HIGH VOLTAGE GAIN LANDSMAN CONVERTER PV FOR ELECTRIC VEHICLE APPLICATIONS

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Abstract- *Power device electric vehicles (FCEVs) are gaining popularity in the auto industry as a result of stricter regulations regarding carbon gas emissions and efficiency. Sun-oriented photovoltaic is one of the most widely used and least expensive environmentally friendly power sources. The majority of extreme Power Point Procedures are used to extract the most power from a PV module, and it has been found that the fluffy-based MPPT (ANFIS) strategy produces better results under randomly changing barometric conditions than other methods. A DC Landsman converter's primary function is to increase the power output of the SPV display and to provide the appropriate control for the safe and delicate start of the BLDC engine. The Landsman converter outshines other DC converters in meeting the proposed EV drive framework's ideal display. Enlistment engines have been needed for a long time, but Brushless DC engines are now replacing them due to their potential advantages. Higher proficiency and quiet activity are the main benefits. For a wide range of tasks, the presentation of the drive is investigated. A negligible rule-based ANFIS speed regulator is also presented to complement its components.*

Keywords--**EV (Electric Vehicle), Power Factor, DC-DC Converter, Harmonics, Non- isolated.**

1. INTRODUCTION

Fuel Cell Electric Vehicles (FCEVs) are receiving more attention from the automotive industry as a result of environmental pollution and the limited availability of fossil fuels. The significant development of FCEVs is made possible by the rapid advancements in power electronics and fuel cell technologies. Clean power generation, high reliability, high efficiency, and low noise are all advantages of fuel cells. Fuel cells fall into a variety of categories based on the electrolyte substance they use, including the Proton Exchange Membrane Fuel Cell (PEMFC), the Alkaline Fuel Cell (AFC), the Phosphoric Acid Fuel Cell (PAFC), the Solid Oxide Fuel Cell (SOFC), and the Molten Carbonate Fuel Cell (MCFC). PEMFCs are the most popular of all of these because of their quick start-up and low operating temperature. The cell temperature and the amount of water in the membrane determine the fuel cell's output voltage. Notably, fuel cells have voltage-current characteristics that are not linear. As a result, fuel cells only have one unique operating point with the highest output voltage and power. To get the most power out of the fuel cell under different operating conditions, the maximum power point tracking (MPPT) method is necessary. The perturb and observe (P&O), parctical swarm optimization (PSO), incremental conductance (INC), fuzzy logic control (FLC), sliding mode control, and neural network (NN) to track maximum power point (MPP) techniques all appear in the literature. Among these accessible MPPT calculations, P&O is basic, famous and simple to execute. At steady state, P&O and incremental conductance methods produce oscillations that will lower the fuel cell system's efficiency. Fuzzy logic controller and neural network algorithms are used to more effectively and accurately track the MPP in order to solve this issue. To keep track of the MPP of the PEMFC, a radial basis function network (RBFN) base MPPT controller is proposed for this project. Electronic commutation is used in Brushless DC motors, which do not require mechanical commutation. Electronic commutation necessitates constant rotor position monitoring. Hall Effect position sensors are used to achieve this continuous rotor position monitoring. BLDC drive motors are being developed by researchers due to their improved performance at a lower cost. BLDC motors are typically preferred for high speed power applications. A landsman converter fed by a PV source powers the BLDC motor, and a simplified IFOC control scheme is used to improve the motor's performance over previous methods. An algorithm for estimating speed that uses a back EMF observer and then uses the relationship between speed and back EMF to figure out the speed of a BLDC motor. The back EMF observer method is used to estimate the speed of the BLDC motor using a simplified Indirect Field Oriented Control technique rather than a sensor. Examining a variety of non-isolated DC–DC converters, such as buck, boost, buck–boost and single-ended primary inductor converter for photovoltaic applications. Despite the fact that this conclusion is not based on motor drive, it is concluded that the buck–boost converter is the best choice of DC–DC converter for the PV system, allowing for an unrestricted MPPT region. A buck–boost converter, on the other hand, always needs a ripple filter at both its input and output to ensure that the system as a whole runs smoothly. This necessitates additional circuitry. This work adapts a Landsman converter, one of the topologies of a DC–DC buck–boost converter, to overcome the aforementioned limitations of various converters used in SPV array fed water pumping. A CSC or topological transformations of a DC–DC boost converter appear to have produced this converter.

