

# SOLAR AND WIND POWERED HYBRID VEHICLE PROTOTYPE

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**Abstract-** Due to scarcity of fossil fuel in future and its detrimental effect on the environment, an alternative energy has to be discovered. Wind power is clean and sustainable natural resources that has yet to be fully utilized in the automotive industry. Also the sun is probably the most important source of renewable energy available today. The hybrid system has been designed and installed to generate power which combines wind turbine and solar panel. The hybrid model system is renewable energy system, which helps conserve energy by reducing the use of fuel in vehicle. Hence developing a new method for the economical evaluation of Hybrid Systems for electricity production.

**Keywords-** Scarcity, fossil fuel, environment, alternative energy, natural resources, renewable energy

## I. INTRODUCTION

Fossil fuel combustion, particularly as it occurs in motor vehicles, has been identified as the largest contributor to air pollution in the world. The biggest disadvantage of burning fossil fuel is the by-product, carbon dioxide, which leads to a greenhouse effect that harms the planet. If Environmental concerns keep growing, and restrictive guidelines constrain the use of the pollutant sources, wind and solar Photovoltaic (PV) power can be considered as viable option for future transportation.

Therefore, the electric vehicle with zero emission will undoubtedly become the mainstream means of private transportation in the future. The governments of each country and their societies have outlined large scale plans to promote battery-powered electric vehicles and are vying for considerable opportunities to change the nature of private vehicles. As a result, people are becoming more aware of the energy related actions and have started looking for an alternative sustainable source.

The conventional electric car finds the difficulty of charging it after few kilometers but the wind and solar powered car helps to eliminate this drawback as this car has the facility to be charged on board due to wind and solar energy. Here, power is generated from wind turbines and the solar plates and is directed to the battery for the charging. The battery is recharged on board and the vehicle doesn't need to be standby for charging.

## II. ENERGY DEMAND

Calculations in the United Nations show that the world population will increase to about 10 billion people by 2050. Parallel to the population growth, the global energy requirement will rise considerable despite all further efforts concerning the rational use of energy. According to calculations by the World Energy Council (WEC), the world-wide primary energy consumption of currently about 12 billion tonnes coal equivalent per year will grow to a level of between 16 and 24 billion tonnes coal equivalent per year depending on the economic, social and political developments by the year 2020. This growth will mainly be based on fossil energy carriers which presently cover hardly 90% of the requirement. Hydrodynamic power and nuclear power cover at present about five percent each of the remaining 10 percent. The world total annual energy consumptions amount to 17 billion coal equivalent.

### A. Reducing Carbon Dioxide Emissions

The most effective way to reduce carbon dioxide (CO<sub>2</sub>) emissions is to reduce fossil fuel consumption. Many strategies for reducing CO<sub>2</sub> emissions from energy are cross-cutting and apply to homes, businesses, industry, and transportation.

### B. Importance of Renewable energy

Generating electricity from **renewable energy** rather than fossil fuels offers significant public health benefits. The air and water pollution emitted by coal and natural gas plants is linked to breathing problems, neurological damage, heart attacks, and cancer.

### C. SOLAR ENERGY

Solar energy is radiant light and heat from the Sun harnessed using a range of ever-evolving technologies such as solar heating, photovoltaics, solar thermal energy, solar architecture and artificial photosynthesis. The large magnitude of solar energy available makes it a highly appealing source of electricity. The United Nations Development Programme in its 2000 World Energy Assessment found that the annual potential of solar energy was 1,575–49,837 exajoules (EJ). This is several times larger than the total world energy consumption, which was 559.8 EJ in 2012.

#### D. WIND ENERGY

Wind power is the use of air flow through wind turbines to mechanically power generators for electricity. Wind power, as an alternative to burning fossil fuels, is plentiful, renewable, widely distributed, clean, produces no greenhouse gas emissions during operation, and uses little land.

As of 2015, Denmark generates 40% of its electricity from wind, and at least 83 other countries around the world are using wind power to supply their electricity grids.<sup>[16]</sup> In 2014 global wind power capacity expanded 16% to 369,553 MW. Yearly wind energy production is also growing rapidly and has reached around 4% of worldwide electricity usage, 11.4% in the EU.

### III. FIELD OF INVENTION

The fixed wind powered electricity generation systems in use, till now are dependent on wind direction and the force of the wind. But the wind is not available at all places and all time through out the year. Therefore, there exists an immense need of a system for generating electricity from wind induced by moving vehicles which is available through out the year at various places and with sufficient force of wind. Also solar powered electric vehicle is there but need to install it as an auxillary fuel for fuel vehicle. Therefore need of inventing a hybrid renewable energy source as an auxillary source for fuel vehicle. Therefore this invention provides a solution to the problem for generating electricity in this manner.

#### IV. Objectives

- The main object of the present invention is to provide a method and a system for generating electricity using easily available wind induced by moving vehicles and solar energy in transit or in operation.
- The other objective is to provide a solution for reducing pollution created by fuel vehicle by use of freely available renewable energy source i.e. solar and wind energy.

