[NC-Rase 18]
DOI: 10.5281/zenodo.1488719

ISSN 2348 – 8034
Impact Factor- 5.070

GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES

SOLAR MAXIMUM POWER POINT TRACKING AND ITS APPLICATION TO GREENHOUSE

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ABSTRACT

In this paper the solar maximum power point tracking system applied on to the Green House Which is very low costing required low voltage and getting high efficiency in output is presented. The main controlling element that is micro controller whose program is done in C language. In this paper additionally we buck power is used to drive fans of green house.

Keywords: *Microcontroller, maximum power point tracking, Green House.*

I. INTRODUCTION

The world contains the fossils fuels which are in the form of renewable energy source and non-renewable energy sources. From the conventional energy sources the environmental pollution is increased, this local is maintaining so used renewable energy sources. It is the need of today's world, the conventional energy sources are replaced by the renewable energy sources. Here, we discuss about the solar energy it is the most important source and for this energy is stored in the solar panel. This solar panel is made from the PV cells that is photovoltaic cells. The PV generation is increased as assume that and the importance of the renewable energy sources application because of more advantages such as high dependability, simplicity of allocation, absence of fuel cost, low maintenance and lack of noise and wear due to the absence of moving parts. The main characteristics of the solar energy is that the, it is clean, pollution free and inexhaustible energy source.

II. RENEWABLE ENERGY

The energy which has unlimited sources, such as solar, wind, biomass, biogas, small hydro. Renewable energy excluding large hydro projects accounts for 90 % of the total installed energy capacity equivalent to 12,610 mw.

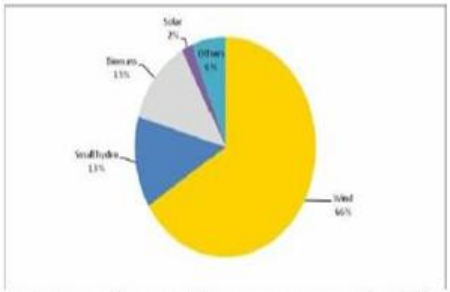

Fig.1Percentageofrenewableenergygenerationin India

III. GREENHOUSE

A greenhouse (also called a glasshouse, or, if with sufficient heating, a hothouse) is a structure with walls and roof made chiefly of transparent material, such as glass, in which plants requiring regulated climatic conditions are grown. These structures range in size from small sheds to industrial-sized buildings. A miniature greenhouse is

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known as a cold frame. The interior of a greenhouse exposed to sunlight becomes significantly warmer than the external ambient temperature, protecting its contents in cold weather.

Many commercial glass greenhouses or hot houses are high tech production facilities for vegetables or flowers. The glass greenhouses are filled with equipment including screening installations, heating, cooling, lighting, and may be controlled by a computer to optimize conditions for plant growth. Different techniques are then used to evaluate optimality-degrees and comfort ratio of greenhouse micro-climate (i.e., air temperature, relative humidity and vapor pressure deficit) in order to reduce production risk prior to cultivation of a specific crop.

Photovoltaic effect

When the large amount of power are collect on the PV cell and electrical field is that present so the voltage and current charges are separated. In the presence of electric field the charge particles can be produces a current which is used in an external circuit. The higher level of the light intensity, the more electrons can be unleashed from the surface, the more current is generated. Software dedicated to the simulation of PV system it can be extensive and precise analyzes.

MPPT

MPPT is a algorithm, that included in solar charge controller used for extracting maximum power available from the PV module. The voltage at which PV model can produce maximum power is called as maximum power point. There are two tracking system manually and automatically the automatically tracking system is preferred as compare to manual tracking, this tracking system can be perform by various algorithms

1. Perturb and Observe.
2. Incremental conductance
3. Constant voltage method.

The algorithms are implemented in a personal computer for implanting the maximum power point tracking.

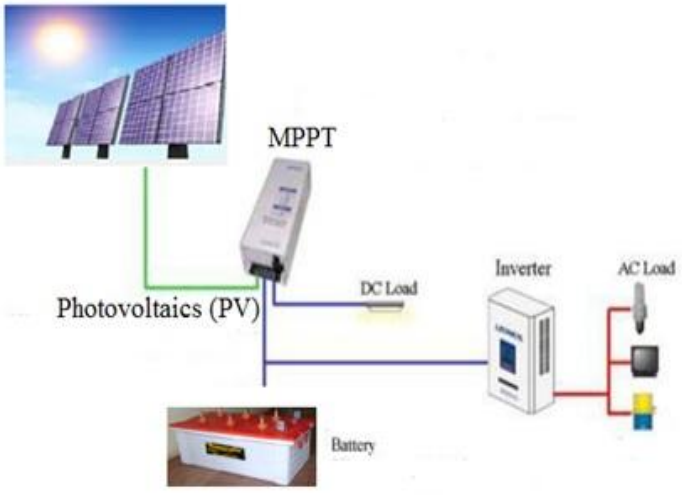

Fig.2 Maximum power point tracking

Hardware

- Solar panel:-It is the package of internally assembly of the photovoltaic cell. For this project we used 17V 10 W solar panel.
- DC Motor (20rpm):-Here we used the DC motor for the application of changing the angle of the panel as per the sun rays.
- Relay (6V dc):-Relay is a component which is operated as the electrical switch. Some relays are operated as an electromagnetic switch. It is used for the application, to control the circuit by a low

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power signal. Here, the purpose of utilizing the relays to controlling the water pump and water air pump.

