

# A REVIEW PAPER ON SOLAR PANEL

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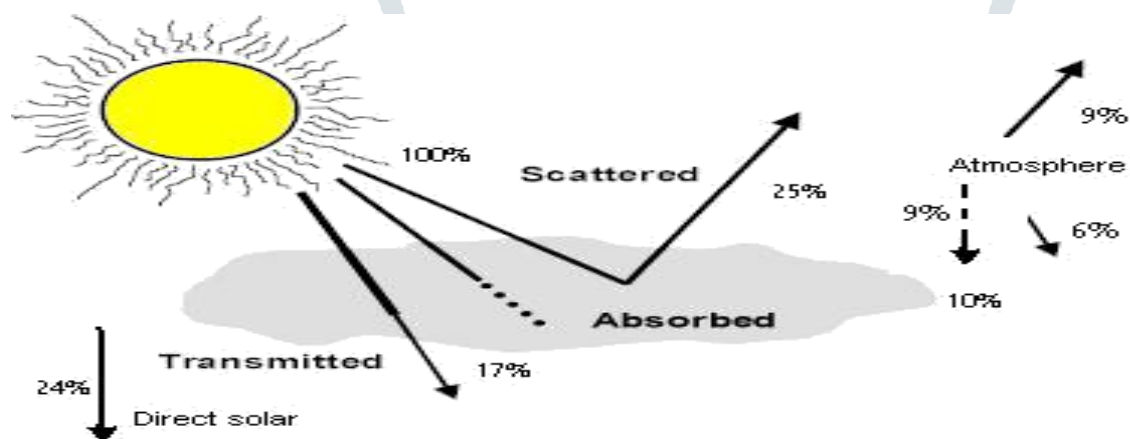
## INTRODUCTION

All over the world there is significant increase in usage of solar energy. Fuel replaced by Solar panel. solar power is now the trend. All the automobile companies have their project works going in Solar power to run vehicles in solar energy. Based on the design of solar panel the entire vehicle is designed because of it being the most dominating feature. The below shows the details and reasons for choosing the panel and the circuits

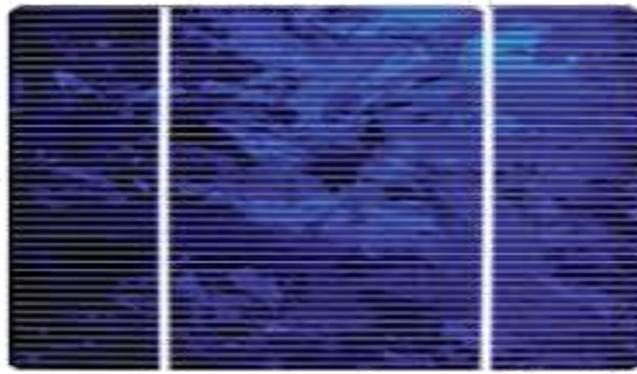
## OBJECTIVE

To design a solar panel to transfer constant 750Watt to the dc motor.

