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Development of a Working Prototype Model of a Pollution Free

[1]K. Someswara Rao,[2]Dr. A. Srinath, [3]D. Pavan Kumar,[4]P. Satyanarayana Chowdary, [5]P. Sai Vishal, [6]R. Pavan Kumar
[1]Research Scholar & Asst. Prof., [2]Prof. &HoD,
Department of Mechanical Engineering, KoneruLakshmaiah Eduaction Foundation,
Green fields, Vaddeswaram, Guntur - 522502,Andhra Pradesh, India.

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Abstract:
This paper mainly focuses on development of a working prototype of an automatic which uses three different ways of generating electricity for running an automobile. The prototype will have three different modules of electric power sources that are solar energy, wind energy and electricity generated by fuel cell. These three different electric power sources are connected to battery bank and from there power supply is connected to motors of the wheels through a power controller. Initially the automobile will run with the electricity stored in the battery, after attaining some speed wind and solar energy start producing electricity and stored in the battery. Whenever requirement is high it used the store energy for running the automobile. All the existed IC engine automobiles are causing environmental pollution and damaging the human's health and many people are dying every year in INDIA and all over the world. This pollution problem is rectified in the developed prototype model. It will not release any harmful gases to the environment there by no harm to the humans life or animals life's.The fuel cell technology uses hydrogen, oxygen and it emits water. Similarly the wind and solar energy generate electricity from sun and wind which will not emit any harmful gases to the environment. Another feature to this prototype is semi-automatic technology. The Initial cost of the car may be high because of fuel cell cost but the maintenance cost is low.

Keywords*: electricity, IC engine, environment, automobile*

Introduction:

A Green energy automobile is a vehicle which was developed to use three different sources of energies. One type of energy source is solar energy, second type of energy is wind energy and third type of energy is power generated by using Fuel cell. This type of automobile decreases the air pollution level and increases the use of green energy resources.

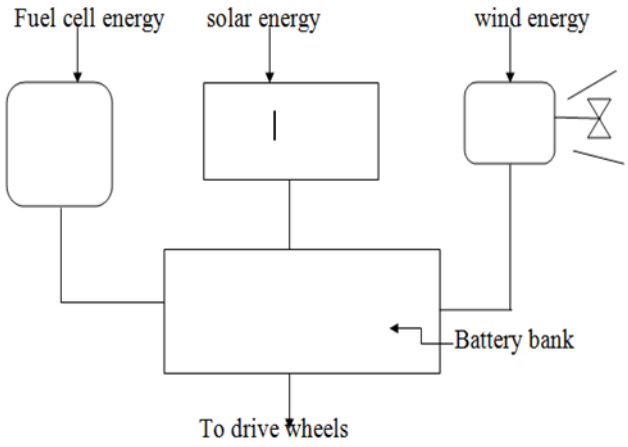

Fig:1. Flow chart of three types of energies to run the vhicle.

The flow of energy from three different types of energy source to the battery is shown in figure.1. The power transmits to the motor from there it transfer to wheel. Initially the solar energy is used to

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run the vehicle and then after attaining some speed the wind energy start generating energy and the generated energy uses to charge the battery bank. Whenever the weather condition is not in supporting level to solar and wind energy at that time the use of fuel cell energy comes into picture. Vehicle uses fuel cell energy when there is no energy generation from the other two types of energies resources.

Working of multi electric power source automobile

The working of multi electric power source automobile is similar as an electric car but it uses three different power sources. The automobile runs with the help of battery and motor powered by three different sources. The energy required to run collects from the sun and wind energies. The other way of generating electricity is by using fuel cell technology. The cost of the fuel cell is generally high so to increase the life of fuel cell, the usage of fuel cell was minimized and maximum time the solar and wind energy is used to run the automobile.

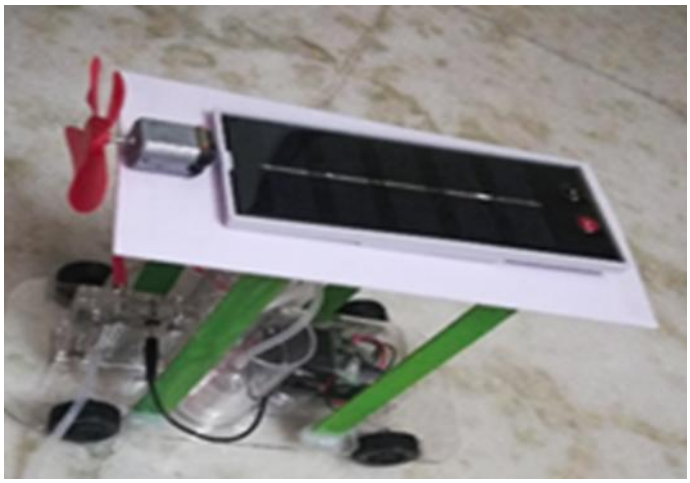

Fig: 2. Prototype multi electric power source automobile

The working prototype of multi electric power source automobile is shown in the figure. 2. The prototype shows the details about automobile model developed in the Lab of Department of Mechanical Engineering, KLEL. The connection of wind energy and solar panels are on the top of the vehicle as shown in the figure.

