Solar Energy measurement using Arduino Board

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Abstract: The Aim of this project is to measure the solar energy using arduino board. In this project, the parameters that are going to be measured are temperature, light intensity, voltage and current. Temperature sensor measures the temperature while the LDR sensor measures the light intensity. The voltage was measured by using the voltage divider since the voltage generated by the solar panel are large for the arduino as receiver. Finally the current will be measured by using the current sensor module that can sense the current generated by the solar panel. These parameters receives the input value from the arduino and the output was displayed at the LCD screen. The LCD screen displays the output of the temperature , the voltage and the current value. The function of the arduino is to convert analog input of the parameter to the digital output and displays it through LCD screen

1.Introduction :

Due to the rise of global warming and extreme weather conditions, many existing countries have forced to look after the alternative sources in order to reduce dependence on fossil based fuels like coal and etc., solar energy is one of the most promising renewable resources which is currently being used all over the world to contribute for making rising demands of electric power.

Solar power is a conversion of sunlight into electricity, the sunlight is collected either directly by using photovoltaics (PV) or indirectly using concentrated of the solar energy. Photovoltaics was initially used as a power source for a small and medium size applications. It is powered by a single solar cell to a remote homes. As the cost of solar electricity has fallen, the number of solar photovoltaics systems has grown into millions.

Solar power stations produces hundreds of mega watts. Solar PV is becoming inexpensive and becoming low carbon technology to harness renewable energy from the sun.

The purpose of this project is to improve the power collection efficiency with developing the track of solar panel. In order to maximize the generation of output power of the solar panel arduino is used.

Concentration of solar energy from the sun using light rays is a point by using lens (or) mirror and tracking system . the light from the sun also produce heat .

2. Specification of components :

The main components that are used in this project are :

2.1 solar cell :

The solar panel which is used is of polycrystalline type . It runs with 12V, 250 mA, 3W as a source. The size of the solar panel is 145mm *145mm which is shown in the figure 1

Fig (1) : the solar panel of poly crystalline

type

2.2 Arduino board :

The Arduino UNO is a microcontroller board based on the ATmega328 data sheet as shown in figure (2). It comprises of 14 digital input and 6 output pins. The clock speed of arduino board is 16 MHz.

Fig(2) : Arduino Board

2.3 Circuit simulation :

The power generated from the solar panel is 12V approximately . In the circuit we have all the four sensors to measure the parameters. At last the LCD displays the output that have written in the coding.
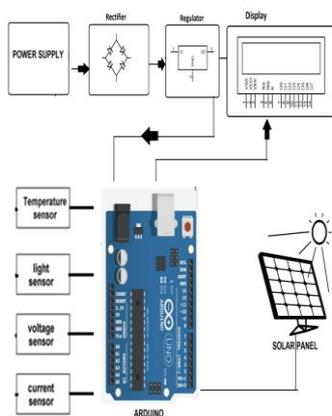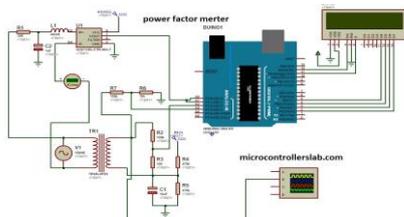

Fig (3) : The block diagram

Fig (4) : simulation circuit

3 . Domain :

This project comes under the domain Embedded systems. In this project the hardware used is Arduino UNO board and the software used is Embedded C

The hardware i.e, Arduino UNO is used to generate the power supply to all the sensors. It is inexpensive and simple to construct.

The software is used to encode the program to simulate the circuit and processing the output.

4 .Future scope :

This gives information about the world with which to make the informed decisions. The measurement of solar energy is useful in the same way that records of rainfall are useful.

The data may also be useful when it comes to deciding how much sun screen to wear (or) for physicians looking to study the rates of skin cancer in relation to rate of solar radiation exposure.

5. Results :

The light intensity that have been recorded when the light rays falls on the solar panel is measured in LUX. The minimum and maximum amount of temperature will be obtained with respect to the light rays. the temperature is measured in degree Celsius while the voltage is measured in volts. Finally the current is measured in amperes with respect to the voltage.

6. conclusion :

Finally the project will achieve the four parameters i.e, temperature, light intensity, voltage and current. This parameters will be measured with respect to their corresponding sensors. The solar power will effectively energized the electricity when it is in the best position.

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