Fabrication of Eco-Car

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Abstract- *This project is mainly designed to build solar and electrically powered car. The greater community on alternative energy and its applications, as well as to build a practical solar and electrically powered car that could have real world applications upon further technological advances. This project has a strong desire to innovate and use local technology and resources. When sunlight falls on the solar panel then solar energy gets converted into electrical energy and stored in the battery, Dynamos are employed that will convert mechanical energy into electrical energy, regenerated energy from a dynamos stored in a supplement batteries and controller supplies required power to the motor .Since petrol and diesel is not required it uses solar energy which is abundant in nature. Sunlight is now-a-days considered to be a source of energy which is implemented in various day to day applications. Solar energy is being used to produce electricity through sunlight. With the help of this technology we aim to make solar and electrical energy (using dynamo) powered car. Preliminarily our objective would be to implement our idea on a remote control toy car and afterwards with help of this prototype we can extend our future work on building an actual car powered by the solar and electrical.*

Keywords- Solar Panels, Eco car, Cycle, Motor, Sunlight

I. INTRODUCTION

Now-a-days, dealers of natural resources like fuel, coal etc. are facing a hard time to keep pace with the increasing demand. At one hand, there are more cars or motor vehicles are dominating the transport medium, on the other hand these cars are being dominated by the fuel. As a result, the limited resources are being quashed by the producers and dealers to satisfy this need which is leading us to an uncertain future with having the scarcity of fuel and minerals .This project is mainly designed to build solar and electrical powered car that is completely eco-friendly as it does not emit any harmful gases. The greater community on alternative energy and its applications, as well as to build a practical solar and electrically powered car using a dynamo to regenerate the power that could have real world application upon further technological advances. This project has a strong desire to innovate and use local technology and resources. Since petrol and diesel is not required, it uses solar energy which is abundant in nature and similarly it regenerates the energy through dynamo and its energy efficient. Sustainable development plays an upcoming role in automotive industry. Besides purely economic aspects, the influences on ecology and society are recognized by customers and legislation and have to be considered by manufacturers. Besides economic-driven factors in automotive development and production, which include return of investment, scope of production, supplier integration and all the others financial-related issues, ecological factors consider the consumption of energy and resources, the effects of produced substances and influences on the environment. Finally, social factors represent the involvement of staff as well as the influences on the general society. All these aspects have to be taken into account during entire life cycle of a car, which includes the phases conception, development, production engineering, manufacturing, the in-use-phase, and finally the phase of recycling and disposal. Influencing factors on the entire life cycle exist on very different levels. Besides legislative boundary conditions (which vary on different markets), technology- and cost-driven aspects play an important role. In addition, automotive manufacturer is influenced by market-specific demands, which are often subject of social, cultural and fashion-related effects. Finally, ecological factors, which are interlinked with all the aspects listed above play an important role. The application of Eco-Design in automotive industry supports an integration of the wide field of influences on product and production design.

Chassis

Chassis was a galvanised profile material. Here we used square type pipe of dimensions is 25*25mm. it has 1.2mm thickness, the total dimensions of chassis are 75*35*9 inches (L*W*H). In chassis front welded front box. The dimensions of front box are 16*12*15 inches. The chassis rear shaft assembled with journal bearing.

Shock Absorber:

Here we used front rare mono suspensions with assembled the chassis in used any damper vibrations reduces in the human body

Wheels:

The wheel diameter is 16 inches (with tire) and the rim diameter 6 inches we used this vehicle

Bldc Motor:

In ECO CAR we used BLDC motor it is a main part of this ECO car a vehicle one place to another place the capacity of 48 volts 1000 watts its rated speed is 3000 rpm.

Controller:

The controller provides pulses of current to the motor winding that controllers are speed and torque of the motor. Its rated current 1000 w. and rated voltage 48v

Solar Panels:

Here we used poly silicon type of solar panels this car consist four solar panels and each solar panel produce 50w power. The peak time charge of this panel 4 hours. Panels are connected to charge controller.

Bateries:

Here we used secondary type of batteries which can rechargeable. Here we provided a battery for charging purpose each Batteries Capacity Has 12v And Four Batteries Are To Series Connection.

Brake System:

In eco car we used hydraulic disc braking system the diameter of disc plate is 10 inches and hub diameter of disc plate is 6.5inches.

II. LITERATURE SURVEY

It is necessary to understand solar energy collection and its conversion into electricity, evaluation of electrical performance, and the current efforts being made to improve conversion efficiency. It was also important to examine the actual effect of the colour filters on the light input into the panel. The primary material used in the modern collection of solar energy is silicon. Even though it takes 100 times more surface area of silicon than that of other solid-state materials to collect the same amount of energy, silicon was already developed and in mass production when solar energy collection technology was developed, and so it was the practical choice. However, any semiconductor is acceptable. The semiconductor is part of a panel called a photovoltaic, or solar cell. This cell absorbs sunlight and transfers it into electricity, typically with a 15-20% efficiency. The true principle of this study (the factor observed) centre not on the inner processes involved in the energy transfer, but rather on the efficiency of the solar cell.

