

# Solar Panel Cooling System Using Peltier Palte

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**Abstract-** Solar energy is renewable source of energy and more intensive non-polluting energy, the sale of photovoltaic solar power in the stem .The solar panel is reliability and its sale is increased by 40% a year for 10 years. Solar energy had a second boost during energy and pollution crisis. The solar panel station do not work effectively once in temperature exceeds 45 C. solar panel efficiency deceases within increase in temperature above 40 C. Here we are using Peltier plate to increase the life span of the solar panel.to avoid the negative temperature coefficient of solar panel. In this project we are able to known its temperature and output voltage in wi-fi devices.

**Index terms-** Node MCU, Peltier plate, DHT11 sensor.

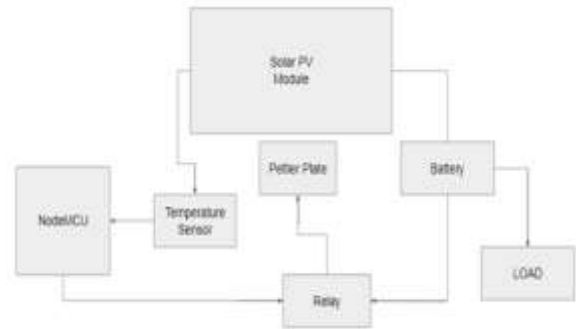
## BACKGROUND

Photons below a threshold wavelength have enough energy to break an electron-hole bond in semiconductor crystal, which in turn can drive a current in a circuit. The solar radiation consists of photons at a range of wavelength and corresponding energies. Photon with wavelength above the threshold is converted into heat in the PV cells.

This waste heat must be dissipated efficiently high cell temperature, which have an adverse effect on the electrical performance of the cells. The cells are the most expensive part of a photovoltaic system.

When photovoltaic cells are used under concentrated illumination, they experience a high heat load because the photons not converted to electricity are dissipated in the cells as heat.so to make it successful photovoltaic concentrator is a cooling system which can efficiently remove the dissipated heat while keeping the cells at the desired temperature. Peltier plates to maintain the solar well as we can monitor it online

## BLOCK DIAGRAM



HARDWARE USE

NodeMCU, Peltier plate, Battery, temperature sensor, Relay, Solar panel.

Software used: Audino IDE compiler

Overview: The sensor gives signal to NodeMCU which is programmed to get the temperature online .if the temperature of solar PV module rises above 40 degree c then the relay will turn ON by NodeMCU to turn ON the Peltier plates to decrease the temperature below 30 degree of the PV module.

The power supply is provided by the battery.

Hardware description:

- NodeMCU ESP12

It is microcontroller having 2.4GHz wifi connectivity and program via Arduino IDE.



- Temperature sensor

Its usable temperature range (-55 to 125 C), compatible with Arduino board. It has the accuracy more accuracy.



