

AUTOMATIC SUN TRACKING SYSTEM

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Abstract— In it uses solar cells to produce electricity. While the output of solar cells depends on the intensity of sunlight and the angle of incidence. It means to get maximum efficiency; the solar panels must remain in front of sun during the whole day. But due to rotation of earth those panels can't maintain their position always in front of sun. This problem results in decrease of their efficiency. Thus to get a constant output, an automated system is required which should be capable to constantly rotate the solar panel

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is generated. Solar trackers can increase the output of solar panels by 20-30% which improves the economics of the solar panel project. Its major components are:

- Solar Panel
- Power supply circuit
- Microcontroller
- Stepper motor

INTRODUCTION

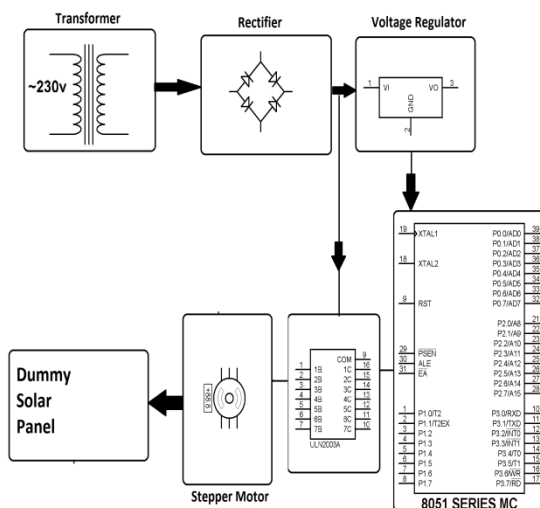
This solar tracking system is a power generation method of solar energy. One of the most promising technology of converting solar energy to electrical energy is Photovoltaic effect. A solar tracker is a device in which solar photovoltaic panels are mounted towards the sun by using photo sensors connected with motor. It is one of the simple and cheaper way for producing electricity. This structure of solar tracker moves with position of sun over the course of day in order to produce maximum KW hours. The heart of this circuitry is microcontroller for tracking and generating power from sunlight and controls the direction of motor to get maximum light intensity. In 2013, china was the leader of new PV installations and ranks now second behind world leader Germany in total capacity. The worldwide photovoltaic capacity grew that year by 38 percent to a total of 139 GW. Solar tracking system will help us to utilize sun's energy in a efficient way..

I. FUNCTIONAL PRINCIPLE

This tracking movement is achieved by coupling a stepper motor to the solar panel such that the panel maintains its face always

perpendicular to the Sun to generate maximum energy. This is achieved by using a programmed microcontroller to deliver stepped pulses in periodical time intervals for the stepper motor to rotate the mounted panel as desired. The microcontroller used in this project is from 8051 family. The stepper motor is driven by an interfacing IC as the controller is not capable of handling the power requirements of the stepper motor. The project is provided with a dummy solar panel which can be used for demonstration purpose only. Trackers are used to keep solar collectors/solar panels oriented directly towards the sun as it moves through the sky every day. Using solar trackers increases the amount of solar energy which is received by the solar energy collector and improves the energy output of the heat/electricity which

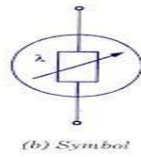
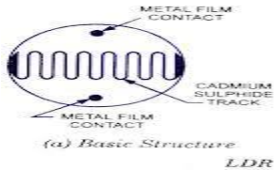
II.BLOCK DIAGRAM



II. WORKING

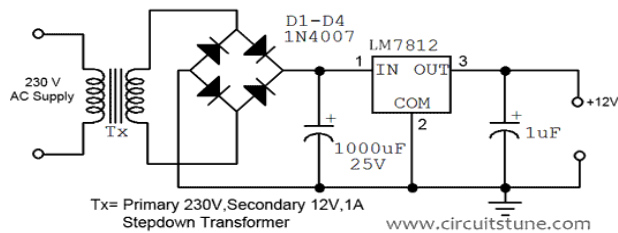
1) LDR Theory:

A light dependent resistor is a device whose resistance is a function of light intensity. The resistance of photocell is inversely proportional to the light intensity. Suppose we place two LDR'S nearby and place a metal sheet in between two sensors and sun is on right hand side and position of panel as shown in fig.(a). SO LDR2 will receive more light and LDR1 will be in dark. On sensing this the microcontroller will rotate motor to right until it senses light on both sensors as shown in fig. (b).



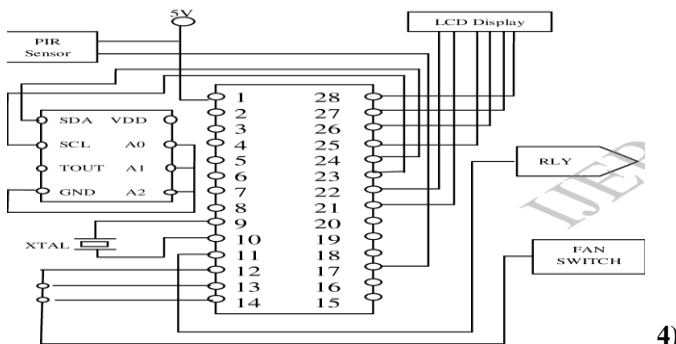
2) Power supply circuit:

The aim is to design power supply section which converts 230V AC to 5V DC. It is preferred to use a transformer with a current rating of 500mA. Here the diode used is 1N4007 as it can withstand higher voltage of 1000V. The 7805 Voltage regulator IC used has an input voltage range of 7V-35V provides a regulated voltage of 5V for microcontroller.



3) Microcontroller Section:

We can use 8051 family microcontroller for our application. We can use AT89C51 series of 8051 microcontroller but it is more convenient to use AT89S52 controller because of inbuilt ISP (inbuilt system programmer) option. It is a 40 Pin microcontroller.



Stepper motor:

It is a position controlled device which is used to translate electrical pulses into mechanical movement of solar panel. The leads of stator winding is controlled by 4 bits of 8051 port. Stepper motor is interfaced with microcontroller using driver ICULN2003.

IV.CONCLUSION

Here we studied sun tracking system based on 8051 microcontroller. The basic thought behind this study is to get maximum utilization of

renewable sources of energy namely Sun's energy for power generation. The tracker can initialize the starting position itself which reduces the need of large number of photoresistors. Use of microcontroller has made the system lighter as less number of components are used. Since it is software based there is less chances of error and is cost effective way of energy generation. This application is adopted widely because its basic requirement is sun's energy which is free of cost. It has a bright future scope further.

V.REFERENCES

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