrical charging it needs 8 hours. The discharge time of battery theoretically is 1 hour. But it was observed that the discharge time of battery is 50 minutes and discharge takes place exponentially. The cycle was tested on plain flat road and a maximum speed of 15 Kmph could be obtained without pedalling.

Advantages:

- Solar power is pollution free and causes no greenhouse gases to be emitted after installation.
- Reduced dependence on foreign oil and fossil fuels.
- Renewable clean power that is available every day of the year, even cloudy days produce some power.
- Return on investment unlike paying for utility bills.
- Virtually no maintenance as solar panels last over 30 years.
- Creates jobs by employing solar panel manufacturers, solar installers, etc. and in turn helps the economy.
- Excess power can be sold back to the power company if grid interties.
- Ability to live grid free if all power generated provides enough for the home / building.
- Can be installed virtually anywhere; in a field to on a building.
- Use batteries to store extra power for use at night.

Conclusion:

Electric vehicles are the future of our world with the increasing consumption of non-renewable resources such as petroleum, diesel which leads us to step our way towards the renewable sources such as solar hydroelectric power and battery. There are alternative ways by which we can save energy. One of such way is electric bike; it is also the new way of transport which provides us easy way of transport to provide of any age. It is cheap source of transport and affordable to anyone. The motor used in this bike has high efficiency and the battery bank has less weight with high speed. These bikes are environmental friendly, needs less maintenance and can be also assembled to small component.

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