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# MULTI OUTPUT FLY BACK CONVERTER USING SOLAR ENERGY

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**ABSTRACT**

**Flyback converter is known by everyone because it is simple in design ,count of parts is lesser and it has isolation. So, it occupies less volume and cost can also be saved. DC-DC converter is used to increase or decrease the voltage level and divided into non –isolated and isolated categories . Flyback converter is an isolation transformer, when mosfet switch is ON that stores energy from the MPPT controller and it delivers energy to the load side if mosfet switch is OFF. Due to this the need of additional inductor for the storage of energy can be eliminated unlike it can be used in the case of forward half and full bridge topologies. Solar energy is used as an input to the Flyback converter and multiple output is obtained for both low and high power application. MPPT controller is used along with solar panel to extract maximum power and constant output voltage is obtained in output side to produce higher efficiency for wide range of input solar irradiation level.**

**Key words—Photovoltaic system, Multiple output FLYBACK converter, Continuous conduction mode, Voltage doubler, DC-DC Converter, MPPT(Maximum power point tracking), MOSFET(metal oxide semiconductor field effect transistor), Rectifier, isolation transformer, isolated topologies, primary winding, secondary winding.**

## I.INTRODUCTION

The consumption of fossil fuels and oil resources the exhaust rate will be increasing , so the change for the naturally avoidable resource. Solar energy is available which cannot be easily polluted and usage of solar energy loads to the reduction of power usage from electricity . A pv source is given as an input at primary side of flyback converter. Flyback converter mainly used for low power applications due to its simple in design and lesser parts and isolation is a term like where the output is separated from the input supply. The varying of output voltage in the flyback converter varies from zero to hundred watts . the dc voltage given as an input to the flyback converter is not a regulated dc supply the voltage range is very large for the working of the flyback converter . the flyback converter uses MOSFET switch and frequency of the switch is in KHz DC-DC converters are applied in the

control mechanism of the voltage in electric vehicles celling excavators, excavator mines. Photovoltaic systems are free environment source the serial connection of multiple solar cell combinations gives voltages for electricity. Solar consists of voltage-current and power voltage characteristics and they always depends on irradiance, operating temperature condition of cell. Shadowing method of the solar panel is used where the efficiency of yield becomes reduced . to avoid more solar cell and reduction in size and cost we can develop some step up chopper based dc-dc converter after solar cells. MPPT controller is used to drive a maximum power from the solar module industries use different voltage for multiple output power supplies. Recently, switched mode power supplied mode power supplies are smaller and lighter in design and based on load and climate change , the energy values are saved.

## II. EXISTING SYSTEM

In existing system, the voltage level of 250 V is given as an input and to the current from the DC supply is given to the current controller device. The reference voltage of 201.044 V is given to the sum block , output from the sum is given to the PI controller and to the NOT logical operator. That voltage is given to the gate of the MOSFET switch to trigger it ON stage.The negative of the DC supply is given to the source of the MOSFET switch when switch is ON, primary current on the source side starts to flow and switch is OFF, Secondary current on load side flows and circuits of different voltage loads can be used for three different applications. The voltage doubler circuits consists of capacitors and inductors which is used to increase gain and extra voltage conversion ratio.

## IV. PROPOSED SYSTEM

This project workers on the pv module for flyback converter with voltage doubler and rectifier circuits. The primary side of the flyback converter consists of solar panel and MOSFET switch is triggered using MPPT control system. Mostly current mode control is used in all control technique but it has disadvantage like limits peak load current. So, controller plays a major role in DC-DC converter. Flyback converter is designed in a way of these output voltage of different ratings. The capacitor at the rectifier branches are used for something purpose in order to get pure DC output voltage.

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## III. BLOCK DIAGRAM

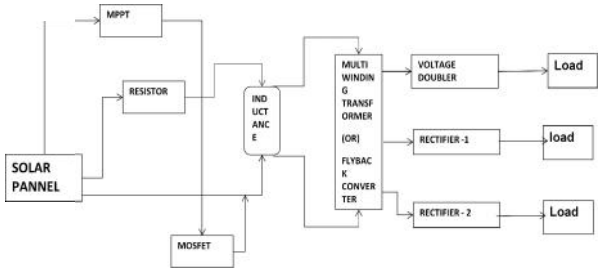


**Fig: Proposed system hardware block diagram**

### Advantages

- Fly back converter , which stores and release energy at the time of ON and OFF of MOSFET switch.
- Voltage stability
- Simple and cost efficient
- Half and full bridge technique needs additional inductor which is not required in flyback converter