2. PV CELL MODELING

Figure 1. Photovoltaic unit

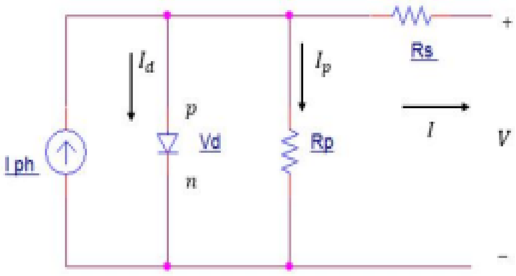

Figure 2. Equivalent circuit of a PV cell with single-diode model

$$I = I_{ph} - I_0[e^{\frac{q(V+R_sI)}{nkT}} - 1] - \frac{V + R_S I}{R_{ph}} \quad (1)$$

$$V_d = V + IR_s \quad (2)$$

A simple equivalent photovoltaic cell circuit model includes a diode in parallel with a current source and a resistor as shown in Fig. 2.

3. EXISTING SYSTEM

To extract the maximum power from the PV cell under a variety of operating conditions, the maximum power point tracking (MPPT) strategy is essential. To follow maximum power point (MPP), various MPPT procedures, such as irritate and notice (P&O), Partical swarm optimization (PSO), and incremental conductance (INC), are discussed. P&O is one of the most straightforward, well-known, and straightforward MPPT calculations that are readily available. P&O and gradual conductance methods cause motions at constant state, which will lower the PV cell framework's efficiency. A boost converter is frequently used as the energy unit's front-end power conditioner. The standard lift converter is used as a power electronic connection point for low-power applications, but a support converter probably won't work for high-power applications due to its low current handling capacity and warm management issues.

4. PROPOSED SYSTEM

The BLDC engine's speed is controlled by a fuzzy logic controller (FLC-ANFIS) in this project. To achieve superior execution drive, speed regulators are the standard PI regulators and current regulators are the P regulators. The Landsman converter is designed to operate consistently in continuous conduction mode (CCM) regardless of irradiance level variation, resulting in reduced weight for its power devices and components. Variation in the DC-connect voltage limits the BLDC engine's speed. In contrast to the speed control, no additional stage current sensors, additional controls, or hardware are required. The engine typically achieves the expected speed regardless of the environment. The various exhibitions of the proposed engine drive framework are examined through programming and equipment by incorporating a fluffy rationale regulator for the BLDC engine.

5. BLOCK DIAGRAM

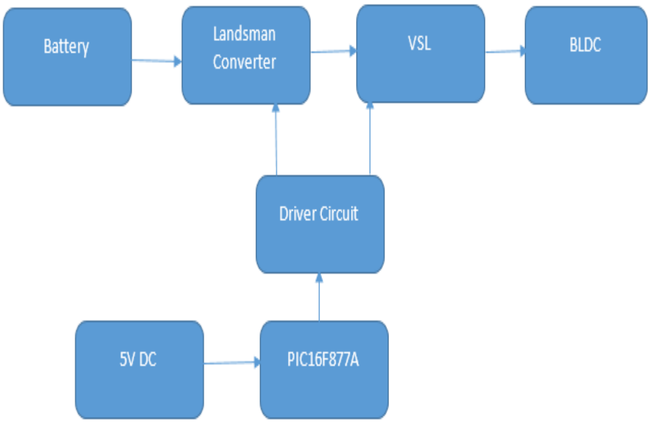

Figure 3. Proposed Block Diagram

5.1 Landsman Converter

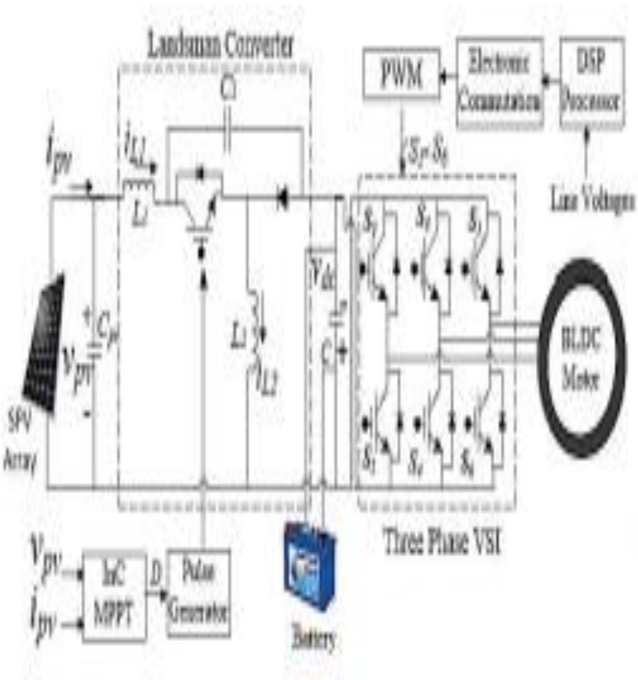

Figure 4. Landsman converter with BLDC

Figure is a diagrammatic representation of the system. A Li-ion battery and a rooftop-mounted solar PV array provide power for the e-vehicle. The BLDC motor powers the vehicle.

5.2 Benefits

- High power conversion efficiency.
- Minimizing switching losses.
- Reduced size with cost.
- Decreased power rating.