#### V. Methodology

This paper deals with how energy can be stored by moving or standstil vehicle which has a fuel kit using wind and solar energy.

#### A. CONSTRUCTION

The vehicle we are using is a robot vehicle. Which act as a chassis or a base for all other components, as other components are mounted on it. Battery is mounted on back side which acts as a energy storing device. The fan are mounted on the front side of the robot vehicle. Motor is attached at backside of fan. Truncted cone is installed infront of fan to increase the efficiency of fan. Solar panel is mounted on the upper side of battery. PCB ( printed circuit board) is installed in between fan and battery to control whole circuit. L.E.D. is used for demo purpose.

#### B. TECHNIQUE ADOPTED

##### ***Routing the induced wind in the direction of the wind turbine:***

If the wind is properly directed towards the wind turbine blades, optimum electricity may be generated. The desired direction of wind is obtained by a means for channelling wind, in the direction of the wind turbine. Channeling of wind in a desired direction may be obtained by, at least one truncated cone or pyramid shaped housing or a pair of planar members converging towards the blades of the wind turbine.

So as per the above concept, to induce more wind in the direction of fan or turbine to produce optimum electricity we have use the truncated cone or can say shroud or nozzle in our prototype.

##### ***C. Working Procedure:***

To conserve the energy and to utilize it at best we are designing a vehicle which will run on battery which will get charged by free energy sources. For this we planned to use the energy resources and store that energy into battery. For this we first checked how much Voltage we need from the Solar panel and Wind energy. Then as per the requirement we connected the solar panel and wind energy generator motor. Coming energy is shown by using LED panel in the project for demo purpose. But in actual this energy will be as per the battery voltage ratings and used to charge the battery which will be then used to drive a car.

For building a robot which is driven by remote we have selected Philips remote which works on RC5 protocol and then we checked that protocol and learnt its functioning. To receive that IR signal from the remote we are using TSOP 1738 which operates on 38 KHz frequency and receives the data signal coming from remote and gives it bit by bit to controller. Then Controller is programmed for receiving the bits from TSOP and as per the signal gives some respective output. Controller receives the bits sent from remote and checks whether it's from required signal or not. If bits matches with the required data then as per the condition Controller will drive robot either forward, reverse, left, right or stop.

For driving motors of the robot we are using Driver IC L293d which receives the signal from controller and as per the signal it gives 12v or 0v to the motor terminals. And as per the voltages on motor terminals motor rotates in either forward or reverse or stop. For moving vehicle in forward direction signal are sent in such a way that driver IC gives 12 and 0v to both the motors to run in same direction i.e. forward. For moving reverse 12 and 0 v are give to the motors by driver IC exactly in opposite way as of forward so both motors rotates in reverse direction. For moving in left direction left motor will remain stopped and right motor will move in forward direction while for moving in right direction right motor will remain stopped and left will be moved in forward direction.

In this way robot is driven by remote wirelessly by using battery as a supply source.

D. ENERGY CONVERSION

The diagram (Fig.1) below shows the working principle and energy conversion method used in prototype Of WIND AND SOLAR POWERED HYBRID VEHICLE PROTOTYPE (WSEHVP).

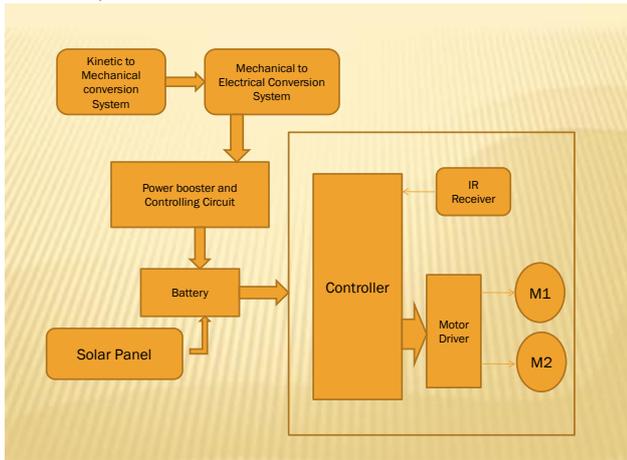


FIG.1. BLOCK DIAGRAM OF PROTOYPE (WSEHVP)