- Sensors:-Sensors are the electronic component which having the property of sensing the physical quantity. Here we use the different types of sensors such as temperature sensor, humidity sensor, day and night sensor.
- Temperature Sensor:-This sensor is used for sensing the temperature which is present in the environment.
- Humidity Sensor:-This sensor sensing the moisture which is present in the soil.
- Day and Night Sensor:-This sensor check the condition whether the mode is day or night, if it is day then microcontroller starts the program. If the mode is night then program will be stop. For checking the condition of day here using the LDR on the panel.
- ADC0808/0809:-This is the data acquisition component which is a monolithic CMOS device with the analog to digital converter. It is the 8bit compatible A/D converter with 8 bit channel multiplexer this 8 bit A/D converter is used as a successive approximation register.
- KIA7805AP:-This is the type of voltage regulator, which is a three terminal IC suitable for the CMOS TTL. It having the feature of internal thermal load and internal short circuit current.
- ARM Controller:-Here the ARM Controller is used as a microcontroller, the arm controller is monitor the environmental condition.

Advantages

- Highly sensitive.
- Works according to the sun direction.
- Fit and forget system.
- Low cost and reliable circuit.
- Complete elimination of manpower.

Applications

- Street lights
- Hotels, hostels and household applications.
- Garden lights.
- Offices.
- Industries.

IV. METHODOLOGY

The complete model of the solar microcontroller based greenhouse system working on the principle of maximum power point tracking will be explained in the following steps:

- The complete layout of the system is drawn below the diagram.
- Day and night sensor will check the condition of day or night and the output is given to the microcontroller.
- The solar panel will be mounted at an optimum angle of 67 degree in the month of April for the latitude of the Chandigarh as referred from the solar electricity handbook 2013.
- Identification of the maximum power point voltage and maximum power is received by the photovoltaic panel.
- The maximum power will be detected by the algorithm of MPPT developed, then applied to A/D converter and store in the microcontroller.
- The motor and the panel will be stopped when the maximum power will be re and it will start the charging the battery.
- The sensor checks the soil, humidity and temperature condition and solar energy stored can be used to run the water air pump so as to maintaindifferent parameters at an optimum level.

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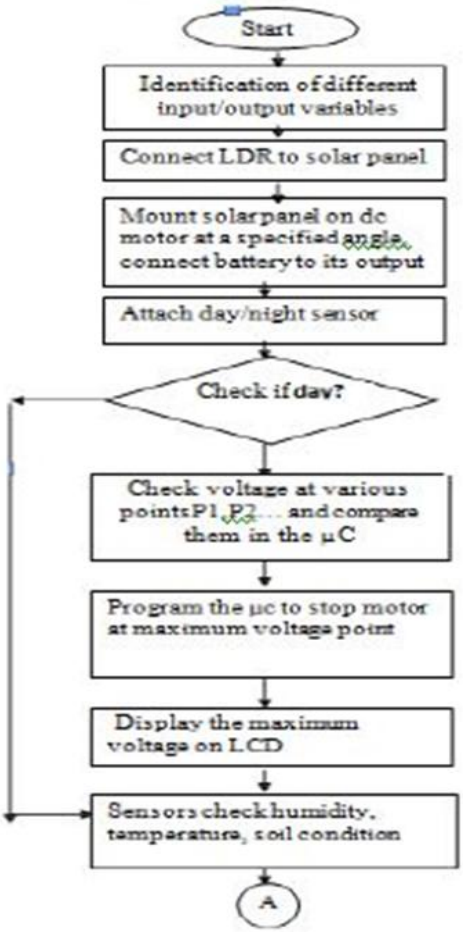
IV. FLOW CHART



Proposed algorithm for mppt

- Firstly identify the input variables name such as temperature, solar radiation, voltage and current obtained on solar panel and the humidity condition is sense by the humidity sensor, temperature sensor and LDR.
- Mount the solar panel at on the angle of 82 degree to vertical on dc motor as referred by the photovoltaic panel.
- Make RAM of microcontroller is clear and initialize the starting data in the microcontroller. Write the LCD information in the controller.
- Check the mode of day and night by the sensor.
- If there is detected the Day mode the microcontroller will rotating the motor and hencesolar panel to tracking sun at a specific angle. The angle of being approximately in the range of 5 to 30 degree of each time.
- The microcontroller checks the voltage which is obtained at various points and it compare their values and stops the PV panel at the maximum voltage point.
- If there is the temperature and humidity is obtained optimum then no action will be take place if there so no obtained the more values the n microcontroller switches on an air fan.

