

# Efficiency Improvement by Using Design of Combine Solar Photovoltaic and Thermal Panel.

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**Abstract-**In is big issue energy facing in several country because tremendous amount of population increase The best of solution of energy then we can move towards the solar energy best source .In this project we will discuss about we can combined pvt system in install in same panels .we can get electricity as well as hot water as output so can reduced the cost of the system. we also modify the system in such way that efficiency of the system is improve with help of cooling water tank .As known that when temperatures is increases voltage will be drop so that we can get voltage must be constant.

**Keywords-** Photovoltaic, thermal solar plate, temperature.

## 1. INTRODUCTION

A hybrid PV/Thermal (PVT) system, in which heat from the PV panel is removed by a working fluid, can simultaneously convert solar energy into electrical and thermal energy. Compared with separate PV or thermal systems, the hybrid system has several advantages, including high total energy conversion efficiency, low cost, and small installation areas. Solar PVT applications can provide heat and electricity. To achieve high efficiency and significant amounts of power and heat from PVT systems, PV module should be cooled, particularly in areas with hot and humid climate. Thus, the overall efficiency of solar energy is improved. Temperature fluctuations in the base fluid (water) of PVT are significantly less than those in the air-based PVT collectors, which are subjected to varying solar irradiance levels. Over the past decades, various PVT systems or collectors that use water as working fluid for heat removal have been numerically and experimentally studied PV-T technology provides a particularly . They heat and electricity is required at the same time. The energy sector is in transition worldwide because of increasing demand for energy; significantly fluctuating oil prices; stronger desire for energy supply security and independence; and in response to sustainability, conservation and environmental considerations.

### 1.1. Objective of this project

This project is given the hot water as well as electricity and efficiency is improvement of system.

## 2. BACKGROUND

The following are different types of PV/T system which are used in past previous years.

### 2.1. PV/T liquid collector

The water-cooled design utilizes a channel to give direct fluid flow using piping of various materials and plates attached to the reverse of a PV system. The fluid flow arrangement through the cooling element will determine which systems the panels are most suited to. A standard fluid-based system, a function fluid, generally, glycol and mineral oil is then piped through these pipes or plate chillers. The heat generated the PV cells is flow through the metal and absorb by the fluid (presuming that the

function fluid is cooler than the operating temperature of the cells). A closed-loop systems this heat is instead of exhausted (to cool it), or transferred at a heat exchanger, where it flows to its application.

### 2.2. PV/T air collector

The essential air-cooled structure uses a hollow, conductive metal housing to arrange the photo-voltaic (PV) panels. Heat is expand from the panels into the surround space, where the air is behind circulated into a building HVAC system to recapture heat energy, or rises and is vented from the top of the structure. The energy transmits to air is not as reliable as a liquid collector, the infrastructure necessary has cheaper cost and difficulty; basically an empty metal box. Disposition of photovoltaic panels can be vertical or angled.

### 2.3. PV/T concentrator (CPVT)

A concentrator system has the beneficent to less the amount of photovoltaic (PV) cells required, due to this more valuable and accomplished multi-junction photovoltaic cells can be applicable that will expand the ratio of generated large -value electrical power versus lower-value thermal power. Concentrator systems also often necessary credible maintained systems to accurately track the sun and to protect the PV cells from damaging over-temperature conditions. The ideal situation, about 75% of the sun's power directly incident upon them gives can be generated electricity and heat.

## 3. LISTS OF COMPONENTS

- Transformer
- Bridge Rectifier
- filter
- Ic7812
- Voltage sensor/Current sensor
- Temperature sensor
- Arduino
- Lcd display16\*2
- PVT panel
- Hot water storage tank

## 4. CONSTRUCTION

### 4.1 Transformer

A transformer is a static device electrical device that transfers electrical energy between two or more circuit. There are basically two types of transformer that is step up and step down .But in this project we are using step down transformer having a rating 230volt ac/12volt ac.

**4.2 Bridge Rectifier**

Bridge rectifier type of full wave rectifier which is used four or more diode in a bridge circuit configuration to efficiently convert the alternating current into direct current.

**4.3 Filter**

It is remove ac ripple factor and gives the pure dc voltage at output terminal, in this module we used capacitor filter.

**4.4 IC7812**

It is a voltage regulator integrated circuit. The voltage source in a circuit may have fluctuations and would not give the fixed voltage output .The voltage regulator IC maintains the output voltage at a constant value.

**4.5. Voltage sensor/ Current sensor**

Voltage sensor and current sensor they will be voltage and current are sense the by panels generated by plate.