## CONCEPT OF SOLAR PANEL



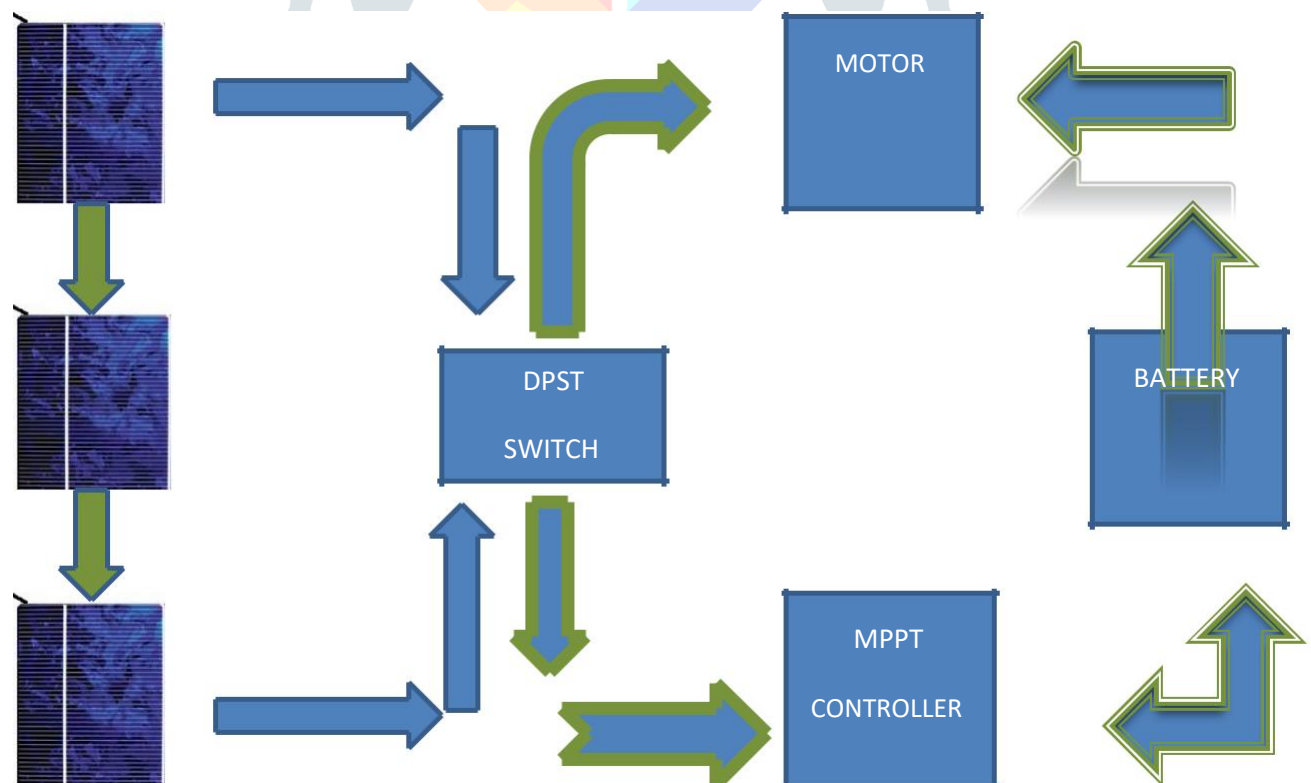
- The surface receives about 24% of the solar energy that reaches the earth. This amount is usable.
- Photovoltaic modules, commonly called solar modules, are the key components used to convert sunlight into electricity. Solar modules are made of semiconductors that are very similar to those used to create integrated circuits for electronic equipment. The most common type of semiconductor currently in use is made of silicon crystal. Silicon crystals are laminated into n-type and p-type layers, stacked on top of each other. Light striking the crystals induces the “photovoltaic effect,” which generates electricity. The electricity produced is called direct current (DC) and can be used immediately or stored in a battery



POLYPHASE SOLAR PANEL

**USAGE:**

COMPONENTS REQUIRED	QUANTITY
Solar panel	3
DPST switch	1
MPPT controller	1
Lead acid Battery	1

**CIRCUIT DIAGRAM OF SOLAR PANEL**

OUTPUT=250+250=250=750Watt

- A DPST switch is used to Change the control directly to motor or to battery and then to motor
- The solar panels are connected in this manner to reduce the loss of current that occur in it.

## SOLAR PANEL SELECTION

A Comparison study was under taken and the following were result were found. Based on commercial availability and cost.

	Monocrystalline	Polycrystalline	Amorphous	CdTe	CIS/CIGS
Typical module efficiency	15-20%	13-16%	6-8%	9-11%	10-12%
Best research cell efficiency	25.0%	20.4%	13.4%	18.7%	20.4%
Area required for 1 kWp	6-9 m2	8-9 m2	13-20 m2	11-13 m2	9-11 m2
Typical length of warranty	25 years	25 years	10-25 years		
Lowest price	50Rupee/W	50Rupee/W	55Rupee/W		
Temperature resistance	Performance drops 10-15% at high temperatures	Less temperature resistant than monocrystalline	Tolerates extreme heat	Relatively low impact on performance	
Additional details	Oldest cell technology and most widely used	Less silicon waste in the production process	Tend to degrade faster than crystalline-based solar panels  Low availability on the market		

