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SUN TRACKING SYSTEM

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Abstract

In the last years, the need for different kinds of energy, pollution, using fossil fuels and reduction of current energy sources have pushed people to search for new technologies and renewable energy sources. Therefore usage of sun has shown a noticeable increase.Sun is preferrable in a lot of fields because it is cheap, easy to convert into other energies and also it can easily manage with the solar panels. Sun tracking system is one of the great usages of sun. In order to sense the intensity of light light Dependent Resistors have been used. Basically this system works according to position of the sun.

Keywords- Solar Enegery, Sun Tracking System, Renewable Energy source, Light Dependent Resistor

1. INTRODUCTION

In today's world because of high technology, energy becomes one of the main needs. But this also caused an energy need which doesnt cause any enviromental pollution. This is basically why people lead themselves to renewable energy sources. Renewable enegry can come from sun,wind and rain etc.[1]

In this paper the sun tracking system with two axis will be presented. This system will follow sun's rays in the daylight. System efficiency increase, power generation by setting the equipment to get maximum sunlight automatically, will be proposed with the system. Project software, automatic control systems, electrical machines, power electronics and mechanics belong to the work area as many techniques have been used. Essentially this system will perceive the maximum intensity of light. If there is a decrease in intensity of light, system will automatically change its direction using a motor to get a maximum intensity of light.

Our system can be used for homes or small factories which would like to keep their budget balanced for a long time by saving engery.

2. WORKING PRINCIPLE

Our sun tracking system consists of few elements and It has two axises. These elements are ; Two light dependent resistors(LDRs), 2x10K resistors, 2x10K potentiometers, BD 547 BC 557 transistors, 4x1N4004 diodes, LM358 integrated circuit and DC motor.

The main idea of our circuit is comparing two voltages by using two comparators (LM358 OPAMP) If the light intensity on a LDR shows increase, naturally its resistance will decrease. This is why we connect two series resistor on the leg of LDR. This working principle is summarized below in the figure.

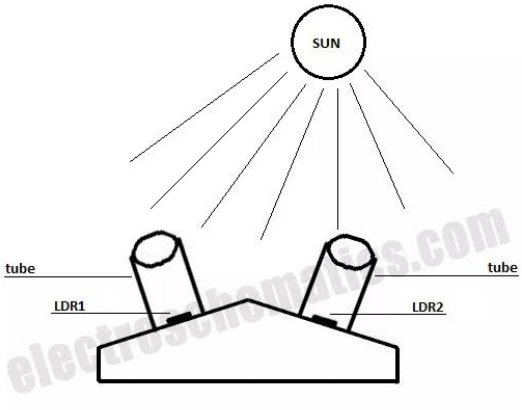

Figure 1. Basic scheme of LDR

The voltage comparator's output will be logic HIGH, if the non inverting terminal's voltage value is higher than the voltage value at the inverting one. As It can bee seen below both inverting terminals of the comparators is connected to a potentiometer to set the reference voltage. Therefore adjustments of LDRs can be done by altering the 10K pot on the left side of the circuit. If the light fall increases on the left LDR, the comparator on the left will react and its output will go logic HIGH. When the light fall increases on the right LDR, the comparator on the right will go logic HIGH. The motor direction is determined based on the transistors used in the system. [2]

There are two scenarios here. First one is when the output of right comparator is high, Q1 and Q4 will turn and act like a switch. In the second case, the second comparator's output will be high and for this situation, Q2 and Q3 transistors will turn and act like a switch again. In the case of both comparator's outputs are low then Q3 and Q4 will turn but there will be no current flow towards motor. Likewise if both comparator's output is high, Q1 and Q2 will show activity but there wont be any observation of current flow through motor. The DC motor must be connected to the panel in an adjusted way which is the rotation of motor, makes panel rotate in the same direction with the Sun. This way calibration is provided in the system. Basic figure can be seen below;