## V. CIRCUIT DIAGRAM

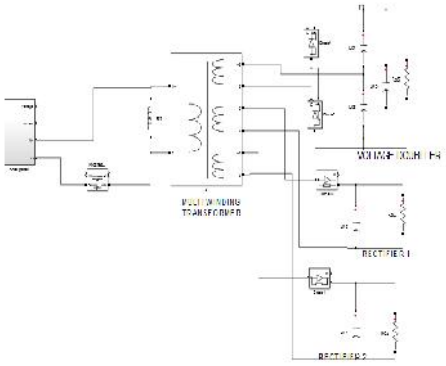

**Fig: Proposed circuit diagram**

Dc voltage taken from solar panel as an input consist of 4 output as volatge ,current , v+ and v- and volatge and current are given as input to the MPPT Controller ,the pulses from the MPPT controller drive the maximum power from the solar module and it is given to the gate of the MOSFET switch to trigger the switch to ON stage. The v+ and v- from solar panel connected to the resistance and

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inductance and connected to Flyback converter and output of Flyback is divided into 3 branches as branch1 with full wave VOLATGE DOUBLER CIRCUIT for medium voltage applications . Branch 2 and 3 with rectifier circuit for low voltage applications.

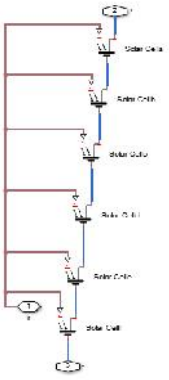
## VI. DESIGN EXPLANATION

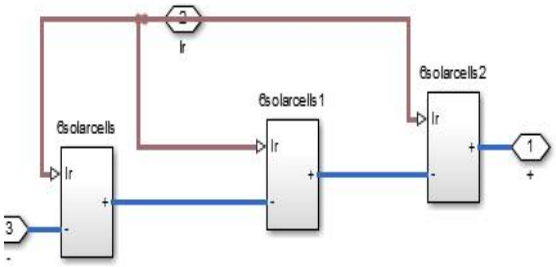
Solar cell is made up of 72 cells in simulation.It will divided into 3 parts in series connections.

6+6+6 =18 cells

18 +18 = 36 cells

36 + 36 = 72 cells






The panel consists of 4 output ports. Voltage and current mode of solar panel is connected to MPPT controller of voltage and current input. The V+ and V- of the solar panel is connected to V+ to resistor and V- to the source of the MOSFET.

## VII.SOLAR PANEL DESIGN:

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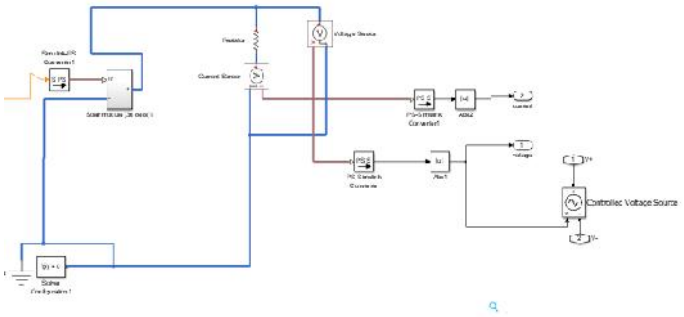


Solar rays is an example of irradiation ,the level of irradiation can be changed to different level. Simulink Contain PS converter ,it convert the unitless simulink input to a physical signal. Current sensor is used to converts current measured electrical signal into physical signal.Similarly voltage sensor converts the voltage measured electrical signal into physical signal.The positive terminal of voltage and current sensor is connected to resistor, V=I*R .So R is constant, positive of the resistor is given to the solar panel,the voltage passing through the resistance is V+ to V-, and negative of resistor is connected to the positive of current sensor. The negative of the current sensor is given to the PS – simulink converter,it changes the input of the physical signal into a simulink output signal.ABS block is used to accept real or complex values and give the output of Absolute value of input from the simulink, because it will not allow Boolean data types, so it takes positive value based on input .ABS is given to port 2 which is represented as current,that is used in the port 2 of the solar panel. The same was followed by voltage sensor finally the voltage from port 1 is given to another block which is called controlled voltage source ,used to take positive and negative voltages. Then controlled voltage source convert the simulink input physical signal into an equivalent voltage as an output.The voltage which is generated is given to V+ and V- as port 1 and port2 of the solar panel.Atlast both the negatives of the current and voltage sensor is connected to the solver point that our circuit model requires before beginning ofsimulation.Each definite simscape block diagram needs one solver configuration block to be linked to it. The negative of solar panel and negatives of sensors are connected to ground which is an electrical reference port.118.7 voltage is coming out from solar panel.

