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Design and Implementation of Eco-Vehicle using Solar

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Abstract:- **Eco Vehicle is a vehicle which uses solar as a source. It receives energy from the sun with the help of the receivers present in the photovoltaic cells present in the solar panel. The motor used to drive the vehicle is brushless dc motor. The energy is stored in the battery and which can be used to run the motor in the absence of sunlight. The vehicle is controlled by using drive circuit (PIC) Microcontroller kit. The braking system used here is ultrasonic capacitor regenerative braking system. It helps to increase the efficiency of the Vehicle by storing the obtained energy back to the battery. The main advantage of this Vehicle is it can be able to run with only solar in absence of battery or vice versa.**

Keywords: Eco Vehicle, Solar panel, BLDC Motor, Ultra capacitor, Regenerative Braking.

I. INTRODUCTION

Earth has limited amount of energy resources which is very soon going to extinct. Fortunately, population might increase nearly hundred times.As the population is increasing the demands of people is also increasing. Fact is that the earth's resources won't be sufficient to sustain that population at a high standard of living for all. So, it is very much clear that fossil fuels wont be sufficient to fulfil our needs. Also these are responsible for Global Warming, Environmental Imbalance, Ozone layer depletion etc. which in turn is a big threat to the future human race. Again, in view of the possibility of global warming, these resources are playing a negative role. Therefore, under this circumstance, it is necessary to make a new invention of resources to make energy and electrical power. Solar powered cars have come a long way since the creation of the first solar cell in 1883. In 1955, William G. Cobb of the General Motors Corp. (GM) demonstrates his 15 inch long "*Sun-mobile*", world's first ever solar-powered automobile at the General Motors Powerama Auto show held in Chicago, Illinois. The newest Prius,is featured with a hybrid electrical and gasoline engine, automatic and self detected parking, and solar panels to power interior cooling system system. The solar cells make Toyota as the first automaker to use solar for a vehicle. Toyota is able to use the power of the sun against itself, save gas, and reduce carbon dioxide emissions. PV cells Convert Sunlight to electricity. Charge Controller work as control the power from solar panel which reverse back to solar panel get cause of panel damage. Battery System act as storage of electric power is used when sunlight not available (i.e. night).From this system connected to inverter for convert Direct Current (DC) into Alternating Current (AC). It is save up to 20% of energy costs. It can be used in Remote Locations. A solar vehicle is primarily powered by direct solar energy. Photo cells (PVC) are inserted on the Vehicle to capture and convert solar-energy into electrical energy. They are made of silicon and the semiconductor absorbs light and then produce flow of electron that generate electricity which charges the 48V battery connected to it, which is used to run a 750 Watt BLDC Motor to transmit power to run the vehicle, using some cells to run the motor. The braking used here is Regenerative Braking. In this method the inverter which is used to drive the motor, alone is used. The back EMF of the motor during regeneration will be less than the battery voltage even if the brake is applied while the vehicle is running at its highest speed. So the regenerated energy has to be boosted and stored back to the battery which increases the efficiency.

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I.BLOCK DIAGRAM OF PROPOSED AREA

