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Energy Efficient Solar System

Abstract

This paper shows the potential benefits of the solar tracking system by using real time clock and microcontroller. This method is developing the systems that increase the efficiency of the system that tracks the sun rays in to its right angle. The solar tracking system is designed and experimentally tested.

Keywords: *Power Optimization From Renewable Energy Source.*

1. INTRODUCTION

The electricity is generated by developing the photovoltaic material and subsequent development of solar cell- a semiconductor material that converts a direct light in to the direct current. By using solar arrays a series, a series connected solar cells generated a dc voltage that directly connected to the load.

This alternative power source is in the recent years achieving a greater popularity especially the realization of shortcomings of the fossil fuels and other generating of energy resources. The use of renewable energy to generate electrical energy by recent 75 to 100 of years. By using this system we can reduce the converter losses, storage losses and light gathering losses. The light gathering is dependent on the angle of incident of sun rays and the solar cell surface, when the sun rays are perpendicular to the surface of the solar plate then the efficiency of the solar cell is maximum. The main objective to create this system to reduce the incident angle between the sunrays and solar cell.

2. ANGEL OF ROTATION

Total angel of rotation in 12 Hours = 180 Degree

So angle of rotation in 1 hr. = $180/12 = 15$ Degree

Hence we give 1 hr Delay to dc motor by programming of microcontroller and panel rotate every one hour and panel adjust perpendicular to the sun rays.

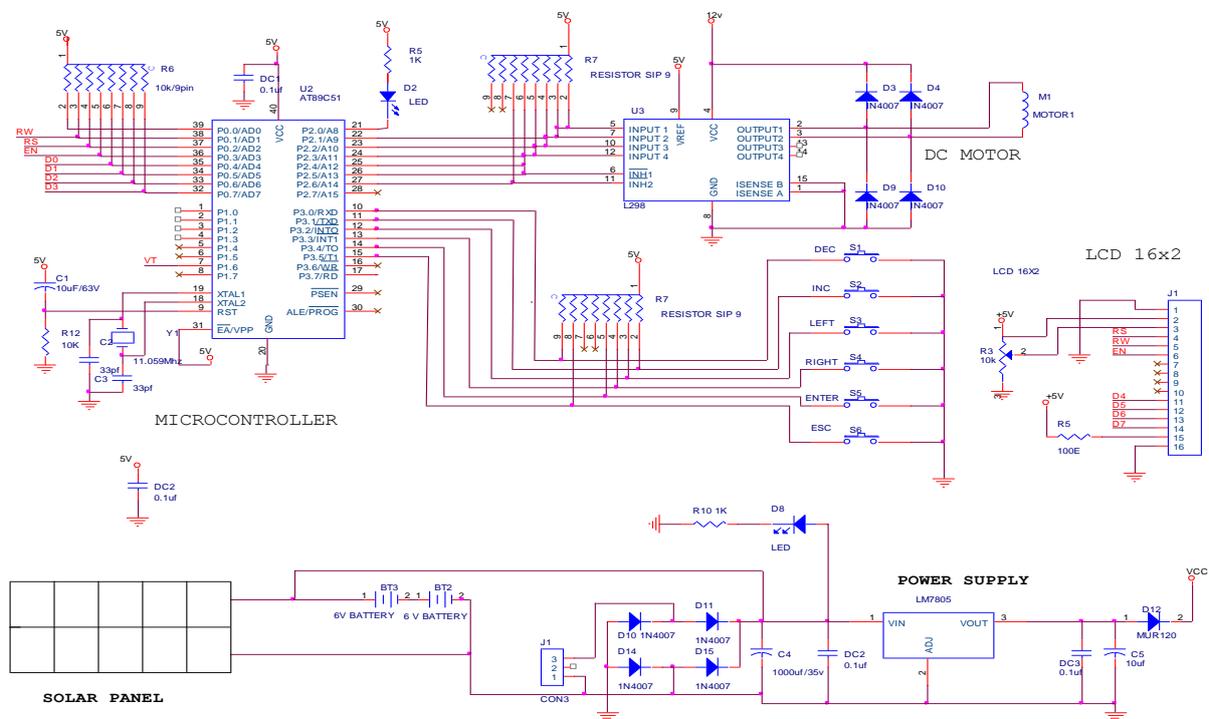


Fig. No. 1 Schematic Diagram of Solar Tracking System

3. Description of Circuit Diagram

Fig No.1 shows The Actual circuit of the solar Tracking system Project, and the Working of the system is given below The RTC Gives Real time clock pulse signal on hourly basis to the microcontroller and microcontroller detect this signal and operate the DC Motor through the L298 Driver IC Then solar panel rotate at appropriate speed set as per microcontroller programming and it holds the solar panel perpendicular to the sun rays whole day, and gives maximum power output as compare to fixed panel. Solar panel will convert sun rays into electricity. Battery will be charged through solar panel. Stored charged will be used as a power source for working of circuit. RTC will continuously detect time and will provide signal to micro-controller. Micro-controller will drive the motor as per table. The time will be displayed on the LCD display connected to micro- controller. By using inverter we can connect AC load to system.