III. WORKING

Components Used:

- Chassis
- Solar Panel
- Solar controller circuit
- Batteries
- BLDC Motor
- Controller
- Warm Gear box
- Hydraulic braking system
- Steering

Chassis:

A chassis is the load-bearing framework of an artificial object, which structurally supports the object in its construction and function. An example of a chassis is a vehicle frame, the under part of a motor vehicle, on which the body is mounted; if the running gear such as wheels and transmission, and sometimes even the driver's seat, are included, then the assembly is described as a rolling chassis. The chassis employs a galvanised profile space frame constructed by (25*25) mm pipe, galvanised square section with (1.5) mm thickness, welded together accurately. In the front-end structure, a rectangle box. the dimensions of the chassis are 75*37*9inches(L*W*H) and its weight is 25 kg.

Figure: Layout of Chassis

Solar Panel

Solar panels are actually “boards” that collect the sun’s rays, and host the whole process of transforming energy coming from the sun into electricity and power. Placing the solar panels on the car allows you to direct solar power to the motor or you can store it in a battery, depending on the car make and design. Known a century ago as home water heaters, then going through some periods of oblivion, solar panels

experience today their rebirth one more time, thanks to growing popularity of solar powered electric cars. Solar panels basically wrap the whole system of solar principle, since they work as long as electrons freely flow around. They are still a little costly, but you can definitely find affordable ones, if you wish to turn your car to a solar electric car.

Figure: Solar panel

Specifications:

- Rated maximum power (P max): 50w
- Tolerance (Tol): 0 to +3%
- Maximum system voltage (Voc): 21.0v
- Cell Technology: POLY Si

Structure Of A Solar Panel

Now, let's analyse the structure of a solar panel. You can see the solar panel has different layers as show in in (Fig:7A). One of them is a layer of cells. You will be amazed to see how these PV cells are interconnected. After passing through the fingers, the electrons get collected in busbars. The top negative side of this cell is connected to the back side of the next cell, through copper strips (Fig:7B). Here it forms a "series connection". When you connect this series connected cells, parallel to another cell series, you get the solar panel. A single PV cell produces only around 0.5 Voltage. The combination of series and parallel connection of the cells increases the current and voltage values to a usable range. The layer of EVA sheeting on both sides of the cells is to protect them from shocks, vibrations, humidity and dirt.

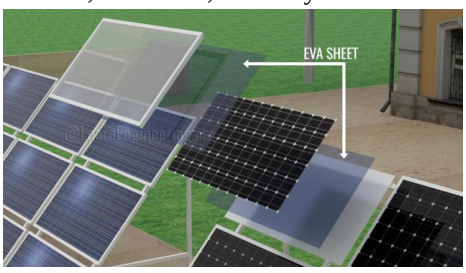

Fig: Different layers of solar panel

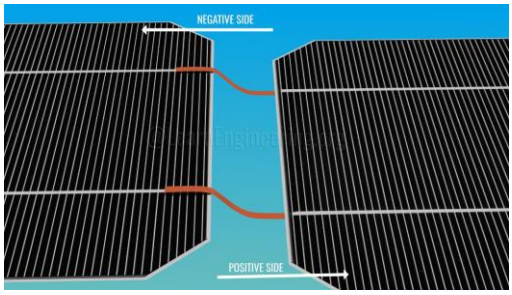

Fig:Negative And Positive Sides Of The Solar Cells

Polycrystalline Solar Panels And Monocrystalline Cells

Why there are two different kinds of appearances for the solar panels? This is because of the difference in the internal crystalline lattice structure (Fig:8A). In polycrystalline solar panels, multi crystals are randomly oriented. If the chemical process of silicon crystals is taken one step further, the polycrystalline cells will become mono crystalline cells (Fig:8B). Even though the principles of operation of both are the same, mono crystalline cells offer higher electrical conductivity. The unique octagonal shape in mono crystalline cells utilizes the cell area more effectively without any loss of material. However, mono crystalline cells are costlier, and thus not widely used.