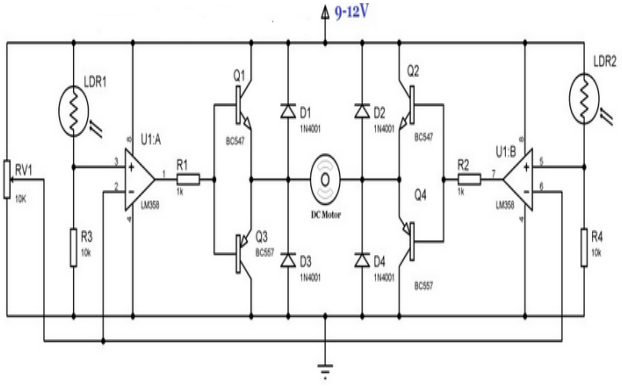

Figure 2. Sun tracking system circuit

3.PRINTED CIRCUIT BOARD(PCB)

Printed circuit board is the part which requires more effort.Before printing the circuit into the paper,we drew it with the proteus which is a very comprehensive circuit simulation program. Proteus consists of two parts.First part is the place where user draws his circuit by choosing each element and place it according to the original circuit scheme.

After completing this, all you need to do is running the simulation and see If it works as you wish.This area where you draw your circuit is called Isis.It is almost possible to find most of the circuit elements you can find in real life.

The second part(Ares) is for printing.When the user completes drawing the circuit, can go directly to the ares by just a click. In that part there will be the ways and pins for printing circuit into a paper.It creates this automatically after you draw your circuit.

What we have done in our project is drawing the circuit first like in the figure above.Afterwards we moved it into the ares to prepare it for printing.When everything is ready we just printed this circuit drawings into the paper. There are two figures of our printed circuit is below.One of them shows the ways and connections with pins in the simulation.The other one is printed one.

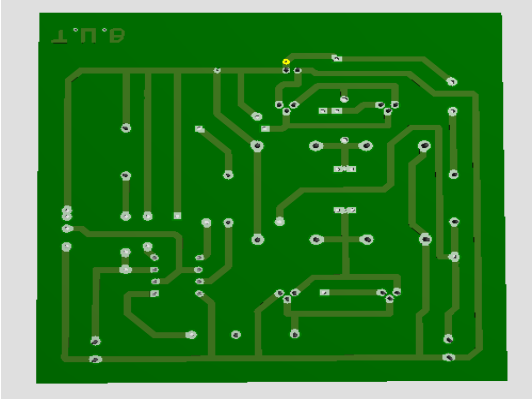

Figure 3. View of printed circuit ways

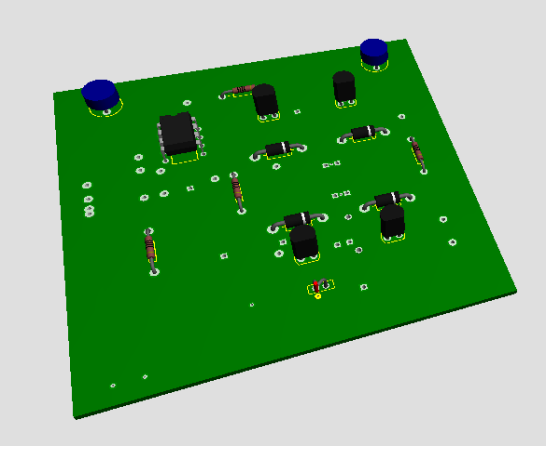

Figure 4. Printed circuit overview of circuit elements

4. CONCLUSION

In this work the proposed system which can track the sun throughout the day, can benefit from the solar energy released, has been presented. Experimental work has been realized carefully.Circuit has been printed and tested.

This paper has proved that higher efficiency can be provided with a sun tracking system. First of all the basic elements which are required in the system have been listed then and the working logic of our system has been explained detailed. PCB part have been covered with an programming example.

Circuit's not complicated structure but very efficient working principle could make this system to produce easily and also could make it improvable. In the near future maybe with the enough contribution, this system can be developed and even with a software support, it is possible to create a better system for general use.

5. REFERENCES

[1]- Nur Khuzairy Bin Jamaludin, "Solar Tracking System ", November 2008

[2]- Nader Barsoum, "Fabrication of Dual-Axis Solar Tracking Controller Project", Intelligent Control and Automation, 2011, 2, 57-68