4. RESULT

Sr.No.	TIME	VOLTAGE (V)	CURRENT (A)	POWER (W)
1	7am	10	0.11	1.1
2	8	17	0.50	8.5
3	9	17.5	0.53	9.01
4	10	17.5	0.54	9.18
5	11	18	0.6	10.8
6	12pm	18	0.6	10.8
7	1	18.5	0.63	11.65
8	2	18	0.59	10.62
9	3	18	0.58	10.44
10	4	17.5	0.55	9.62
11	5	17.4	0.53	9.22
12	6	9.8	0.10	0.98
13	7	3	0.04	0.12
TOTAL	12 Hours			102.04 W/D

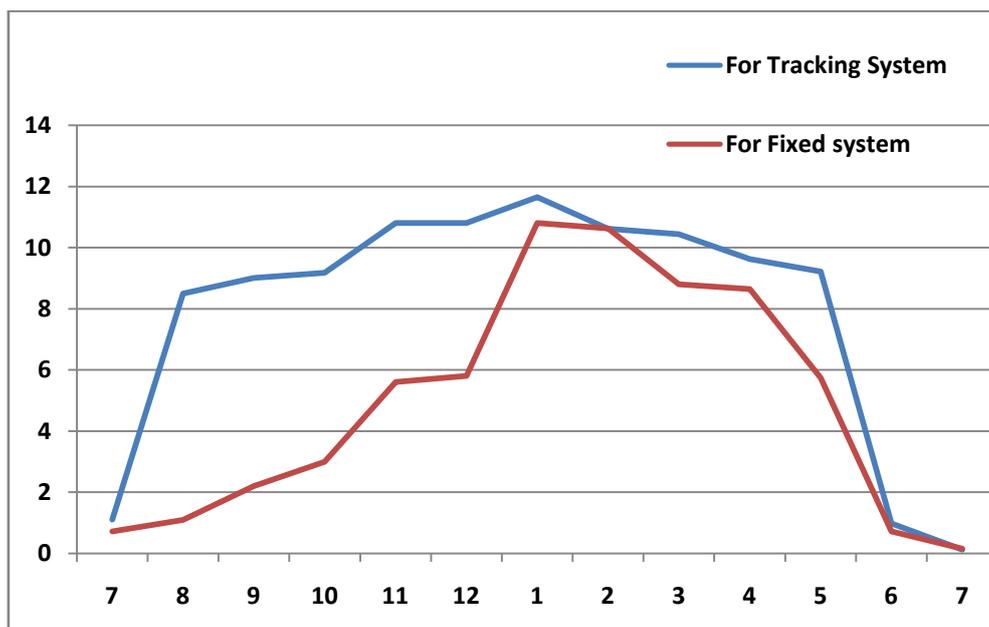
Table No. 1 tracking System

Sr.No	TIME	VOLTAGE (V)	CURRENT (A)	POWER (W)
1	7am	8	0.09	0.72
2	8	10	0.11	1.1
3	9	11	0.20	2.2
4	10	12	0.25	3
5	11	14	0.40	5.6
6	12pm	17	0.50	8.5
7	1	18	0.60	10.8
8	2	18	0.59	10.62
9	3	16	0.55	8.8
10	4	16	0.54	8.64
11	5	14	0.41	5.74
12	6	8	0.9	0.72
13	7	4	0.04	0.60
TOTAL	12 Hours			66.66W/D

Table No. 2 Fixed System

5. POWER OUTPUT COMPARISON BETWEEN FIXED AND TRACKING SYSTEM ON 22 & 23 MARCH 2014

Scale: On X-axis: 1cm=1hr, On Y-axis: 1cm=2watt



From the above graph we can see that the tracking system gives maximum power output between 9 am to 5 pm. And other graph show the maximum output only 12 pm to 4 pm. So the we conclude that the tracking system is better energy efficient solar system than fixed panel system.

6. CONCLUSION

A solar tracking system is design to employ the new principle of self-adjusting features of solar cell as a light sensor as well as providing various indications of their relative angles to the sun rays by detecting the voltage output. By using this system we can increase the efficiency of the solar cell 30% more than the tracking system.

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- [8] Damm, J. Issue #17, June/July 1990. An active solar tracking system, HomeBrew Magazine. Fig. 4 Solar reference cells at a significant angle to the sun World Academy of Science, Engineering and Technology 41 2008315