**Polyphase solar panel costs lesser than other solar panel.**

- It has high absorption coefficient and has a direct bandgap of 1.4eV

• <b>ADVANTAGES</b>
• LOW COST
• NO NOISE
• HIGH EFFICIENCY

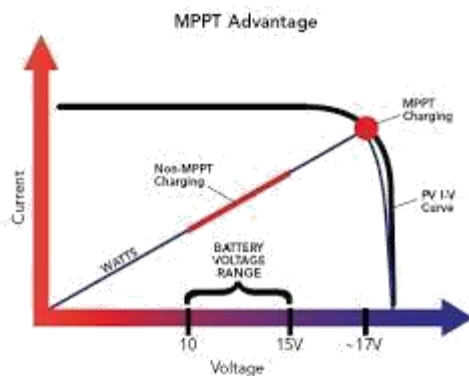
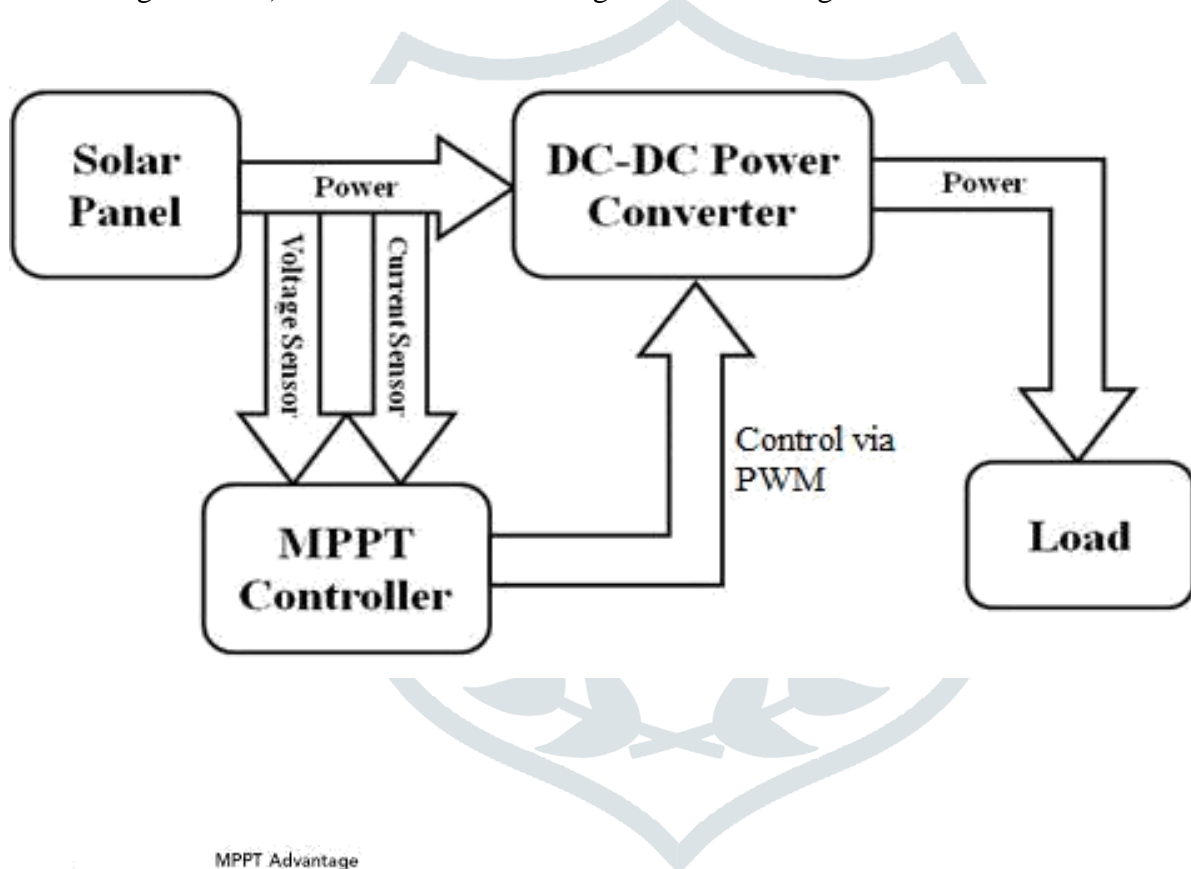
## SOLAR PANELS USED

SIZE	NO	Weight	POWER OUTPUT
5.446*3 SQ.FEET	3	50kg	750Watt

## MPPT CONTROLLER DESIGN

### MAXIMUM POWER POINT TRACKING (MPPT) SOLAR CHARGE CONTROLLERS

A MPPT, or maximum power point tracker is an electronic DC to DC converter that optimizes the match between the solar array (PV panels), and the battery bank or utility grid. To put it simply, they convert a higher voltage DC output from solar panels (and a few wind generators) down to the lower voltage needed to charge batteries.



- MPPT controller is used to transfer the constant power to the battery from varying power output of solar panel.

## CALCULATION

1. Maximum voltage from one cell =0.666V
2. Size of 48V solar panel =(5.446ft\*3ft)X3=49 Sq.ft
3. Maximum voltage from one 72 cells of solar panel at open circuit =0.666\*72 =59.5V
4. The max voltage output at average condition of sunlight at Short circuit =48.5V
5. Maximum current from one 72 cells of solar panel at open circuit =8A
6. The maximum current output at average condition of sunlight At short circuit =5.15A
7. The maximum power output from a solar panel at average condition of sunlight =250Watt
8. Maximum power output from 3 solar panel output =750Watt

These calculated values were verified by practical values and the values are tabulated.

PARAMETERS	THEOROTICAL	PRACTICAL
VOLTAGE(ONE PANEL)	59.5V	48.5V(Max)
CURRENT(ONE PANEL)	8A	5.15A(Max)
POWER(ONE PANEL)	1041.66W	250Watt(Max)
TOTAL POWER(2 PANELS)	3125W	750Watt(Max)

## CONCLUSION

Based on the above parameters and conditions the other components of the vehicle are coordinated to get the maximum out of the vehicle.