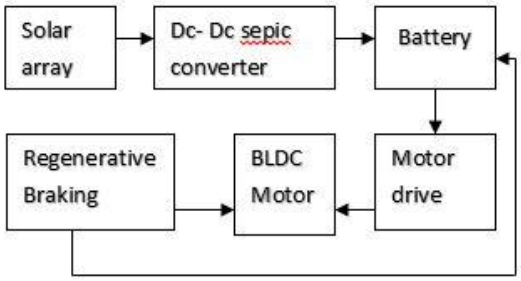

Figure.1 Block Diagram

II.ENERGY ABSORPTION AND CONVERSION

3.1 WORKING OF SEPIC CONVERTER

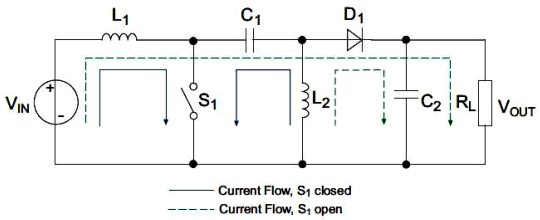

Figure.2 Working of Sepic Converter

Due to the increase in demand of high voltage gain DC-DC converters for various applications supplied by low DC output voltage power sources, the development of these converters has been a wide research area in recent years. Usually a grid connected PV cell needs DC-DC converters which is used to stepup the output of the solar cell. The design of DC-DC converters are typically made with high gain static so that the output voltage can be increased and it also obtains a high conversion efficiency.However, the conventional DC-DC converter topologies like SEPIC can only step up the output by 5 times of the input voltage when the duty Cycle is set to 0.82.In the other hand, to meet out the dc input voltage of the inverter, the input supply voltage of the converters has to be increased more than 10 times. Therefore, to overcome these problems, this paper proposes the solution and the use of design of DC-DC modified SEPIC converter topologies for photovoltaic applications. By adding capacitors and diodes modifications to the conventional SEPIC converter is done. From the experimental results shows that times and has the efficiency about 91.5%. Furthermore voltage about 10 percent.

3.2 MPPT USING FUZZY LOGIC

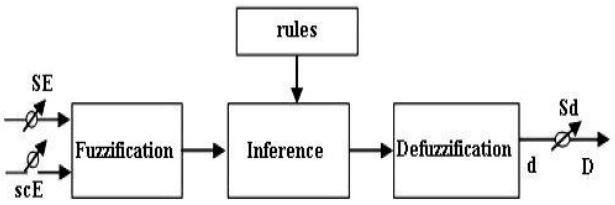

Figure.3 General Diagram of Fuzzy Controller

The actual energy conversion efficiency provided by photovoltaic cell is very low of . So as to neglect this issue and to get the maximum results and efficiency, the entire design of PV system should be optimised. MPPT controllers are used because they play vital role in increasing the efficiency. These controllers are becoming an important elements in PV systems. A significant number of MPPT controller schemes had been extended with simple techniques such as voltage and current feedback based MPPT to improvise power feedback based on MPPT controller such as the incremental conductance technique. In recent days intelligent control schemes in MPPT controller have been introduced Already some of the control schemes used previously shown greater defects, new schemes are necessary to bring new methods to bring optimised output. Fuzzy logic controllers have more effective than the existing non-linear controllers because of its flexibility.

IV. WORKING OF BLDC MOTOR

4.1 WORKING

PERMANENT Magnet Synchronous Motor (PMSM) has two types of excitation model; sinusoidal and another one is trapezoidal. PMSM having a trapezoidal excitation is called as the Permanent Magnet Brushless DC Motor (PMBDCM). In a BLDC motor, stator contains three phase windings and the rotor segment is made up of permanent magnet and consist of 2 to 8 pole pairs with alternate pairs of North (N) and South (S) poles. In a conventional DC motor, the commutation of a BLDC motor is carried out using electronic switches. To operate BLDC motor, sequential excitation must be provided. For this, details of the rotor position are required so that the coils will be excited. Hall based sensors placed in the stator. Generally BLDC motor consists of Hall sensors placed on the stator provides positioning of rotor and it is also connected at the off-driving end of the motor. As the magnetic poles of the rotor crosses the Hall sensors, they give out a high or low signal, corresponding to the North or South Pole close to the sensors, these two fields are orthogonal to each other and reduces gradually as the fields stay together. Unidirectional torque can be produced by the flux produced by the windings should catch up with the rotor. BLDC motors mostly finds application with the operation at medium and very high speeds. As these kind of motors shows less inertia with high peak torque characteristics, the motor matches for quick acceleration and deceleration of drives. BLDC With the help of speed feedback (speed sensor) or by a sensor less mode (without a speed feedback) motors can be controlled. During the normal speed control of such type of drives, an encoder measures the speed and compares it with a reference speed in-turn controlling the PWM switching process . The speed encoders come with high cost and their mounting arrangement is involved. So this problem is overcome by using speed sensor less control technique.

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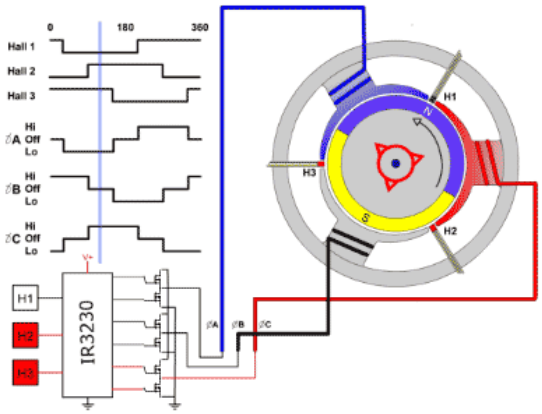

Figure.4 BLDC Motor

4.2 SPEED CONTROLLER

Pulse-width modulation (PWM) is a most commonly used technique for the power control to an electrical device, made practical by modern electronic power switches. The average value of voltage (and current) given to the load is controlled by turning on and off the switch between supply and load. Longer the switch is in ON condition compared to that of the OFF periods, the higher will be the power supplied to the load. The PWM switching frequency should be as faster as it can, than what would affect the load.

