

## Development of Solar Power Electric Bike

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**Abstract**—Now days the use of fossil fuels increases continuously because of which in future there will be a stage where we are going to lost all these resources completely. Therefore, there are so many organizations or companies which are preferred to used renewable energy sources. Though our bike is running on electric power but our main objective is to charge the battery by means of solar power. When we run this electric bike on road the motor will consume the electric power but also at the same time the battery will charge due to the solar panels provided at overhead of the bike. To overcome the depletion of fossil fuel we causimply use an electric bike, but for charging of battery we need to pay money for its charging purposed. But by using our project idea charging of battery will becomes less costly or free as the solar power is available free<sup>l</sup>y. The remedy solar bike is not only limited to overcome the fossil fuel depletion but it also considered other factors. The consumption of fossil fuels like petrol, diesel etc. creates pollution which adversely effects human health and also causes ozone layer depletion. It will also reduce the running cost as the solar power is available freely<sup>[2]</sup>. For current condition this solar bike may not be that much effective but in coming years it will definitely going to be highly efficient because we all know that after 5-6 years there will be an era of electric vehicles.

**Keywords**—Solar panels, Electric bike, BLDC motor

### I. INTRODUCTION

The work presented in this report is based on utilization of solar power. By considering the unavoidable depletion of fossil fuels, implementation of renewable energy sources has become vital. Taking into account the climate condition of major part of our country solar energy is easily available. Photovoltaic (PV) cells of solar convert the radiation from sun into electric energy which is direct current (DC). But the efficiency of solar panel depends on climate condition such as radiation, temperature, wind speed and appropriate placement of solar panels<sup>[3]</sup>.

#### 1.1 Project Objective: -

The objective of our project is reduced the consumption of fossil fuels like petrol, diesel etc. by running the bike on electric energy. 1.2KW BLDC motor runs on 48V lithium ion battery. Charging of battery is done by means of solar energy which is the main aim. We also provide an extra socket to battery for external charging purpose. In case if climate condition is not so good then we can use this socket for charging. We are doing our project on Hero Honda Passion motorcycle. Here we totally eliminate the use of engine that operates on petrol, for that we disassemble the bike and remove the main parts which includes engine, gearbox, clutch assembly etc. Instead of engine here we used BLDC motor for driving purpose which drives the rear wheel. There are two types of BLDC motors are available, first is simple BLDC motor and another is Hub BLDC motor. By using simple BLDC motor, we need chain drive for rotating rear wheel and Hub motor is directly assembled at wheel<sup>[18]</sup>. So, Hub motor is more efficient than simple one as in case of simple motor due to chain drive some losses may occurred. By considering

the total weight of bike including driver we decided to use 1.5KW motor having speed range between 1500-3000rpm under no load condition. So, with driver or under loaded condition it may give speed up to 700-900rpm which is enough.

## II. PROBLEM DEFINITION

### 2.1 Problem statement: -

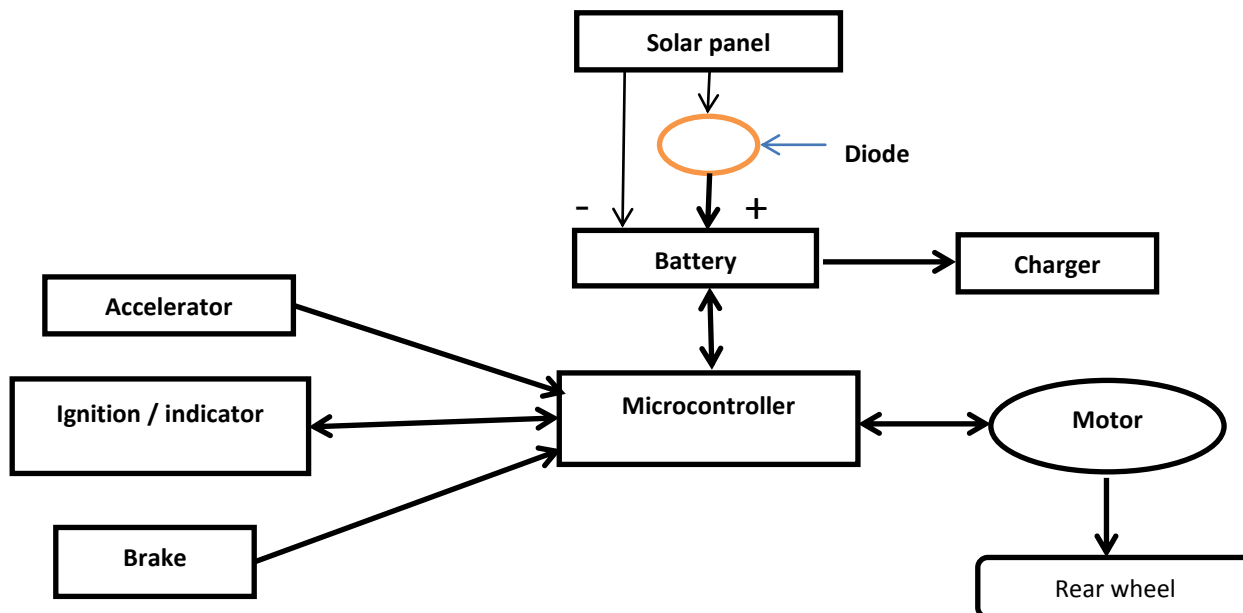
With the inescapable depletion of fossil fuel resources, increased global energy consumption and the critical threat of climate change, the need for efficiently utilizing renewable energy resources has become more vital. After reading research papers it has been found that IC engines are 40% efficient whereas BLDC motors equipped in E-bikes are above 90% efficient in power utilization.