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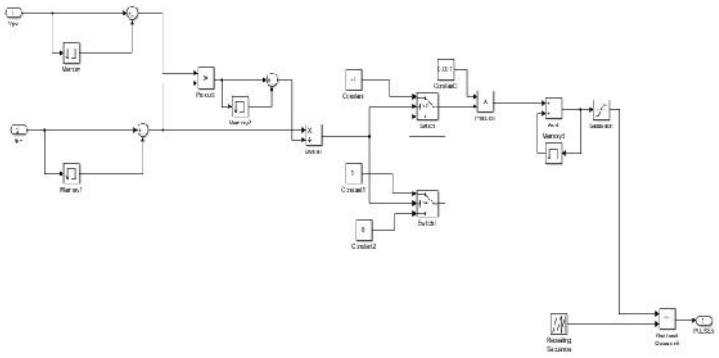
**VIII. MPPT:**



The pulses from the MPPT controller is given to the MOSFET gate to trigger the switch to ON state. Charge control devices controls the energy coming from solar panel. Charge control devices are of 2 types – PWM and MPPT. PWM, pulse width modulation is an electrical switch between the batteries it is quickly turn ON and OFF. So, desired voltage will be charged to batteries. MPPT ,is maximum power point tracking used to observed and regulated the energy coming from panel to battery .Solar panels will show changeable outputs according to the weather conditions. So, it can match solar panel voltage with repeating sequence and maximize the charge efficiency. The main difference between the PWM and MPPT is more efficient 30% than PWM. In MPPT panel series are allowed to have higher voltage than batteries. So, more flexibility for system growth. At the same to time MPPT is expensive when compared to the PWM. So, in small system where efficiency is not critical are still using PWM. The square wave pulse from MPPT is given to the gate of MOSFET.PWM technique is nothing but a modulation which give rise to different width pulses to exhibit the amplitude of analog input signal.

**XI. MOSFET:**

A metal oxide silicon transistor having source, drain, body and gate pin configuration. Drain is connected to load and S(source) of the MOSFET switch is connected to negative voltage of solar panel and inductance (L) that is connected by gate pulse of the MPPT controller .switching speed of MOSFET is faster than that of separate junction transistor. MOSFET provide very good isolation between the gate and other two terminal when compared to BJT. It can also capable of handling more power than BJT.MOSFET has a very low power loss and high speed voltage signals can easily

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operate the MOSFET. It is a voltage driven controlled device and has high input impedance, the current in the drain and source are controlled by voltage at the gate terminal.

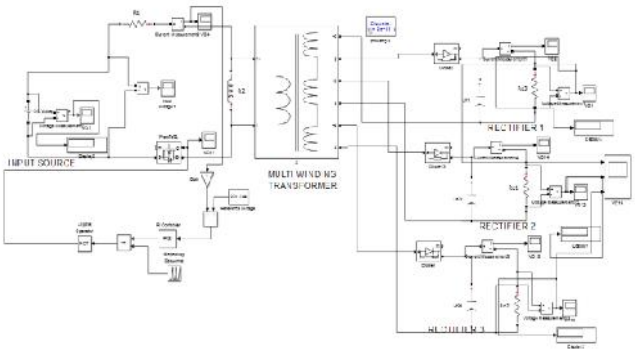
Two modes of process takes place

1. Depletion Mode -MOSFET is turned ON at zero gate voltage.

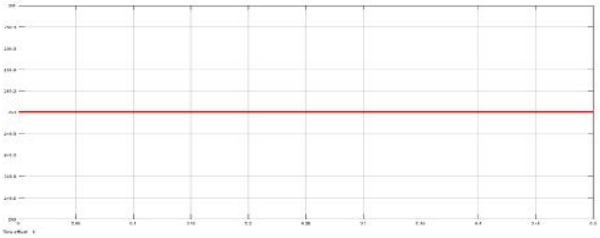
2. Enhancement Mode – MOSFET turns OFF when gate voltage is zero and ON at powering the gate.

