

Solar Tracking System

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Abstract:-Solar panel has been used increasingly in recent years to convert solar energy to electrical energy. The solar panel can be used either as a stand-alone system or as a large solar system that is connected to the electricity grids . We are trying to consume more energy from the sun using solar Tracking panel. In order to maximize the conversion from solar to electrical energy . The tracking of the sun’s location and positioning of the solar panel are important. The tracking system will move the solar panel that its position perpendicular to the sun for maximum energy conversion. In our project output will give more energy then panels without tracking.

Keywords— Solar panel, Comparator IC, *Motor Driver*.

I- INTRODUCTION

Renewable energy solutions are becoming popular. Maximizing output from solar system increases efficiency. Presently solar panels are of fixed type which lower the efficiency. Maintaining vertical direction between light and panel maximizes the efficiency. Solar tracking system has higher generating power than fixed.

II- BLOCK DIAGRAM

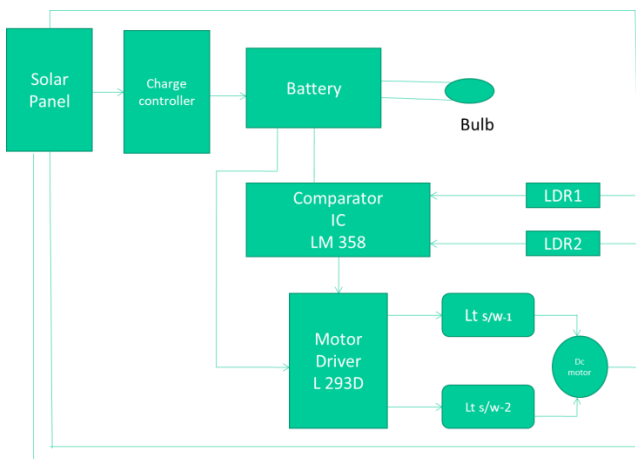
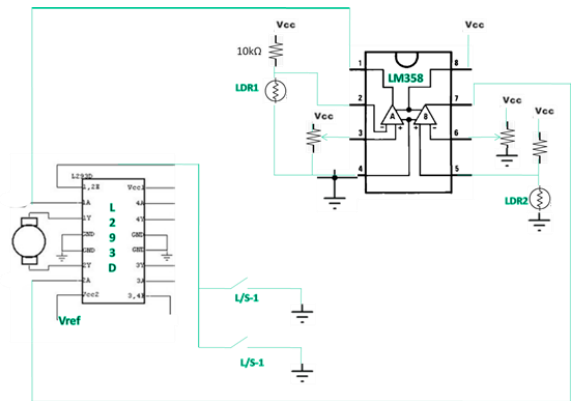


Figure (1):- BlockDiagram Of solar tracking system

III- CIRCUIT DIAGRAM



IV- COMPONENTS

A.- SOLAR PANEL

A solar panel works by allowing photons, or particles of light, to knock electrons free from atoms, generating a flow of electricity. Solar panels actually comprise many, smaller units called photovoltaic cells. (Photovoltaic simply means they convert sunlight into electricity.) Many cells linked together make up a solar panel

QUICK OVERVIEW

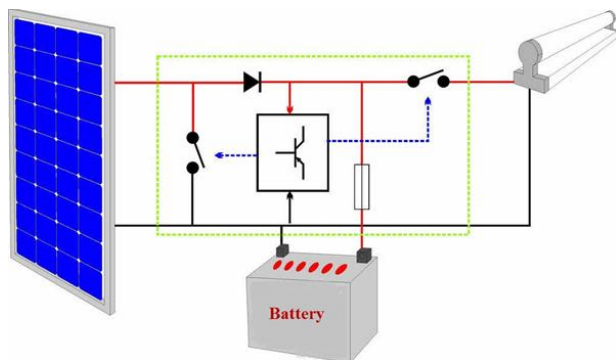
1. Power Watt-20 W
2. Dimension: 540 x 460 x 24 mm
3. Poly-crystalline Solar Module
4. Open circuit voltage (VOC) – 23.1
5. Voltage maximum power (Vm(v)) -17.5
6. Short circuit current (ISC) (Amps) – 1.44
7. Maximum power current (MP)(Amps) -1.03