5.3 Applications

- EV Applications.
- Water pumping.
- Aeronautical field.

6. FUZZY INTERFERENCE SYSTEM (ANFIS)

The ANFIS is the mixture model of joining ANN and fluffy frameworks together to consolidate the advantages of both the Frameworks. It utilizes a Takagi-Sugeno grounded fluffy framework to incorporate where the last fluffy end framework is upgraded by the ANN. A common ANFIS framework can be demonstrated as displayed in the fig. 3, in which a proper bunch is demonstrated by a circle and the versatile bunch is shown by a square. The organization shown is multifaceted feed forward network. Each layer has its own capacity while reusing the contributions to get the works. The sources of info and the results are constrained by a bunch of information and issue part works which are connected by the fluffy if-additionally runs the show. Not at all like the ordinary fluffy end framework, where the info issue part works and the fluffy if-likewise runs the show re altogether reliant upon the human spunk, the ANFIS gives an edge by improving the guidelines and class capacities by the ANN preparing. The most common way of creating an ANFIS framework begins with setting the first info and class capacities grounded on the information on the framework, for sure on the off chance that the past information isn't accessible the stoner can personally choose the class capacities. Likewise the ANN preparing interaction will initiate the arrangement of if-additionally decides that would fit the information properly. To try not to snare into the first minima and furthermore work on the viability, different proficiency calculations are utilized to tune the fluffy standards. The half and half methodology is the mix of least places and grade plummet approach.

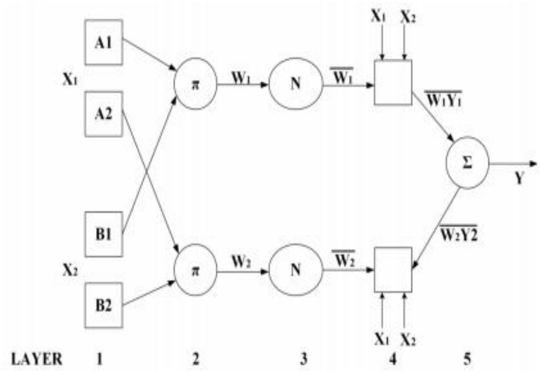

Figure 5. ANFIS Design

In this plan, a specialist information has been utilized to make the first fluffy and furthermore, the PSO has been applied to upgraded fluffy class capacities.

● Versatile Neuro-Fuzzy Inference System (ANFIS) is a brain network usefulness individual to fluffy end framework.

● This armature has the capacities to catch the advantages of both the brain organization and the fluffy sense in one.

● It's grounded on the "Main Order Sugeno Model",

7. CONCLUSION AND RESULT

A DC-DC landsman converter with a high voltage gain is proposed for use in EV applications in this project. In order to lessen the strain placed on power devices, the Landsman converter has been operated in CCM. The losses brought on by high frequency switching are eliminated when the VSI is operated in 120° conduction mode with fundamental frequency switching. Other important features of the proposed system include the motor drive system's stable operation and the safe starting of the BLDC motor. The current ripples, voltage stress and switching losses on the power semiconductor switches have been reduced by the proposed converter. And the frequency will be varying according to the voltage reduces by V/F method of speed control and speed is constant.

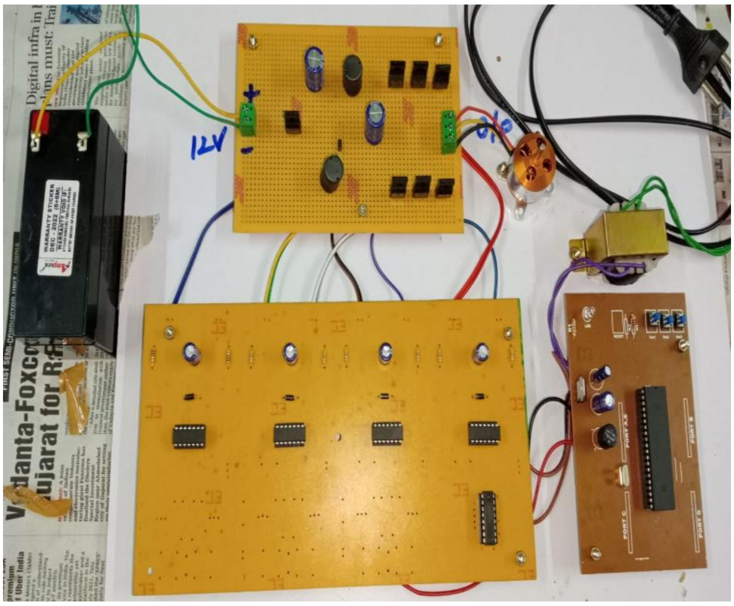

Figure 6. The above picture represents the working prototype of the proposed idea

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