## X. SIMULATION RESULTS

### Conventional circuit




### Input DC Voltage



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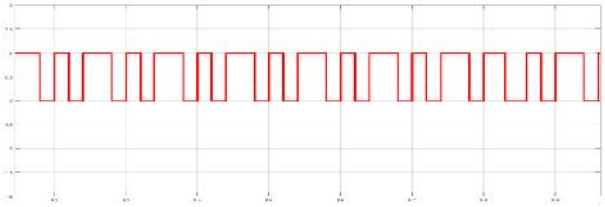
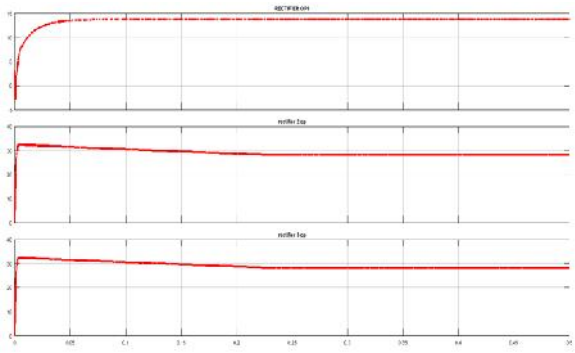
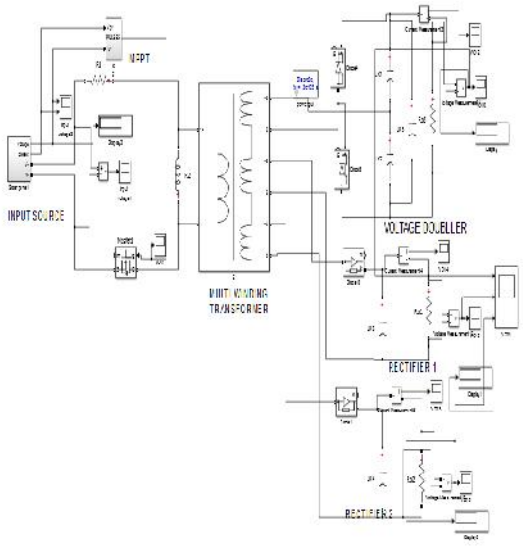
**Switching Pulses**



**Multiple Output Voltage**



## XI.PROPOSED CIRCUIT



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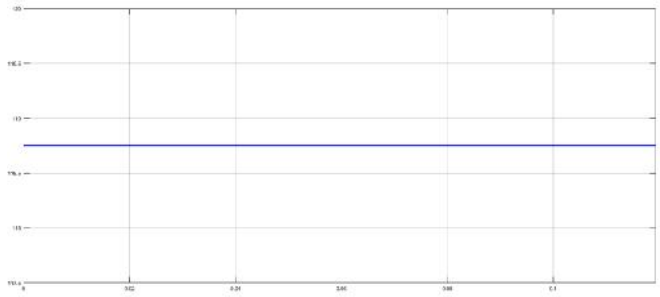
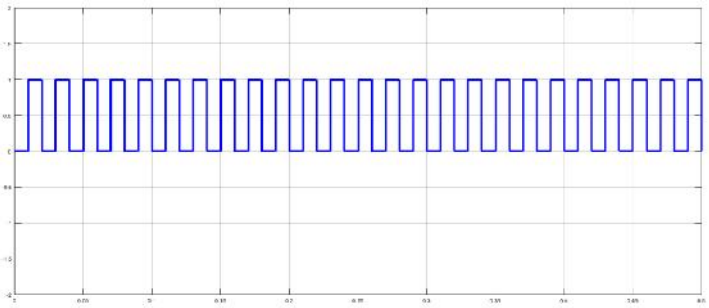
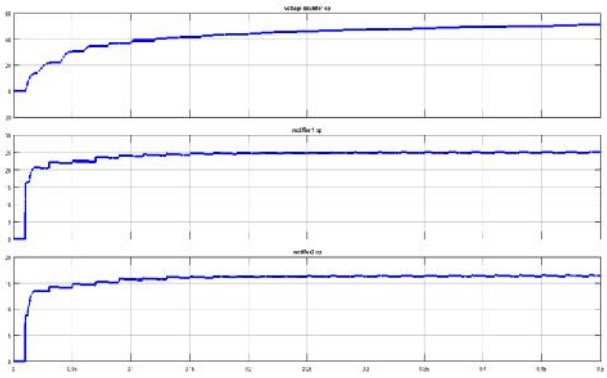
**PV Input Voltage**



**MPPT Gate Pulse**



**Multi-Output Voltages**



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## XII.CONCLUSION

Flyback converter is designed in order to produce the input voltage in the range of 250-850 voltage conventional simulation results are compared with proposed circuit. Adequate output voltage regulation obtained along with low ripple voltage .SIC MOSFET is used to decrease the losses in power condition and losses in switching the MOSFET . this result in giving efficiency at high rate even when the input voltage is loss.

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