**4.6. Temperature sensor**

By using this module we can control power to most type of electrical device depending upon the temperature sensed by consisting high accuracy NTC temperature sensor

**4.7. Arduino**

The arduino is microcontroller board based on the at Mega328(datasheet). It has 14 digital input / output pins, 6 analog input 16mhz crystal oscillator a USB connection, power jack and ICSP header, and reset Button.

Analog I /p pins: 6

DC C/N per I/O pin: 40mA

DC C/N for 3.3v pin: 50mA,

**4.8 Lcd display 16\*2**

The 16\*2 translates 0 a display 16 characters

Per line in 2 such line. In this LCD each characters is Displayed in a 5\*7 pixel matrix.

**4.9 PVT panel**

The pv/t made of silicon for pv and copper material. Combine that gives the o/p of electricity as well as Hot water. In pv system material are made generally Silicon have good tendency to generate electricity, and thermal plate made for copper plate

**4.9 Hot water storage tank**

Hot storage tank are wrapped in a heat insulation to reduce energy consumption, main tend the desired operating temperature.

**5. BLOCK DIAGRAM**

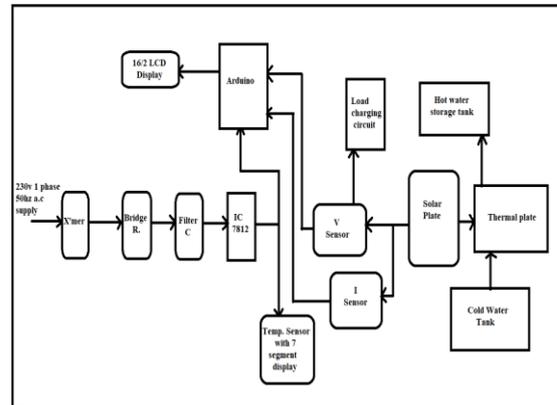


Figure 5.1:-Block Diagram of solar photovoltaic and thermal panel

**6. WORKING**

First we can take single phase ac supply is given to the step-down transformer. The role of transformer is reduced the voltage levels up to 12 v respectively. Then output transformer is gives to bridge rectifier. Function of bridge rectifier is they convert ac to dc current the input of bridge rectifier is again given to filter. Role of filter at

SR NO	TIME	TEMPERATURE	Without water flow in tube and load is connected (Voltage )	With water flow in tube and load is connected (Voltage)	COOL WATER TEMP	HOT WATER TEMP
1	7 AM	27	10.01V	10.02v	18	45
2	9 AM	30	10.03v	10.04v	20	50
3	12 10AM	47	9.67V	10.01V	22	70
4	2PM	50	9.01V	10.17V	27	72
5	3PM	46	9.80V	10.12V	35	67
6	5PM	40	10V	10.02V	23	60

output terminal they provide the pure dc as output then of output filter is given to IC i.e. 7805/7812 then role of IC they gives constant output of voltage then further output IC is given to input of temperature sensor and arduino. In that temperature sensor is used for to measure the temperature at solar panel and arduino is taken as input to the voltage sensor and current sensor they will be voltage and current are measured to voltage and current sensor as input to the arduino they role arduino is to collect analog quantity to digital quantity then output of arduino is given to 16x2 display the display shows reading of physical quantity.



**Figure:- Model of the system**

When light falls on solar plate then they generated solar panel at surface of plate we are provide thermal plate as input of cooling water tank. Thermal plate absorbed heat. When cooling waterflows through the thermal plate tubes the generated hot water this hot water storage in the tank due to the properties of hot water they flows to upper surface of storage tank. At the bottom surface of cooling water is presence. So in this way we are design the system they provide hot water, electricity and efficiency we are improve Implement

#### **7. ADVANTAGES OF SYSTEM:-**

This system is most cost-effective.  
Over panel efficiency is improvement.

#### **8. APPLICATIONS**

- 1 This project more used in hospital because they need hot water as well as electricity need.
- 2 This project used in hotel, domestics purposed as well as agriculture.

#### **9. CONCLUSION:-**

This systems utilized in large applications in various fields such as space heating, domestic and industrial water heating, distillation of water and drying as well as electricity generation. As the thermal collector integration also provides simultaneous cooling of the PV system during electricity generation, it enables the efficiency of the system to be increased as compared to conventional methods. This project deals with PV panels and thermal collectors, which are the main components of PV/T systems, and discusses the advantages of the system. Advanced of photovoltaic-thermal combination, regardless of whether single fluid or a combination of fluids are used, have increased provide the overall efficiency of the system and electrical yield from the PV module by reducing operating temperature of the solar PV panel.

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