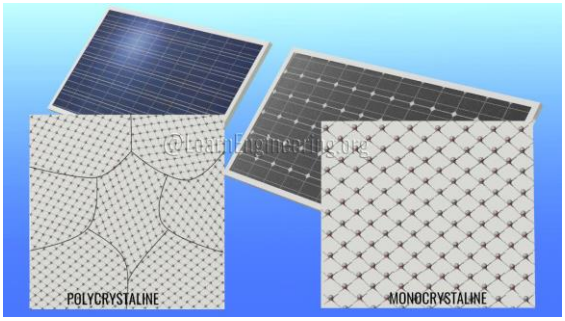

Fig: Polycrystalline cell and Monocrystalline cell

III.1.SOLAR CHARGE CONTROLLER

This charge controller was designed for high efficiency, use of common parts, and operation with common ground circuitry. The charge controller circuit has been used with solar power input. It also functions well as a battery charger when used with any current limited DC power supply such as small "wall wart" transformers or a high current supply with a series resistor. Purpose of the charge controller circuit is to cut off the supply from the solar panel when the battery is fully charged to avoid over charging... and to start charging when battery voltage drops off a certain value... in my case the max. allowed voltage is 11.5 volts and min is 12volts. The circuit uses a 12-volt solar panel and a variable voltage regulator IC LM 317. The solar panel consists of solar cells each rated at 1.2 volts.12-volt DC is available from the

panel to charge the battery. Charging current passes through D1 to the voltage regulator IC LM 317. By adjusting its Adjust pin, output voltage and current can be regulated. VR is placed between the adjust pin and ground to provide an output voltage of 9 volts to the battery. Resistor R3 Restrict the charging current and diode D2 prevents discharge of current from the battery. Transistor T1 and Zener diode ZD act as a cut-off switch when the battery is full. Normally T1 is off and battery gets charging current. When the terminal voltage of the battery rises above 6.8 volts, Zener conducts and provides base current to T1. It then turns on grounding the output of LM317 to stop charging

Figure: solar charge controller

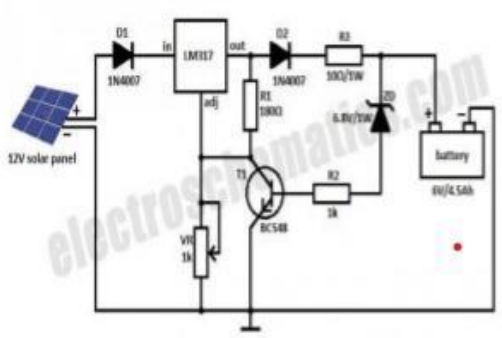

Figure: Solar circuit

Specifications:

Rated Voltage (volts) : 48
Rated Current (amp) : 10

ECO CAR SPECIFICATIONS:

Vehicle weight	150 Kg without battery
Length, Breath & Height	5060, 1340, 1234 (mm)
Body material	F.R.P.
Chassis Material	Galvanised profile
Average speed	35 Km/hr
Top speed	40 Km/hr
Without sunlight	35 Km
Range in Sun light	∞ Km
Motor output	500 Watt (800-watt peak power)
Max payload capacity	65 Kg
Battery	12 V, 20 AH.
Battery complete charging time	4.5 Hrs (approx.) by solar power
Battery charging time by AC current	2 Hrs
Solar panel	600 watts
Suspension System	Swing Trailing Arm (Front), Swing Arm(Rear)
Steering System	Acreman steering mechanism
Turing Radius	4.5
Brake System	Hydraulic Disc (Front) Hydraulic disc rear Size: F(200mm) and R(200mm)

Fig: Eco Car

IV. ADVANTAGES

- Unlike regular cars, solar energy powered cars are able to utilize their full power at any speed.
- Solar powered cars do not require any expense for running.
- Solar cars are quiet.
- Solar cars require very low maintenance.
- A solar car produces no harmful emissions.

V. CONCLUSION

- A three-wheeled low-cost electric solar vehicle (ESV) for lower income strata of developing countries is feasible and practicable.
- Our ESV, a single-seated vehicle powered by 750 W BLDC hub motor can be a good choice for Indian market.
- A multivariate technical group has enriched the design and fabrication of our EVS, for which it stands with higher safety, high performance as well as cost-efficient electric solar vehicle.
- The dynamic stability of our ESV has been successfully done through maintaining the CG in the front half of the vehicle which in turn taking care for lateral and rollover stability as well.
- Our design for wide track, longer wheel base and forward weight distribution system improves lateral stability of the ESV, which also reduces directional stability under braking (as load on the rear gets less) and at the extreme, lifting the rear wheel and tipping the nose to the floor.
- During fabrication a special attention was given to reduced cornering stability with acceleration of a tadpole which becomes reduced cornering stability with braking
- Use of Buck Boost Converter in the EVS improve the efficacy of its power system including effective recharging facilities.
- Safety and Ergonomics consideration in design as well as in fabrication including drivers‘ seat design, incorporation of lock nut for motor, suspension, steering, braking and transmission etc. strengthen the acceptability of consumers in Indian road ways.
- Application of Automatic Brake Alert in our design strengthens the safety aspects of the ESV which will reduce the severity of any accident. This is our special innovation in this project.

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