ROBOTiX CLUB
National Institute of Technology
Raipur

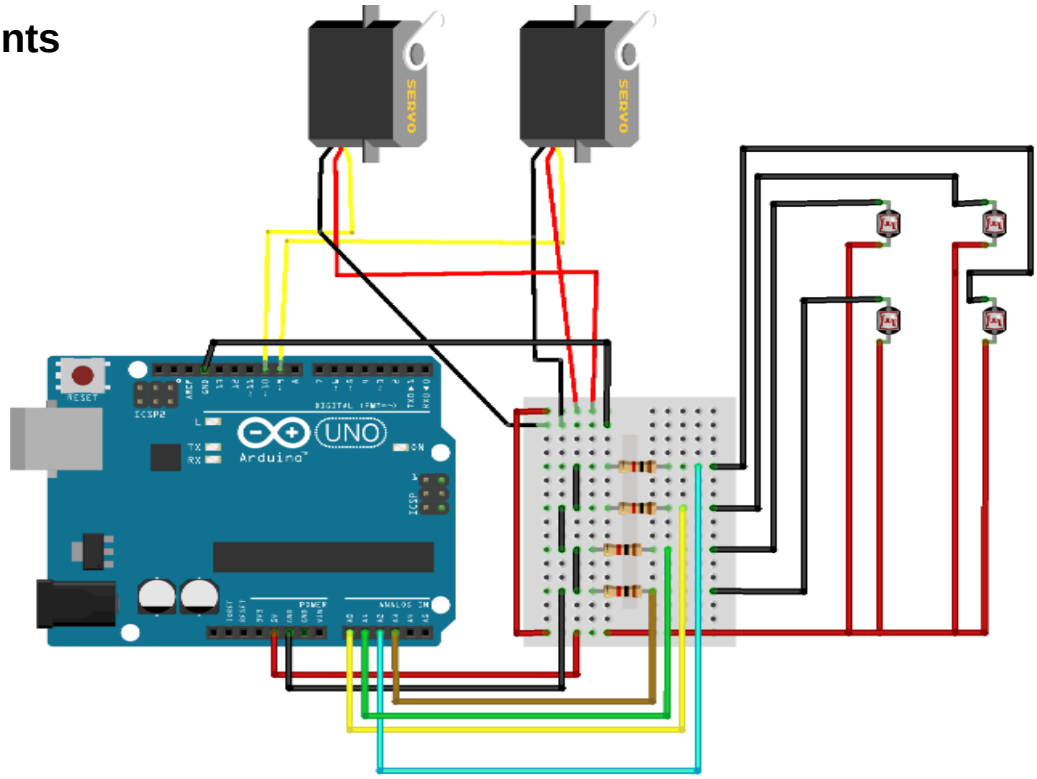
Project Name - Solar Tracker

Mentor - Mahendra Gavel **Members -** Vedant A Ashthikar, M Tejaswini, Shreyas Royzada, Aman Verma

1. Introduction

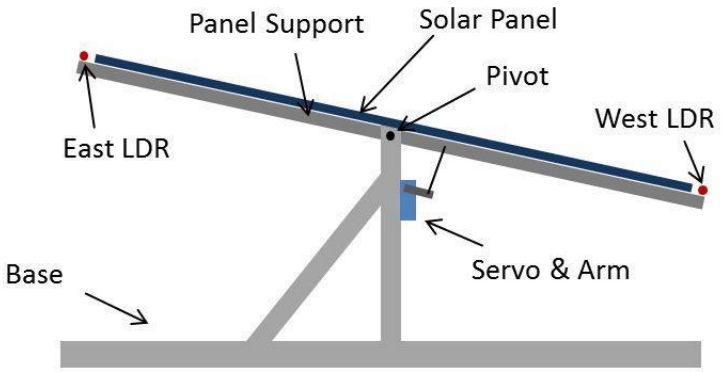
The solar panel tracker is designed to follow the sun movement so that maximum light intensity hits on the solar panel, thus increasing the power efficiency. Use of a solar tracker circuit in the field of energy production will increase its efficiency by almost 25%. This system can also be successfully implemented in other solar energy based projects water heaters and steam turbines.
There are basically two types of Arduino sun trackers. One of them is the single axis solar tracker and the other is dual axis. Single axis solar tracking system moves the solar panel from east to west in a day to point in the direction of the sun. Dual axis solar trackers use the motor to move the solar panel in all four directions (North-South & East-West).
South to north is not a viable or big movement, because this movement covers only 20 degrees in half year and in remaining half year it moves from north to south and we can set this, manually in a week. Since the East-West tracking is more important, I will be explaining more of the single axis solar tracking.

2. Blueprints



LDRs are used as the main light sensors. Two servo motors are fixed to the structure that holds the solar panel. The program for Arduino is uploaded to the microcontroller. The working of the project is as follows.
LDRs sense the amount of sunlight falling on them. Four LDRs are divided into top, bottom, left and right.
For east – west tracking, the analog values from two top LDRs and two bottom LDRs are compared and if the top set of LDRs receive more light, the vertical servo will move in that direction.
If the bottom LDRs receive more light, the servo moves in that direction.
For angular deflection of the solar panel, the analog values from two left LDRs and two right LDRs are compared. If the left set of LDRs receive more light than the right set, the horizontal servo will move in that direction.
If the right set of LDRs receive more light, the servo moves in that direction.

3. Working



In this project, LDR's are working as light detectors. Before we go into detail, we will have to understand how the LDR's work. LDR (Light Dependent Resistor) also known as photo resistor is the light sensitive device. Its resistance decrease when the light falls on it and that's why it is frequently used in Dark or Light Detector Circuit.
Check the various circuits based on LDR here.
The two LDR's are placed at the two sides of solar panel and the Servo Motor is used to rotate the solar panel. The servo will move the solar panel towards the LDR whose resistance will be low, mean towards the LDR on which light is falling, that way it will keep following the light. And if there is same amount of light falling on both the LDR, then servo will not rotate. The servo will try to move the solar panel in the position where both LDR's will have the same resistance means where same amount of light will fall on both the resistors and if resistance of one of the LDR will change then it rotates towards lower resistance LDR.

4. Construction

Materials Required:

- Arduino UNO & Genuino UNO
- Breadboard (Generic)
- Resistors 10K Ohm x 2
- SG90 Micro-Servo Motor
- Light Dependant Resistor x 2
- Solar Panel
- Battery (6 to 12V)

- In this **Arduino Solar Panel Tracker**, Arduino is powered by the 9V battery and all the other parts are powered by the Arduino.
- Arduino recommended input voltage is from 7 to 12 volts but you can power it within the range of 6 to 20 volts which is the limit.
- Try to power it within the recommended input voltage.
- So connect the positive wire of the battery to the V_{in} of the Arduino and the negative wire of the battery to the ground of the Arduino.

- Next connect the servo to the Arduino. Connect the positive wire of the servo to the 5V of Arduino and ground wire to the ground of the Arduino and then connect the signal wire of Servo to the digital pin 9 of Arduino.
- The servo will help in moving the solar panel.

- Now connect the LDRs to the Arduino.
- Connect one end of the LDR to the one end of the 10k resistor and also connect this end to the A0 of the Arduino and connect the other end of that resistor to the ground and connect the other end of LDR to the 5V.
- Similarly, connect the one end of second LDR to the one end of other 10k resistor and also connect that end to the A1 of Arduino and connect the other end of that resistor to ground and connect the other end of LDR to 5V of Arduino.