An IoT Micro Project Report

on

SOLAR TRACKER

Submitted in partial fulfilment of the
Requirements for the award of the Degree of
BACHELOR OF ENGINEERING
IN
COMPUTER SCIENCE & ENGINEERING

BY

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DECLARATION BY THE CANDIDATE

We, **AMITH SOURYA** and **GUTPE SAITEJA,** bearing hall ticket numbers **1602-19-733-128** and **1602-19-733-161** respectively, hereby declare that the project report entitled **"SOLAR TRACKER"** Department of Computer Science & Engineering, VCE, Hyderabad, is submitted in partial fulfilment of the requirement for the award of the degree of **Bachelor of Engineering** in **Computer Science & Engineering**.

This is a record of bonafide work carried out by me and the results embodied in this project report have not been submitted to any other university or institute for the award of any other degree or diploma.

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BONAFIDE CERTIFICATE

This is to certify that the project entitled **"SOLAR TRACKER"** being submitted by **AMITH SOURYA** and **GUTPE SAITEJA,** bearing hall ticket numbers **1602-19-733-128** and **1602-19-733-161** respectively, in partial fulfilment of the requirements for the award of the degree of Bachelor of Engineering in Computer Science & Engineering is a record of bonafide work carried out by him/her under my guidance.

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ACKNOWLEDGEMENT

With immense pleasure, we record our deep sense of gratitude to our guide Mr. P. Narsaiah, Assistant Professor, Vasavi College of Engineering, Hyderabad, for the valuable guidance and suggestions, keen interest and thorough encouragement

extended throughout the period of the project work. We consider ourselves lucky enough to be part of this project. This project would add as an asset to our academic profile.

We express our thanks to all those who contributed for the successful completion of our project work.

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. The earth receives 84 Terawatts of power and our world consumes about 12 Terawatts of power per day. We are trying to consume more energy from the sun using solar panel. In order to maximize the conversion from solar to electrical energy, the solar panels have to be positioned perpendicular to the sun. Thus the tracking of the sun's location and positioning of the solar panel are important. The goal of this project is to design an automatic tracking system, which can locate position of the sun. The tracking system will move the solar panel so that it is positioned perpendicular to the sun for maximum energy conversion at all time. Photoresistors will be used as sensors in this system. The system will consist of light sensing system, microcontroller, gear motor system, and a solar panel. Our system will output up to 40% more energy than solar panels without tracking systems.

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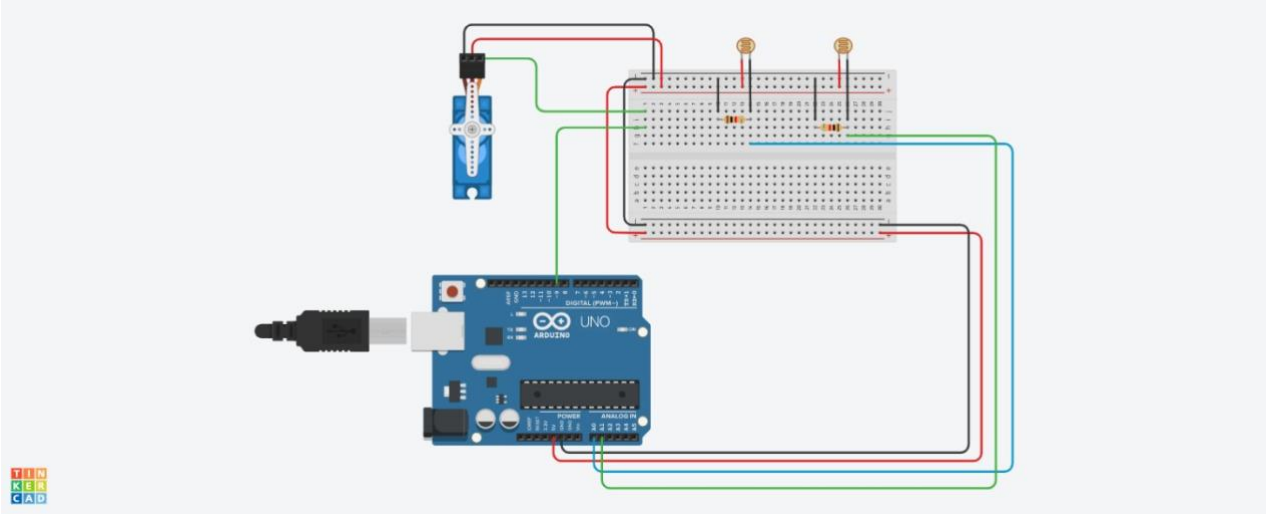
The main objective of this project is to track the sun and rotate the solar panel accordingly, to receive sunlight to the fullest extent always during the day time. This movement is achieved by interfacing a stepper motor to the solar panel that changes its direction according to the positioning of the sun. This is achieved using time reference that controls the movement time for 12 hours by a program written in such a way that for every given time the solar panel faces to the sun to generate maximum power which is stored in batteries and future use.