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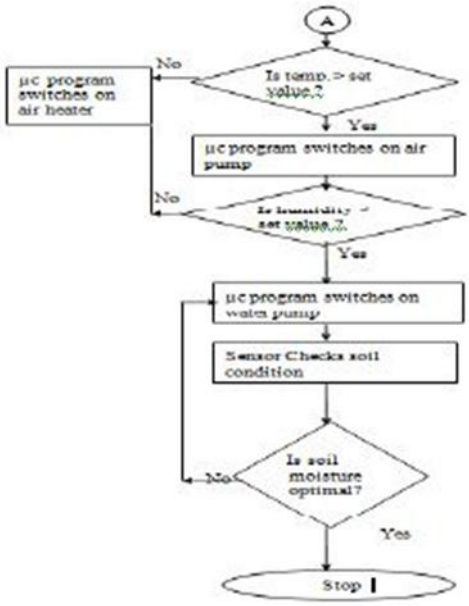

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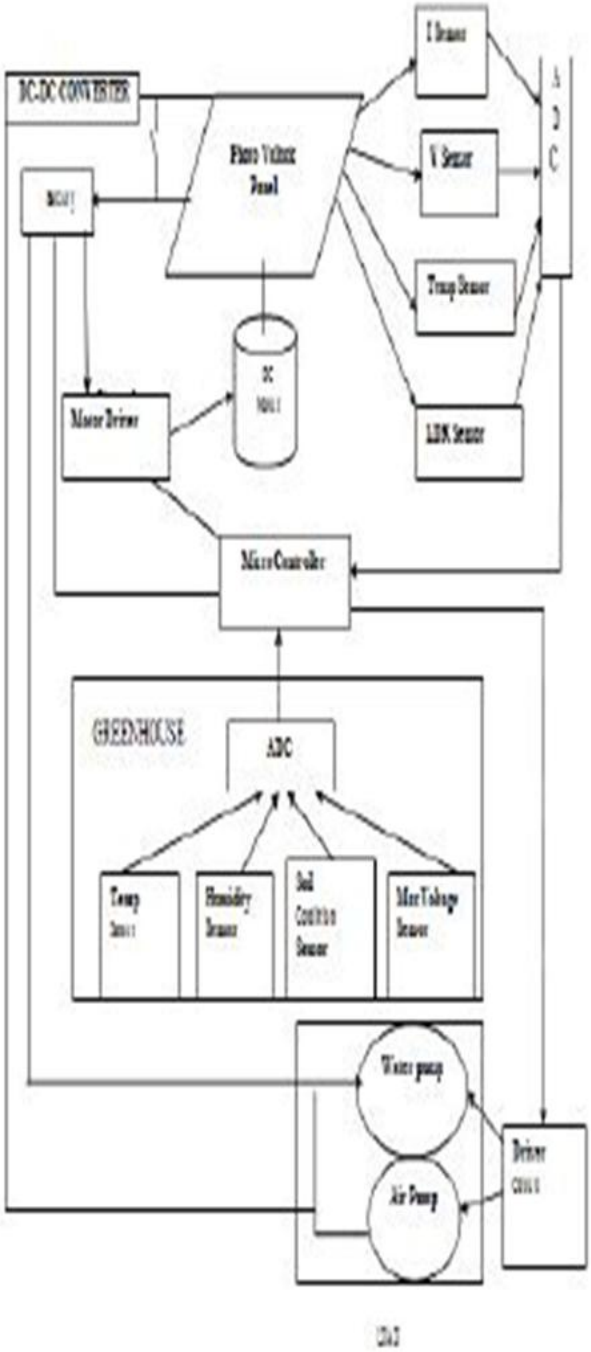
V. BLOCK DIAGRAM



V

Fig.3 Block diagram

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V. LITERATURE SURVEY

The research work is going on for the maximum power point tracking system. In this project the MPPT algorithm is used for tracking the maximum power. Here we used the ARM Controller for monitoring the environmental conditions of Greenhouse and also provides the necessary precautions to be taken for yield to increase.

Hence this project implementation we can generate the power and the generated power is used by ARM controller for controlling the environmental conditions of greenhouse .Further the generated power can be used for the other real time applications.

VI. CONCLUSION

Here the conclusion is that, the development of solar greenhouse is based on the maximum power tracking with various parameters being controlled by microcontroller and maintained further to an optimum value required for adequate growth of plants using the solar energy.

An increasing the output of solar panel due to Implementation of maximum solar power tracking system.

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