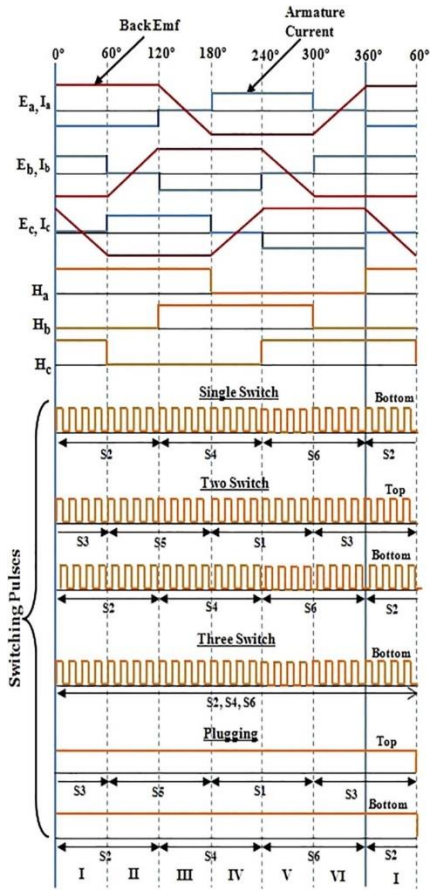

Figure.5 Switching pulses

V.BRAKING SYSTEM

5.1 REGENERATIVE BRAKING

The method of braking used here is regenereative braking using ultracapacitor combined with pedal brakes.it is for energy conservation. We use 2farad ultracapacitor to store the energy obtained from the motor after the manual brakes are applied.Range (driving range) of the EV, the distance travelled by the vehicle per charge, is an important parameter.

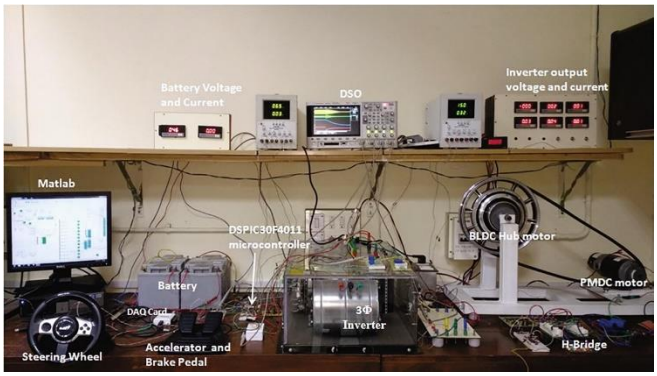

Figure.6 Real Time Model

VI. IOT APPLICATION

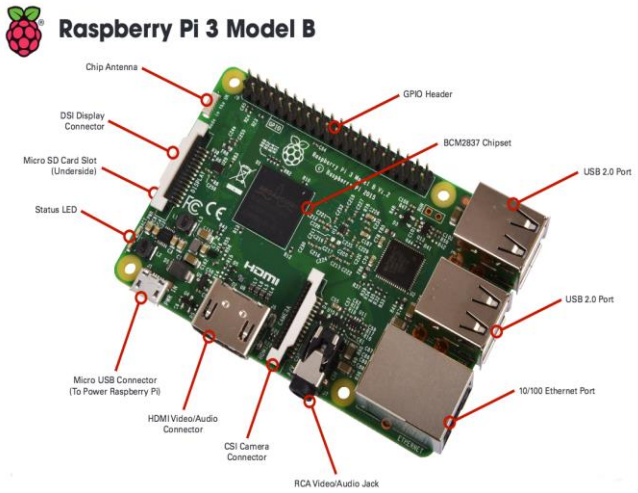

Figure.6 Raspberry Pi

Raspberry Pi is a small card-sized pc that can do all the functions that we do with our desktop. Raspberry Pi serves as a friendly desktop that can be used as a router. Now, this powerful (Linux) computer is being used to build many IoT projects that can transform any device smarter. Since IoT technology needs a microcontroller board to send and receive the data, Wi-Fi integration to send data into the cloud and actuators which controls the operations, using Raspberry Pi board for creating IoT projects. Raspberry Pi module comes with Wi-Fi and Bluetooth. It is used link some actuators like relay driver modules, DC motors to carryout variations actuations like speed controlling, switching ON/OFF of devices etc upon programming. The

