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### Transformer less inverter for PV grid tied applications

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#### ABSTRACT

A hybrid pulse width modulated single-phase Transformer less grid-tie photovoltaic (PV) power system is proposed system. The PWM works when the ac output voltage is lower than the dc source voltage, otherwise the PAM operates the single-phase Transformerless inverter. The HPWM leads to the reduction of power loss, and the Transformerless capacitance and inductance. An effective control strategy is proposed for the new PV power system to manage the MPPT of PV panel, grid-tie power injection, and dc-link voltage. A grid-tie current controller, combining a repetitive controller and proportional-resonant regulator, achieves strong harmonic suppression, fast dynamic, and zero tracking error. Power loss estimation and impedance design are detailed. Experimental tests validate the HPWM, new PV power system with higher efficiency, and the related control method

**Index Terms:** Power System, Output Voltage, Dc source Voltage, Single-phase Transformerless Inverter, PV panel, DC-link voltage.

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#### INTRODUCTION

The Photovoltaic (PV) power systems have become very popular among the renewable energy sources, because they generate electricity with no moving parts, operate quietly with no emissions, and require little maintenance. Distributed grid connected PVs are playing an increasingly role as an integral part of the electrical grid. Due to the large stray capacitors between the PV panels and

the ground, PV systems suffer from a high common mode current, which reduces the system efficiency and may cause safety issues like electric shock. In order to eliminate the leakage currents, transformers are commonly used in the PV system to provide galvanic isolation. The leakage current still exists due to the parasitic capacitor of the switch and stray capacitance between the PV panel and ground.

PV system applications. Which can be used as Buck-Boost the input voltage, minimizes the Harmonics, increases the efficiency and reduces the cost?

#### OBJECTIVE

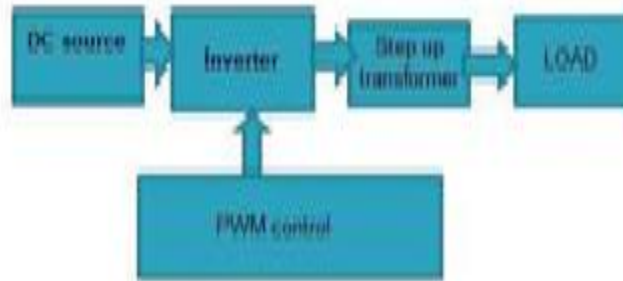
The main objective of the project is to implement a transformer less inverter for a grid tie

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**EXISTING BLOCK DIAGRAM**

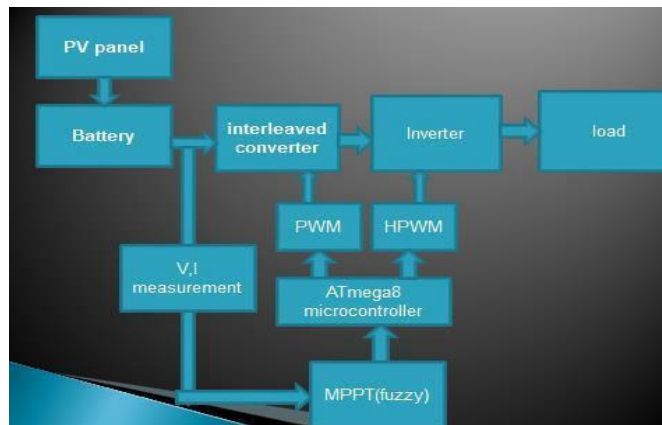


**DISADVANTAGE OF EXISTING SYSTEM**

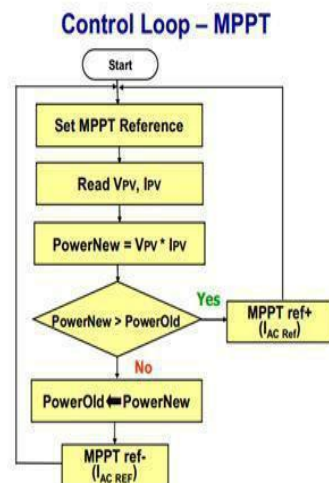
Transmerless losses is high more than 30% losses occurs. In existing system is open loop so there is no voltage stability in output. In open loop if input had fluctuation output voltage varies .so ripples will high.