Success and challenges of FCEV's

1. Hydrogen is vastly available on commercial market across the globe., it is used in the warehouses of companies like Amazon, Wal-Mart for different purposes.

2. Hydrogen storing and refilling is a major issue as it is highly inflammable and is very light in atmosphere.

3. Consumer refueling stations are increasing day by day throughout the world, Toyota and Honda are teamed up with Japanese govt to build 4000 stations across japan

Design of chassis

Design of chassis is very important for any automobile before it goes to actual production. The figure.3 shows the design model of chassis type. The design was done by using solid works and validated.

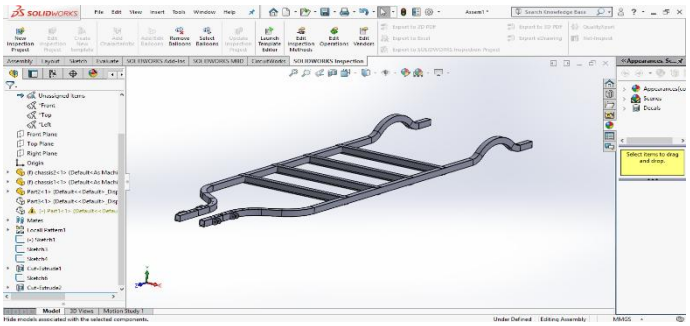

FIG: 3. CHASSIS MODEL

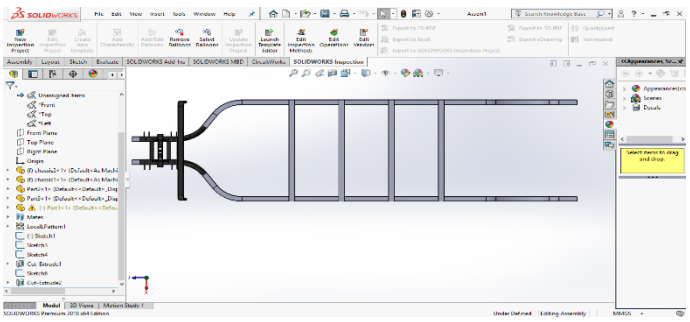

Fig: 4. Chassis and wheel axial

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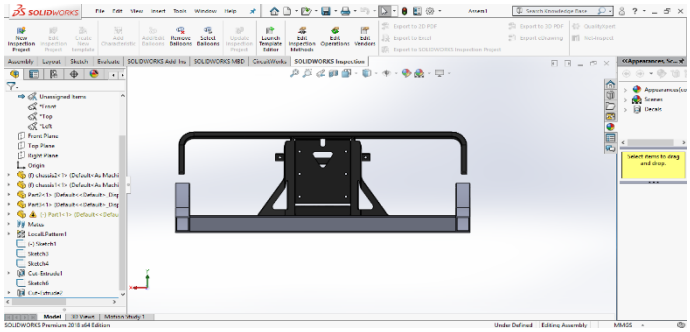

Fig: 5. Wheel axial Back view

The detailed design model of chassis of automobile is shown in figure 3, figure 4 and figure 5. The front and rear axle design views are also shown clearly for analysis purpose. Ladder type of chassis is used because it can accommodate more space to put required loads on it. The table 1 shows the specifications of chassis and its dimensions in centimeters.

Table: 1. Specifications of chassis

Specifications	**Dimensions in (CM)**
Length	330
Width	120
Wheel Track	Front = 87
	Rear = 97
Wheel Base	237
Ground Clearance	11

Calculations:

As shown in fig.6. We calculate about the power output of the solar panel.

1 Solar Panels are connected in series

Voltage = 5V

I = Current = 3amps

Power = V*I

= 5*3

= 15 Watts

SPECIFICATION OF SOLAR PANEL

Maximum power 15 Watts

Voltage at P_{max} 5 Volts

Current at P_{max} 3 Amps

Limited Warranty 1 Year

Size 150*60*5(mm)