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eco vehicle is turned on with the help of Raspberry pi module without mechanical engaging of the key.

VII. CONCLUSION

We have designed a eco vehicle which runs with green energy that is the solar without emission of any gases or by-products. It can run on both solar as well as on battery as a source. This is very economical vehicle helps to maintain green environment. This will be the future means of transport since fuels are exhausting day by day. By making future advancement it can be used for long distance drive also and it can be able to bring a revolution in the vehicle history.

VIII. ACKNOWLEDGEMENT

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IX. REFERENCES

[1] **A Review Paper on Electricity Generation from Solar Energy.** International Journal for Research Applied Science & Engineering Technology (IJRASET) Volume 5 Issue 9, September 2017.

[2] **Brushless dc motor speed control using Microcontroller.** International Journal Of Current Engineering and Scientific Research (IJCESR) in Volume 2, Issue 2, 2015.

[3] **Study on Improving Electric Vehicle drive range using Solar Energy.** International Conference on Electrical, Control and Computer Engineering Pahang, Malaysia, June 21-22, 2011.

[4] Shivanand Pandey, Bhagirath Pandey, **"DC motor torque control using Fuzzy proportional Derivative controllers"**, International Journal of Engineering and Advance Technology, volume 3, Issue 6, Aug 2014.

[5] **A new electric braking system with energy regeneration for a BLDC motor driven electric vehicle.** International Journal of Engineering Science and Technology in Volume 21, Issue 4 , August 2018.

[6] S. Khosrogorji, M. Ahmadian, H. Torkaman, and S. Soori, **"Multi−input DC/DC converters in connection with distributed generation units A review,"** Renewable and Sustainable Energy Reviews, vol. 66, pp. 360-379, 2016.

[7] Vinod Kr Singh Patel, A.K.Pandey, **"Modelling and Simulation of Brushless DC Motor Using PWM Control Technique"**, International Journal of Engineering Research and Applications, Vol. 3, Issue 3, , pp.612-620, May-Jun 2013.

[8] **Speed Control of BLDC Motor using PI & Fuzzy Approach: A Comparative Study.** International Conference on Information, Communication, Engineering and Technology (ICICET) Zeal College of Engineering and Research, Narhe, Pune, India. Aug 31, 2018.

[9] **Comparison of Two Electric Braking methods With Regenerative Capability of Brushless DC Machine and Their Four-Quadrant Operation** in The 33rd Youth Academic Annual Conference of Chinese Association of Automation (YAC, Nanjing, China on) May 18-20, 2018.

[10] Rambaldi L, Bocci E and Orecchini F. Preliminary experimental evaluation of a four wheel motors, batteries plus ultracapacitors and series hybrid powertrain. Appl Energ 88: 442–448, 2011.

[11] J.B. Liu and C.H.Zhang, Electric Machinery and Their Drives (2nd Edition)(In Chinese), Beijing, Qinghua University Press, 2015.

[12] A. Ajami, H. Ardi and A. Farakhor, **Design, analysis and implementation of a buck-boost DC/DC converter"**, IET Power Electronics, vol. 7,Issue 12, pp. 2902-2913, 12 2014.

[13] T. LaBella, W. Yu, J. S. (. Lai, M. enesky and D. Anderson, **"A Bidirectional-Switch-Based Wide-Input Range High-Efficiency Isolated Resonant Converter for Photovoltaic Applications"**, IEEE Transactions on Power Electronics, vol. 29, Issue. 7, pp. 3473-3484, July 2014.

[14] S. Miao, F. Wang and X. Ma, **"A New Transformerless Buck-Boost Converter With Positive Output Voltage"**, IEEE Transactions on Industrial Electronics, vol. 63, Issue 5, pp. 2965-2975, May 2016.