**PROPOSED SYSTEM**

We implement closed loop fuzzy algorithm with interleaved converter so output voltage is very stable and ripple reduction. If input voltage had fluctuation even though the output voltage will be constant. Fuzzy is new method in optimization technique so response time is very lower than other technique.



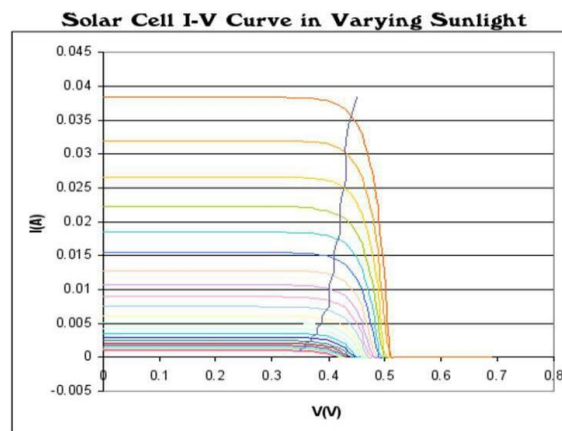
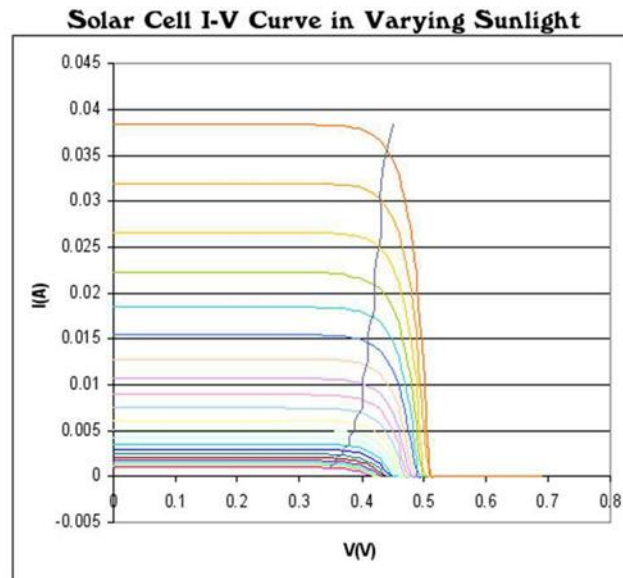
**FLOW CHART**



## BOOST MAXIMUM POWER POINT TRACKING

Match the received converter impedance to the solar panels for maximum power transfer. Several methods with varying degrees. An even simpler method. Constant Voltage (CV). The point of

maximum power transfer occurs at approximately 76% of the open circuit panel voltage. The ratio  $V_{mpp}/V_{oc}$  is relatively constant throughout the operating range. Only voltage sensing is needed on the input.



### Hardware components

- Atmega8 microcontroller
- IRF840 MOSFET
- Inductor
- Capacitor
- 10w 12v solar panel
- 12v battery
- Driver IC IR2110

### Application

- Interface of renewable energy
- As boost converter
- Voltage regulation
- Harmonic filtering
- VAR compensation

## CONCLUSION

From the analysis of transformer less inverter and CMV characteristics, it is inferred that maintaining CMV as constant at conduction and freewheeling modes has completely eliminated the leakage current. The performance metrics of the topologies are compared and verified with simulated results. The MPPT and HPWM has high

efficiency above 95% and THD below 5% satisfying IEEE 1547 standard. Among the compared topologies, HBZVR-D topology has very low leakage current, constant CMV (200V), low THD (1.84%), efficiency (97.57%). Hence it is concluded that the HBZVR-D inverter is an attractive solution for grid tied PV system. 16000 A/m or 0.016 A/m. Figure labels should be legible, approximately 8 to 10 point type.

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