2.1 OVERVIEW

This project presents an open hardware/software test bench for solar tracker. The proposed prototype is based on a single-axis solar tracker controlled with Arduino Uno which is an open-source prototyping platform based on easy-to-use hardware and software. The solar tracker can be controlled automatically with the help of LightDependent Resistor (LDR) sensors

- **CIRCUIT DIAGRAM :**



❾ COMPONENTS USED :

1. ARDUINO UNO

The Arduino UNO is a microcontroller board based chip on the ATmega328P. It has sets of digital input/output pins (of which some can be used as ultrasonic sensor inputs), 6 analog inputs, 14 digital inputs - 4 of which are programmable with Arduino IDE using USB cable. Arduino Uno can be powered using an external power supply which ranges from 7-20 volts.

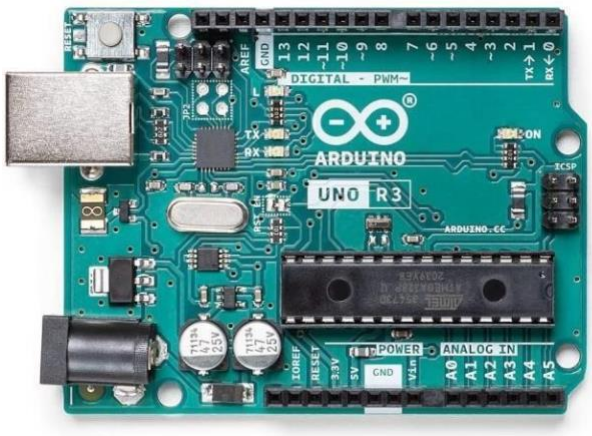


Figure 2.2.2

2. LDR SENSOR

An LDR is **a component that has a (variable) resistance that changes with the light intensity that falls upon it**. This allows them to be used in light sensing circuits. Light Dependent Resistors (LDR) are also called photoresistors..

Figure 2.2.3

3. RESISTOR

A resistor is **an electrical component that limits or regulates the flow of electrical current in an electronic circuit**. Resistors can also be used to provide a specific voltage for an active device such as a transistor..

Figure 2.2.4

4. SERVO MOTOR

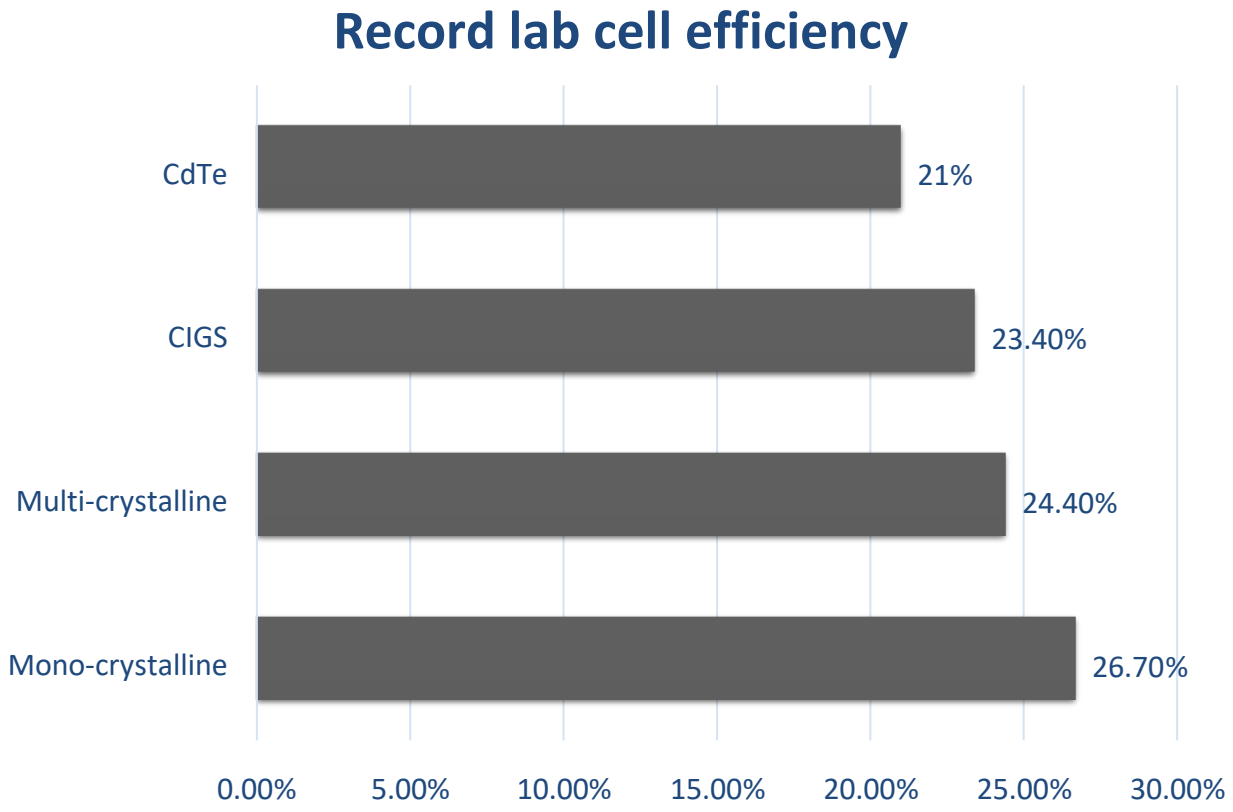
A servo motor is **a rotary actuator that allows for precise control of angular position**. It consists of a motor coupled to a sensor for position feedback. It also requires a servo drive to complete the system. The drive uses the feedback sensor to precisely control the rotary position of the motor.