Figure (2):- solar panel

B Charge controller :-

A solar charge controller manages the power going into the battery bank from the solar array. It ensures that the deep cycle batteries are not overcharged during the day, and that the power doesn't run backwards to the solar panels overnight and drain the batteries. Some charge controllers are available with additional capabilities, like lighting and load control, but managing the power is its primary job



Figure(3):- Charge controller

c. Battery

The cathode and anode (the positive and negative sides at either end of a traditional battery) are hooked up to an electrical circuit. The chemical reactions in the battery causes a build up of electrons at the anode. This results in an electrical difference between the anode and the cathode



Figure (4) :- battery

D. Comparator IC LM358

The LM358 is operational amplifier ,and easy to use dual channel op-amp IC. It is designed and introduced by national semiconductor. It consist of two internally frequency compensated, high gain , independent op-amp. the IC is designed for specially to operate from a single power supply over a wide range of voltages. It is available in a chip sized package .it can handle 3-32v dc supply source up to 20mA per channel.it is available in an 8-pin

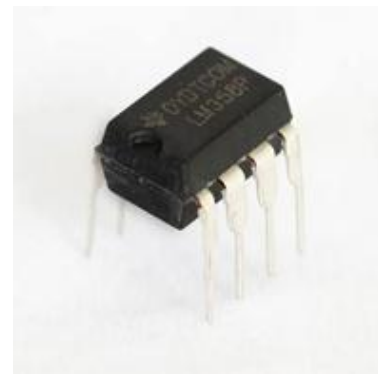
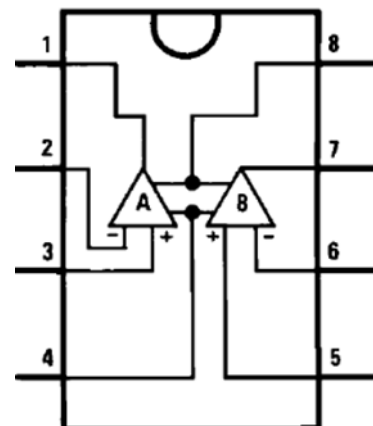


Figure (5):- IC LM358

Pin diagram



Working:

LM358 is an operational amplifier (Op-Amp) and in this circuit we are using it as a voltage comparator. The LM358 has two independent voltage comparators inside it, which can be powered by single PIN, so we can use the single IC to build two IR sensor modules. We have used only one comparator here, which have inputs at PIN 2 & 3 and output at PIN 1. Voltage comparator has two inputs, one is inverting input and second is non-inverting input (PIN 2 and 3 in LM358). When voltage at non-inverting input (+) is higher than the voltage at inverting input (-), then the output of comparator (PIN 1) is High. And if the voltage of inverting input (-) is Higher than non-inverting

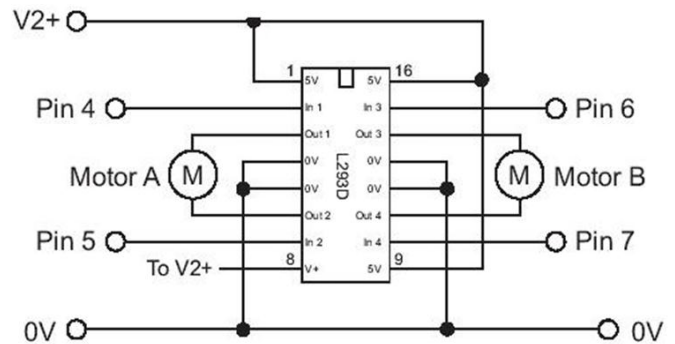
E. Motor Driver L293D

Motor Driver IC- It means, by using a L293D IC we can control two DC motors. As well, this IC can drive small and quiet big motors. This L293D IC works on the basic principle of H-bridge, this motor control circuit allows the voltage to be flowing in any direction.



Figure (6) :- Motor driver L293D

Pin Diagram



Working

There are 4 input pins for L293d, pin 2,7 on the left and pin 15 ,10 on the right as shown on the pin diagram. Left input pins will regulate the rotation of motor connected across left side and right input for motor on the right hand side. The motors are rotated on the basis of the inputs provided across the input pins as LOGIC 0 or LOGIC 1. In simple you need to provide Logic 0 or 1 across the input pins for rotating the motor.

