

# Electric Vehicle using Solar Panel and Lead Acid Battery and Fuel Cell

<sup>1</sup>Mr.Sivaramkrishnan.M(Ph.D.), <sup>2</sup>Poovendran.M, <sup>3</sup>Abu.I, <sup>4</sup>Balaji.P, <sup>5</sup>Manoj Kumar. M

<sup>1</sup>Assistant Professor, <sup>2,3,4,5</sup>UG Students,

<sup>1,2,3,4,5</sup> Department of Electrical Engineering, Karpagam College of Engineering, Coimbatore Tamilnadu, India.

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## Abstract

The aim of this article is to avoid the use of fuels and be an eco-friendly model. To give the society a very useful and make the pollution free model. Our Electric Vehicle (EV) is laid out with less weight since of NO STROKE Engine which in turn gives client welcoming and comfortable. On-liquid powers which joins control and characteristic gas will gotten to be dynamically basic in coming decades. Sunshine is utilized as source for our solar panel arranged. POLYTHENE Sun oriented is utilized for more supportive. By charging the motor, vehicle gets run. FUEL CELL, LEAD ACID and Solar panel which runs the vehicle with their essentialness. Hydrogen fuel consumption, time period of battery, and loss of battery energy are major indicators for performance of fuel cell hybrid vehicles (FCHVs). As indicated by the ultra-capacitor (UC) and lead-corrosive battery qualities, a novel and simple half-breed control system (HPS) circuit consisting of UC collection and battery array is intended to understand the fundamental technique for using UC collection to process both sun-based vitality and a large parts of peak current.

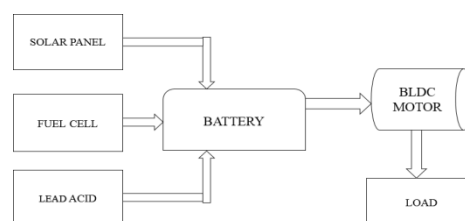
## I. INTRODUCTION

Around the world global warming may be a major concern all around and to spare Mother Soil, there area handful of approaches, guarantees and vows. With the ever expanding spread of nursery gasses, there's an amplified fear of environment contamination at each step. With show day headway and progression, transportation and communication have experienced a worldview move.[1-3] Near to this, we are in expansion experiencing the negative impacts of industrialization interior the diagram of around the world warming. Underneath these circumstances, when there are development jams, after you wish to run an errand at an odd hour of the day, once you wish to go to working environment rapidly, you influence and bobble as there are so different vehicles oozing residue and CO<sub>2</sub> sully the look at unremittingly. [4-6] With expanded number of fossil-fuel subordinate vehicles, they not as it were include to more noteworthy level of contamination but are moreover driving to exhaustion of fuel asset. It is here that vehicle

companies felt the got to improve motorized vehicle that will get charged through power and will not be depending on fossil powers. Exactly when the vehicle is been braking, the motor energy is discontinued back and set away in the UC gathering. Be that as it may, since the battery set has an a lot higher vitality thickness than the UC gathering, it is utilized to supply control when vehicle run on journey speed. Both UC and battery set inventory the driving force for vehicle start up, acceleration and climbing [7-9].

## II. BLOCK DIAGRAM

The fig.1 shows the detailed Block Diagram of the Electric Vehicle.



**Figure 1. Diagrammatic representation of Electric Vehicle**

### III. COMPONENTS USED

- BLDC motor
- Lead Acid Battery
- Fuel Cell
- Solar panel
- Keystarter

#### A. BLDC Motor

The working rule of BLDC engine is same as the dc engine its activity depends upon the standard that "when a current passing conductor is set in magnetic field it experience a magnetic force whose bearing is given by Fleming's left hand rule"[11-12].

#### Specification:

750w, 48v, 16A shown in Fig.2



**Figure 2. BLDC motor drive with chain attachment**

A brushed DC engine has lasting magnets outwardly of its structure, with a turning armature within. In the brushless DC motors, the immutable magnets are on the rotor, and the electromagnets are on the stator. Generally, the BLDC motors have a yield of 85-90%, however brushed motors are ordinarily only powerful at 75-80%. Finally, the Brushes wear out, often causing hazardous flickering, increasing a brushed motor's lifespan. Thinking about these central focuses, BLDC engines are utilized reliably in present day contraptions requiring low turmoil and low warmth, particularly in constantly working gadgets. Articles of clothing washers, climate

control systems and other purchaser gear might be melded. Brushless DC motors offer several distinct advantages over other types of electric motors, which is why they have entered so many household items and can be a major factor in the growth of service robots inside and outside the industrial sector[13-14].