Figure 2.2.5

2.2 PROBLEM STATEMENT

◦ Most commercial solar cells efficiency is less than 30%. What a consumer can do to increase its efficiency?

A study performed by Sandeep Dhundhara in CCS Haryana Agricultural University showed that changing angle of solar panels in accordance with time can increase efficiency by 8%



■ Record lab cell efficiency

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3. SYSTEM REQUIREMENTS

Hardware:

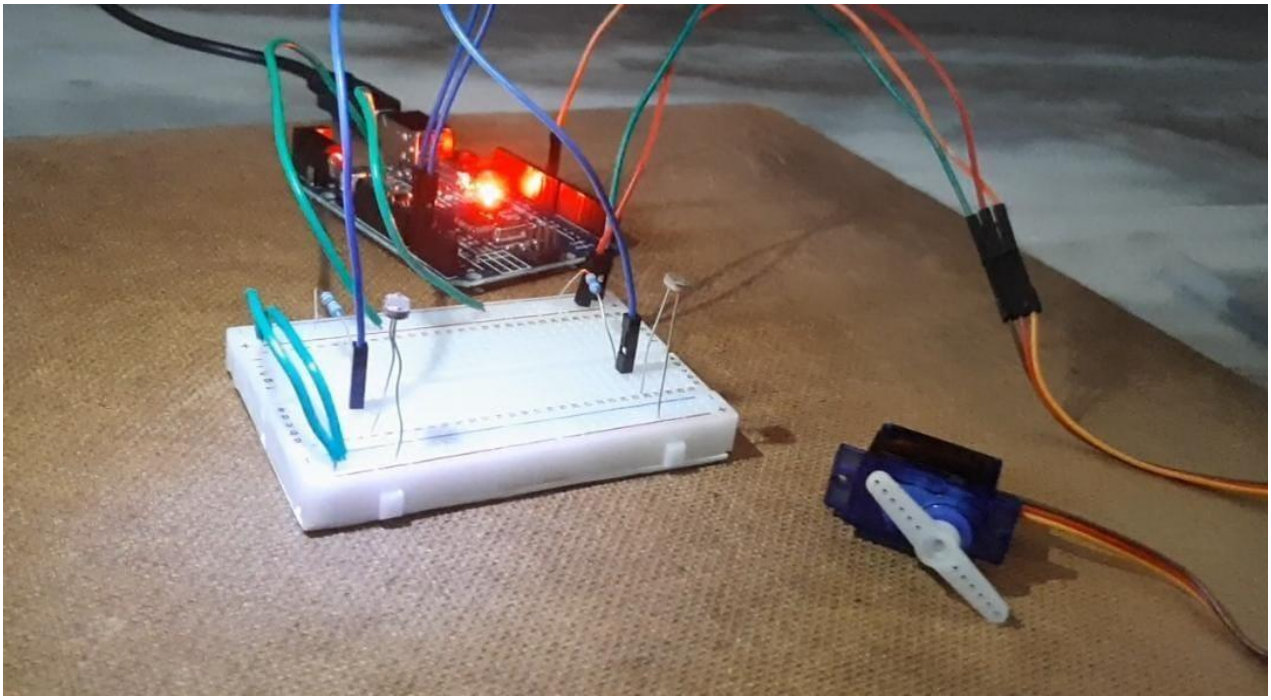
- Arduino UNO
- LDR sensor
- Resistor
- Servo Motor **Software:**