- Peltier plate

It is of cooling type, usage in refrigerator/warmer/generator



- Solar panel

Total power of 12W with maximum output current be

1 Amp with voltage 12V.



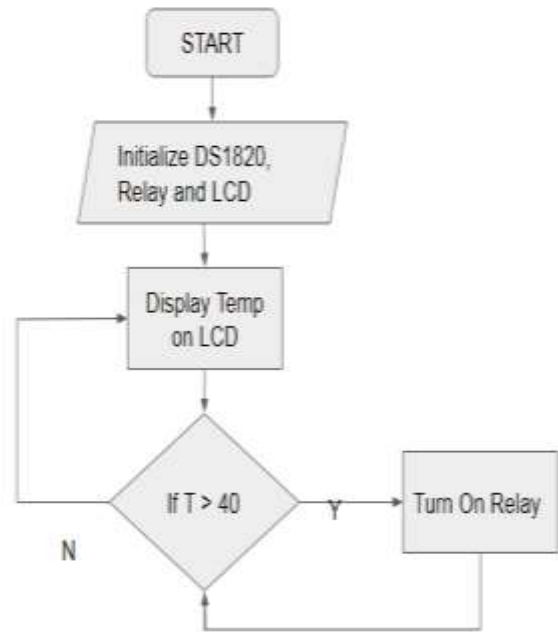
- Battery

Rechargeable sealed Lead Acid Battery with 6V and 1.2 Ah

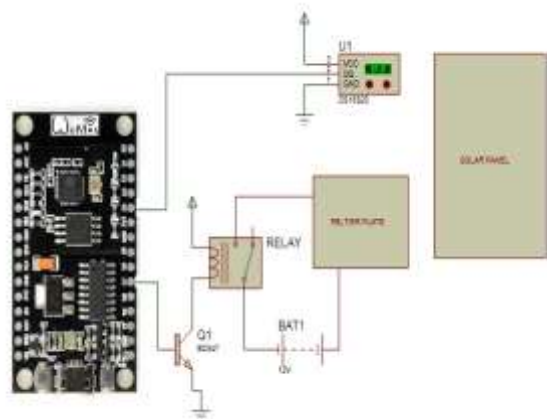
- Software

Embedded C for language with Arduino compiler and cloud server are used in database.

FLOW CHART



CIRCUIT DIAGRAM



CIRCUIT DESCRIPTION

- 1 NodeMCU Pin D4 is connected to Temp Sensor DHT11
- 2 Peltier plate will switch ON/OFF by using Relay which is controlled by Transistor BC547 connected to Node pin D7

- 3 The NodeMCU is wifi controller so we can program it to access via IP address on web browser
- 4 We Also try to send the data to cloud server to monitor the Voltage graph online

#### WORKING

- 1 The temperature sensor is connected to the solar PV module
- 2 The sensor gives the signal to NodeMCU which is the programmed to get the temperature online.
- 3 if the temperature of solar PV module rises above 40 degree C then the relay will turn ON by NodeMCU to turn on the Peltier plate to decrease the temperature of solar panel.
- 4 The power supply is provided by battery.

#### IMPLEMENTATION

- Xoscillo, an open-source oscilloscope
- Scientific equipment such as the Chemduino
- Arduinome MIDI controller Monome , a device that mimics the
- OBDuino trip computer on-board diagnostics , a that uses the interface found in most modern cars
- Ardupilot, drone software / hardware
- ArduinoPhone, a do-it-yourself cellphone

#### RESULT

- The sensor gives signal to NodeMCU which is programmed to get the temperature online
- If the temperature of solar PV module rises above 50 degree C then the Relay will turn ON by NodemCU to turn ON the peltier plates to decrease the temperature below 30 degree of the PV module

#### REFERENCES

- [1] Mr. Swapnil B Patondet. al., —Experimental Analysis of Solar operated thermo electric heating and cooling systeml. IJETT Volume 20 Number 3 Feb-2015
- [2] Chetanjangondaet, al., —Review of Various Application of Thermoelectric Modulel.

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- [3] Prof. Pushkarny B.H et, at., —Solar Refrigeration Using Peltier Effectl. IJRAME ISSN (ONLINE): 2321-3051 Vol.4 Issue 2, February 2016 Pgs: 67-74
- [4] B. I. Ismail and N. Alabdrabalnabi —Design and Performance Characteristics of a Portable Solar-Driven Thermoelectric Heat Pump under Thunder Bay Extreme Cold Conditions in Northwestern Ontario, Canada. Journal of Green Engineering, Vol. 4, 117–134. do: 10.13052/jge1904- 4720.422
- [5] Investigation of the Effect Temperature on Photovoltaic (PV) Panel Output Performance IJASE Vol.6 (2016) No. 5
- [6] The Effect Of Temperature On The Performance of PV Array Operating Under Concentration, International Journal Of Scientific & Technology Research Volume 4, Issue 08, AUGUST 2015 ISSN 2277-8616
- [7] Experimental Investigation of Module Temperature Effect on Photovoltaic Panels Efficiency, Journal of Polytechnic, 2016; 19 (4) : 569-576
- [8] Performance Evaluation and Enhancement of Solar PV Panels, International Journal of Scientific & Engineering Research Volume 9, Issue 2, February-2018 1994
- [9] arduino.cc/