- Pin 2 = Logic 1 and Pin 7 = Logic 0 | Clockwise Direction
- Pin 2 = Logic 0 and Pin 7 = Logic 1 | Anticlockwise Direction
- Pin 2 = Logic 0 and Pin 7 = Logic 0 | Idle [No rotation] [Hi-Impedance state]
- Pin 2 = Logic 1 and Pin 7 = Logic 1 | Idle [No rotation]

F: LDR

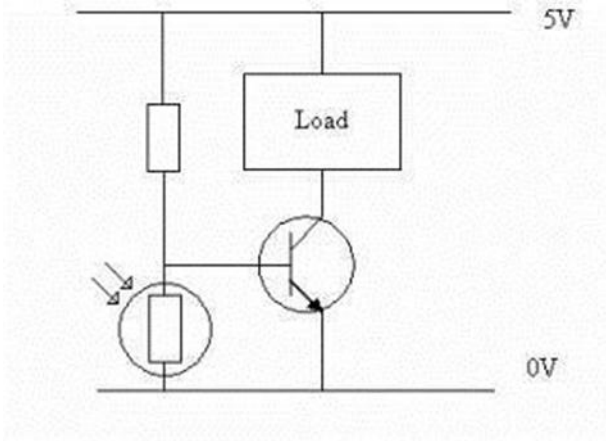
When it’s dark, the LDR has high resistance. This makes the voltage at the base of the transistor too low to turn the transistor ON.

Therefore, no current will go from the collector to the emitter of the transistor. All the current will instead pass through the LDR and the potentiometer.

When it’s light, the LDR has low resistance. This makes the voltage at the base of the transistor higher. High enough to turn the transistor ON.

Because the transistor is turned on, current flows through the transistor. It flows from the positive battery terminal, through R1, the LED, and the transistor down to the negative battery terminal.

This makes the LED light up.



G : DC MOTOR

An Electric DC motor is a machine which converts electric energy into mechanical energy. The working of DC motor is based on the principle that when a current-carrying conductor is placed in a magnetic field, it experiences a mechanical force



Figure(7):- DC MOTOR

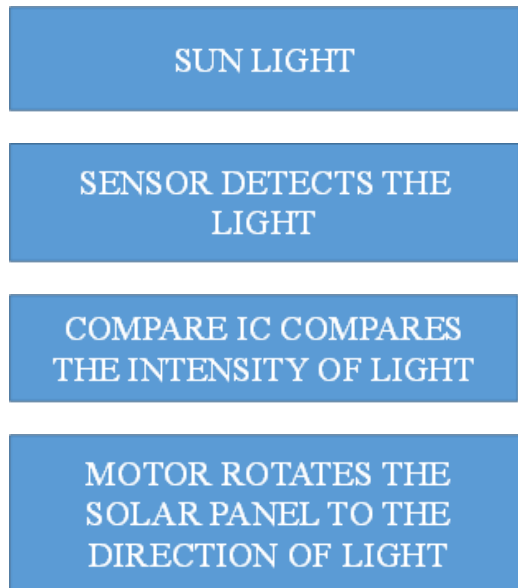
H. LIMIT SWITCH :

A limit switch is an electromechanical device that consists of an actuator mechanically linked to a set of contacts. When an object comes into contact with the

actuator, the device operates the contacts to make or break an electrical connection



FLOW CHART:



Result

WITHOUT TRACKER

(A) Without charge controller

TIME	VOLTAGE	CURRENT	POWER
10:00 AM	20.3 V	0.51 A	10.35 W
11:00 AM	20.4 V	0.52 A	10.60 W
12:00 PM	21.5 V	0.55 A	11.82 W

(B) With charge controller

Time	Voltage	Current	Power
10:00AM	10.2 v	0.29 A	2.95 W
11:00AM	10.4 v	0.29 A	3.02 W
12:00PM	10.8 v	0.30 A	3.24 W

WITH TRACKER**(A) WITHOUT CONTROLLER**

TIME	VOLTAGE	CURRENT	POWER
10:00 AM	20.3 V	0.51 A	10.35 W
11:00 AM	20.4 V	0.52 A	10.60 W
12:00 PM	21.5 V	0.55 A	11.82 W

(B) WITH CONTROLLER

TIME	VOLTAGE	CURRENT	POWER
10:00 AM	11.4 V	0.31 A	3.54 W
11:00 AM	11.5 V	0.32 A	3.68 W
12:00 PM	11.9 V	0.33 A	3.92 W

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