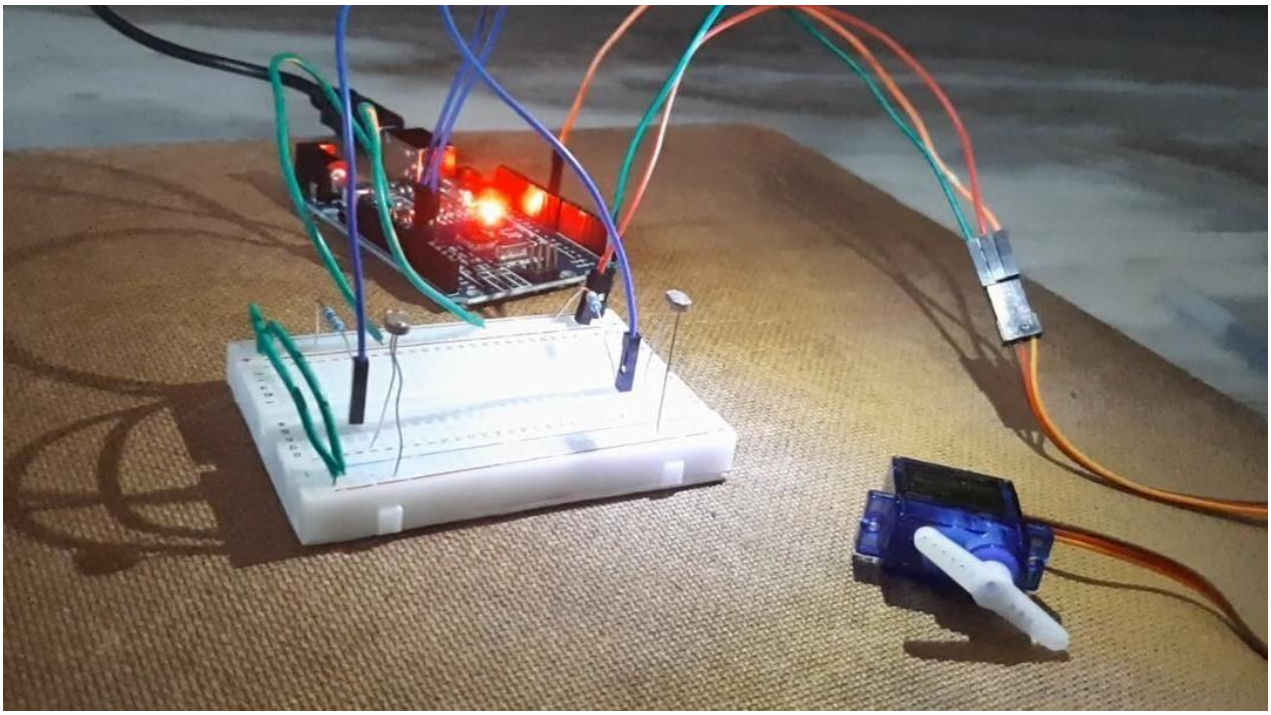
- Chrome 76.0 or above
- Windows 7 or above

4. IMPLEMENTATION

```
#include <Servo.h>
int rs = 12, en = 11, d4 = 5, d5 = 4, d6 = 3, d7 = 2;
Servo s; void setup()
{
  s.attach(9);
  s.write(90);
} void
loop()
{
  int input1 = analogRead(A0);
int input2 = analogRead(A1);   int
pos = s.read();
  if(input1>input2)
  {     pos = --
pos;
  }
  if(input2>input1)
  {     pos =
++pos;
  }
  s.write(pos);
}
```

5. OUTPUT SCREENSHOTS





6. CONCLUSION AND FUTURE WORK

The main aim of this project is to increase the efficiency of the solar power and increase the use of renewable energy as much as possible

The innovative designs in sun tracking systems have enabled the development of many solar thermal and photovoltaic systems for a diverse variety of applications in recent years compared to the traditional fixed panels. Solar systems which track the changes in the sun's trajectory over the course of the day collect a far greater amount of solar energy, and therefore generate a significantly higher output power

We would like to scale this project in the future so that this project can be reached to every person and In future the present paper details willbe useful in selecting an accurate and particular tracker with respect to region, available space and estimated cost. The present work may be useful to improve the design characteristics of different types of solar tracking systems to improve performance.

7. REFERENCES

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