**Figure 3. Back side of the BLDC Motor**

#### Advantages:

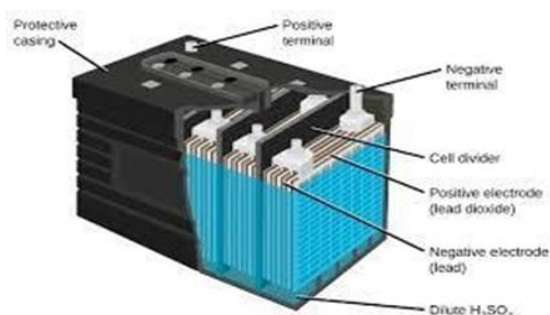
1. High Torque at Low Speeds
2. Longevity and Ease of Maintenance
3. Positioning and Actuation Systems

The below table shows the different characteristics like commutation, maintenance, life, torque, efficiency, speed range, electric noise generation.

S.NO	BRUSHLESS DC MOTOR	BRUSHED DC MOTOR
Communication	Electronic commutation	Brushed commutation
Maintenance	Less or no maintenance	Periodic maintenance
Life	Longer	Shorter
Speed/Torque	All speed with rated load	At higher speed
Efficiency	High	Moderate
Speed Range	No Mechanical Limitation	Lower Mechanical Limitation
Electric Noise Generation	Low	Arcs in brushes generate electric noise

## B. LEAD ACID Battery

A high current level of the lead acid battery and its cost-effectiveness and abuse tolerance. For many applications, it makes it ideal. However, as electric vehicles move towards greener energy sources, apply (Fig. 4) to manufacturers and laws that indicate that the internal combustion engine has phased out now appear to be the future. The total battery is typically made up of several series cells that are able to supply a voltage of 2.1 volts per cell [11][15-16].



**Figure 4. Picture represents the Lead acid battery**

To produce a voltage, the basic lead acid cell should first be loaded. The used voltage reaches 2.1 volts in order to allow the current to flow into the cell. Lead and lead dioxide, the dynamic substances on the surfaces of the tank, respond with sulfuric corrosive in the electrolyte. First, the lead sulfate appears in a finely dissolved, amorphous state, which is readily transformed by the pump into lead, carbon dioxide and sulfuric acid. Lead-acid batteries have seen moderately wide sending because of their minimal effort and generally long help life, as much as 15 years, and there are progressions as yet being made to lead-acid battery plan, which could empower them to turn into a progressively achievable alternative for energy management. The Battery which is mounted on the top of the BLDC Motor refer (Fig.5) by which power is utilized to run the Brushless DC Motor [17-18].



**Figure 5. Lead acid battery mounting on Electric Vehicle**

### Advantages:

1. Cost is low.
  2. Robust.
  3. Overcharge resistant.
  4. Small inner impedance
  5. Can generate very strong currents
- Overload resistant.

## C. FUEL CELL

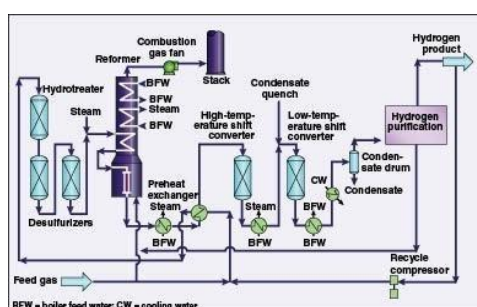
A vehicle with fuel cell (FCV) or electric fuel cell (FCEV) is an electric vehicle which operates its on-board motor with fuel cells, rather than batteries, or a supercapacitor or battery. Fuel cells generate electricity in vehicles, usually using air oxygen and hydrogen compressed. Many cell cars are classified as emission-free automobiles releasing only water and heat. Hydrogen vehicles centralize emissions on the site of hydrogen production as hydrogen is typically extracted from reforming fuel compared to domestic combustion vehicles. The power module system is made of 300-W vitality segment like vacuum contraption, weight, sensors. To lessen cost, all segments are industrially accessible with the exception of the microcontroller, which has been created to work the framework



adequately. The Results of the power device system show that the viability refer (Fig.6)[11][19-20].

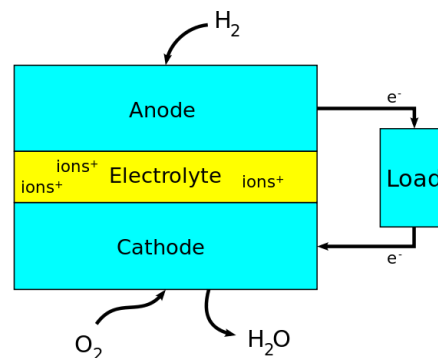
In any case, hydrogen isn't generally a vitality source, it's a battery: "That is on the grounds that you can make it in two different ways: steam-methane reconstruction, which implies that it is a petroleum product, and the hydrogen source for 95 percent) or electrolysis of water, which makes it basically a battery putting away electric power. "On the off chance that, and it's a major in the event that, we could couple sustainable power source with hydrogen creation, and if (and it's another large on the off chance that) we had the foundation set up for customer hydrogen filling stations, and afterward had moderate energy component electric vehicles promptly accessible, at that point hydrogen 'batteries' could have a greater influence in transportation.[20] However, there are a few signs that a portion of those moves are as of now being made, for example, this zero-carbon hydrogen filling station that produces hydrogen on location with overabundance power from sustainable power sources, and afterward apportions to shoppers simply like some other corner store[19-21].