Weight 150grams

Number of panels 1

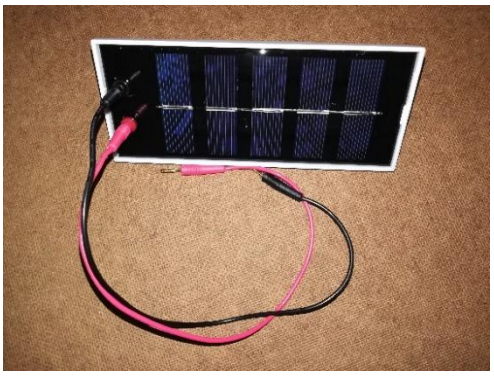

Fig:6. Solar Panel

Assembly of multi electric power source automobile

1. The four wheels as to be connected to the chassis
2. Connection of electric motor and controller to the drive wheels
3. Assembling fuel cell mechanism to the chassis
4. Assembling the battery bank to the chassis
5. Building the top frame of the vehicle with the suitable columns
6. Placing solar panel on the top of the vehicle
7. Placing the alternator on the top of the vehicle
8. Connecting with the wires to solar panel and alternator to the motor through charge controller.
9. Connecting with wires to the motor and battery bank.
10. Connecting the power switch in between power source to the motor.

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Fig: 7. Prototype

Advantages of semi automatic multi electric power source automobile

1. Noise free
2. Renewable source of energy
3. Pollution-free
4. Used as fuel in space operation
5. Fuel efficient
6. Safe fuel
7. Maintenance is simple
8. Decrease of greenhouse effect

Results and analysis

The developed prototype was tested for analyzing its running conditions.It was identified that the prototype was running with good speed as the energy utilization Increases. The figure number 8. is a graph between the vehicle speed and the amount of power utilized for running the vehicle.

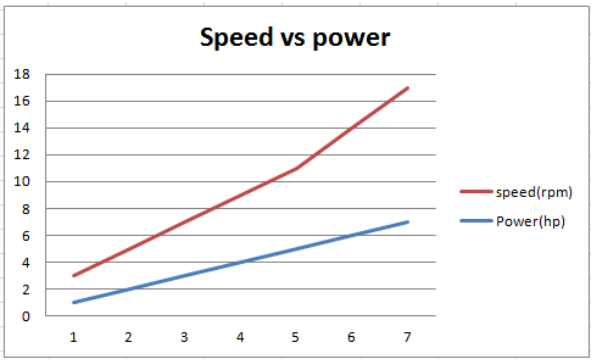

Fig: 8. Speed vs Power graph

It was identified from the analysis that when the acceleration is increasing the speed of the vehicle also increasing. The figure number 9. is a graph between the vehicle speed and the acceleration given to the vehicle.

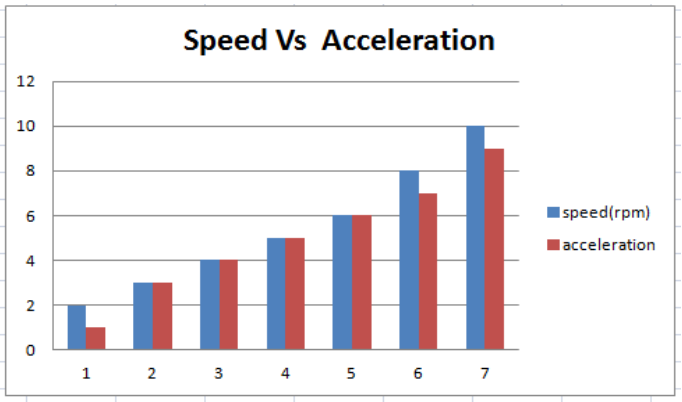

Fig: 9. Speed vs Acceleration graph

It was also identified from the analysis that the when the speed of the vehicle increases the wind energy generation also increased. The figure number 9. is a graph between the vehicle speed and the wind energy generation.

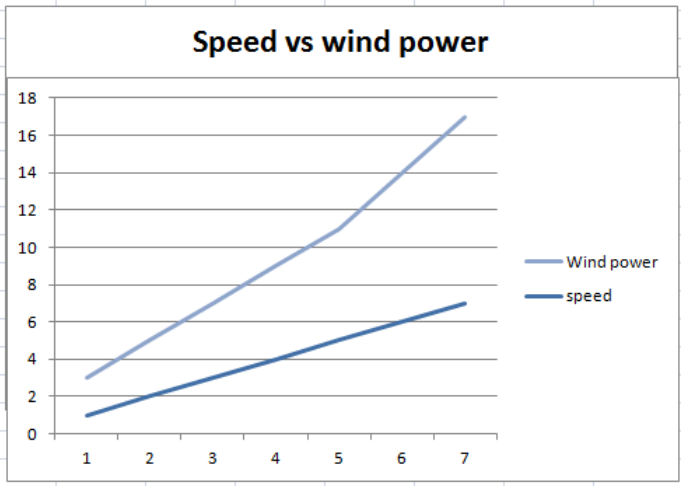

Fig: 10. Speed vs wind power graph

CONCLUSION:

The detailed design and prototype of multi electric power source automobile was developed. The model is suitable to develop on road condition cars for the future generation automobiles. It brings a new revaluation in the automobile market. It reduces the pollution level caused by the existed automobiles. Definitely it brings lot of changes on future automobiles sector.

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