In last few months there are few cars and scooters were manufactured which run over electric energy<sup>1</sup>. But due to the inconvenience of charging ports that vehicle could not be used efficiently. In order to overcome such a problem, we think to power this vehicle by means of sunlight (solar). This reduces the consumption of fossil fuels as well as the use of electricity by some percent.

### 2.2 Key points: -

1. To reduce consumption of fossil fuel
2. Reduced pollution
3. Reduced ozone depletion
4. Utilization of natural resources which are freely available

## III. PROPOSED METHODOLOGY



### 3.1 Solar Panel: -

Silicon wafers cells are used in Polycrystalline solar panel. To build a monocrystalline wafer are assembled into rows and columns to form a rectangle, covered with a glass sheet, and framed together<sup>[10]</sup>. polycrystalline solar cells tend to have a bluish hue to them due to the light reflecting off the silicon fragments in the cell in a different way than it reflects off a pure monocrystalline silicon wafer<sup>[13]</sup>. Similarly, to monocrystalline, polycrystalline panels have different colors for back sheets and frames. Most often, the frames of polycrystalline panels are silver, and the back sheets are either silver or white<sup>[9]</sup>. It has low cost and has low efficiency/performance compared to monocrystalline panels.

### 3.2 MotorController: -

48v 750w 3 phase rating motor is used. It can be mounted using screws. Low voltage cut down 42v Reverse and Forward Movement both are available in the controller High efficiency and low noise gives smooth motor performance<sup>[8]</sup>. High power mosfets drives the bldc motor with PWM Techniques. ProtectionforOverheating. latest intelligent micro controller use for high efficiency and smooth motor performance & Controller is having 24 MOSFETS (TUBES)<sup>[5]</sup>

### 3.3 BLDC Motor: -

A Brushless DC motor or BLDC motor is most suitable for those applications which are in a need of high reliability, high efficiency, more torque per weight<sup>[12]</sup> etc. The BLDC motor has power-saving advantages by comparing with other motor types. A Brushless DC motor or BLDC motor is the type which is most suitable for applications that require high reliability, high efficiency, more torque per weight etc. The BLDC motor has power-saving advantages relative to other motor types<sup>[6]</sup>.

### 3.4 Battery: -

Lithium Ion batteries<sup>[1]</sup> are compact in size. They have better energy density. They have more charging cycles than Lead acid batteries. 4-6 hrs.of charging time. Lithium Ion batteries can blast on high temperature<sup>[4]</sup>.

## IV. CONCLUSION

As per the literature review, we studied the increasing pollution and many more hazards that are taking place in the environment due to carbon emission in the atmosphere which is harmful. So, to tackle this situation of increasing pollution we can come up with ideas that do not harm the environment and one of them is Electric Vehicles that can be run on renewable energy which are freely available and many more technology can be added in the future to more efficient EVs<sup>[11]</sup>. As Electric Vehicles are eco-friendly and less noisy compared to carbon emitting vehicles, also the solar panels can be used to charge the vehicle when not running. Batteries used in EVs are also an important part of it, mostly now a days Lithium-ion battery are used instead of Lead-acid batteries because the Li-ion has more advantages than the lead acid battery. By 2020-2022, many automotive industries are trying to roll out their Electric vehicles in the market to reduce the pollution and as well as moving for an eco-friendly environment.

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