Practically all the hydrogen accessible today is made by steam renewal of a decent old non-renewable energy source, petroleum gas refer (Fig.7)."This requires a deal of great vitality to do, in actuality more vitality than you can recoup from the subsequent hydrogen that is delivered.[22-23]"



**Figure 6. making of hydrogen form natural gas**

In Lorries, busses, automobiles, motorcycles and bike systems, among other vegetable types, fuel cells are also developed and tested.



**Figure 7. shows the internal structure of Fuel Cell**

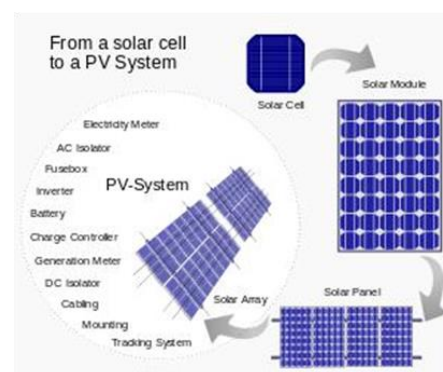
### Advantages:

The fuel cell's energy efficiency is usually between 40% to 60%, but 85% efficiencies can be attained once waste thermal is stored in the cogeneration process.

1. Hydrogen has the highest energy content.
2. Hydrogen is the sustainable fuel vitality source

### D. SOLAR PANEL

Photovoltaic sun based generally sheets ingest light as a wellspring of hugeness to give direct stream power. An electrical phenomenon (PV) module refer (Fig.8) could be a packaged, related get along of electrical marvel sun battery-controlled cells available in various voltages and wattages. Electrical phenomenon modules comprise the photovoltaic cluster of a photovoltaic framework that produces and provides sun battery-powered power in business and personal applications [23-24].



**Figure 8. Solar cell to a PV system**

The cells must be associated electrically in arrangement, to each other. Each module has a standard dc power output STC rating and typically reaches 10 watts. Polycrystalline type of solar panel is used in our vehicle which is less cost and is simple. Some financially accessible sunbased modules exceeds 24% efficiency's-bicycles and e-bikes, battery-controlled and charged by sunlight based vitality, can change transportation in India, making it fuel free, naturally well-disposed and reasonable. Right now is an ideal opportunity for pushing this. Sun powered vitality needs to assume a predominant job in India's vitality blend. Sunlight based fueled individual transportation e-bicycles, for example can be a piece of India's answer. Besides, sunlight based power in India should essentially be "dispersed age" and attached to the matrix just as back-up refer (Fig.9)[24].



**Figure 9. Solar Panel attached in Electric Vehicle**

Regardless of whether the housetops of a groundswas secured with enough photovoltaic boards to make it a Net Zero Energy office, that is, power independent, it would in any case have several fuel-consuming vehicles and bikes. An earth inviting grounds oughtto have electric vehicles, e-bicycles and e-bikes joined with PV [25].

#### **Advantages:**

1. Source of renewable energy
2. Electricity pricing reduces
3. Different implementations

4. Low cost of repair
5. Production of technology
6. A cleansource
7. Zero energy-productioncosts
8. Various deployment.

#### **E. KEY STARTER**

A Starter is a gadget that controls the utilization of electrical capacity to hardware, generally a motor. As the name implies, starters "start" engines refer (Fig.10) They can likewise stop them, switch them, and ensure them. At the point when you turn the start switch, the starter engine is empowered, and the electromagnet inside the body locks in. This pushes out a pole to which the pinion gear is appended. The rigging meets the flywheel, and the starter turns. This twists the motor over, air as a sucker (just as fuel)[25-26].



**Figure 10. Key starter for Electric Vehicle**

#### **IV. DISCUSSION ON ELECTRIC VEHICLE USING SOLAR PANEL AND LEAD ACID AND FUEL CELL**

Here the controller used in the Electric Vehicle.





**Figure 11. The experimental prototype**

## V. CONCLUSION

The random load is divided into two types of electric vehicle in this article: average load and dynamic load. The energy consumption strategy of the electric vehicle is determined according to the characteristics of the UC group and the acid lead battery collection. A basic parallel circuit architecture of the UC unit / battery array is proposed and planned in this article to make best use of experimental tools and according to the characteristics of electric vehicles. This makes full utilize of the sun based vitality supply as well as Keeps a safe distance from the high current battery delivery framework and the energy component. The economic performance of the compound energy system and its practicality were significantly improved.

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