1. PROPOSED HYBRID MODEL

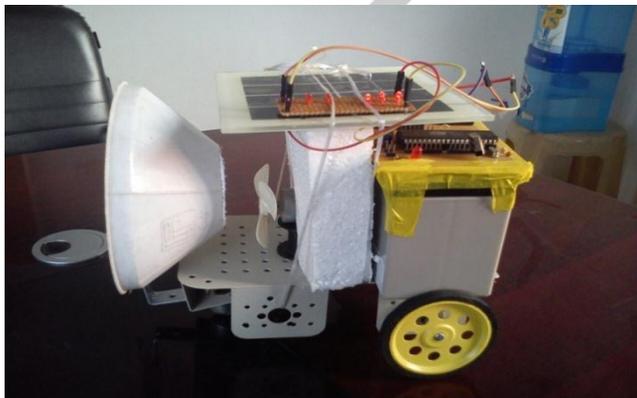


Fig.2.SOLAR AND WIND POWERED BATTERY VEHICLE PROTOTYPE

2. CONVERSION OF WIND ENERGY INTO ELECTIC ENERGY

In this prototype the wind capturing device is a fan. Fan is mounted on the front side of the chesis with the truncated cone infront of it. Fan will get rotated by the wind blown by the blower which will get directed toward the fan due to cone where in actual it will be the wind around the vehicle when vehicle is in running condition.

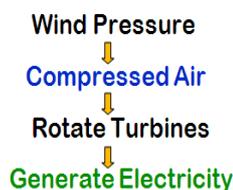


Figure 3. Basic flow diagram

Rotating fan will convert the captured kinetic energy of wind into mechanical energy .The centre shat motor which

is connected to battery will convert this mechanical energy into electric energy which is going to stored in the battery.Fig shows below the energy stored by prototype from wind energy.

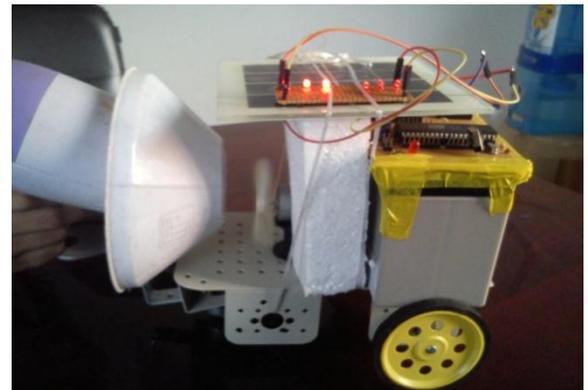


Fig.4.LED glowing due to wind energy

3. CONVERSION OF SOLAR ENERGY INTO ELECTRIC ENERGY:

Solar panel is situated on the top of battery in the prototype.Where in actual vehicle it will be mounted on the upper body of chesis of four wheeler. While the vehicle in running position or stand still and have a sufficient solar energy the soalr panel will trap that energy and due to the photovoltaic effect of solar panel, it will convert this solar energy into electric energy which will get sored into the battery. Fig 6 shows the energy stored by WSEHVP.

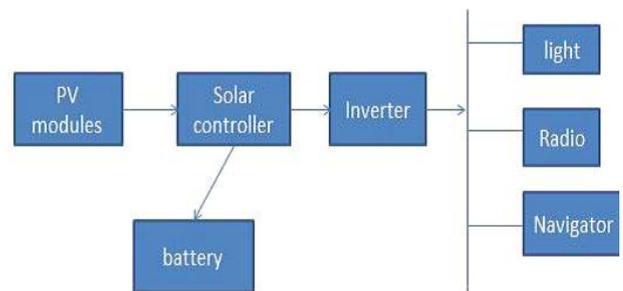


Figure5. The schematic picture of a solar power system

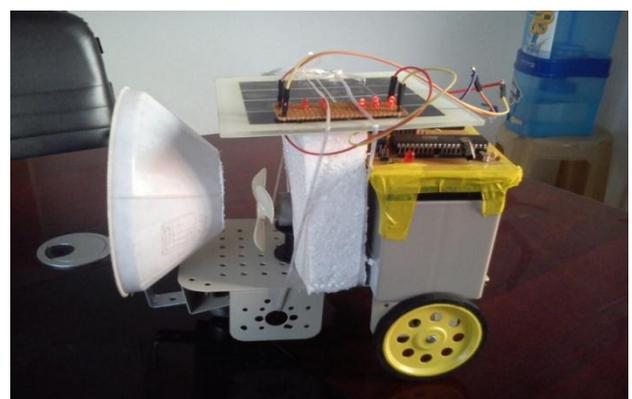


FIG. 6.LED glowing due to solar energy

## VI. ADVANTAGES

- This concept of hybrid system is useful as it has two power sources for vehicle. When there is insufficient fuel and battery has a sufficient charge then vehicle will operate on battery and vice versa.
- It helps to reduce the use of fuel which is more profitable for future. Also it will help in reducing pollution as there is less consumption of petrol.

## VII. DIS-ADVANTAGES:

- While operating on battery vehicle will not run at same speed as it drive with the fuel powered system.
- Also the time required to charge the battery by solar and wind energy will be little more.

## VIII. Conclusion

After making the final completion of project it is found that project is in working condition. It is found that prototype captured the solar energy through solar panel and wind energy through fan induced on it. There are huge potential for producing electricity from renewable sources. This paper gives a clear idea that vehicle powered with the help of solar energy and wind energy is more effective than fuel vehicle.

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