**PROJECT PROPOSAL**



**CSE-203L Circuit & Systems-II Lab**

**Fall 2022**

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**CLASS SECTION:**

C

**SUBMITTED TO:**

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**Project TITLE:**

**Dual-Axis Sun Tracking Solar Panel**

**Problem statement:**

Solar Energy is one of the most widely used form of energy nowadays. By means of solar panels, we convert Solar Energy of Sun into Electrical Energy to light up our houses, rotate some fans and do other necessary things. We need the Solar Panel to be looking at the Sun for getting maximum Solar Energy. A Dual-Axis Sun Tracking Solar Panel System can be used to achieve maximum power output.

**INTRODUCTION:**

Solar Energy is one of the most widely used form of energy nowadays. It is present in almost everywhere in our world. It is cheaper than other energy source and is freely available everywhere in our world. Sun is the ultimate and the only source of Solar Energy. By means of Solar Panels, we convert Solar Energy of Sun into Electrical Energy to light up our houses, rotate some fans and do other necessary things. In order to get maximum Solar Energy from Sun, we keep the Solar Panels on our roofs. Still, it doesn’t receive maximum Solar Energy from Sun because of different angle and changing direction of Sun. In order to overcome this problem, we need the Solar Panel to be looking at the Sun for getting maximum Solar Energy.

**TOOLS/EQUIPMENTS:**

* 1 x Arduino UNO
* 4 x LDRs
* 5 x 10K Ω Resistors
* 2 x Servo Motors
* 2 x 221 Ω Resistors
* 2 x Potentiometers
* 2 x LEDs
* 1 x Push Button

**WORKING:**

It contains a small 5V solar panel that can rotate in two axis so as to gain maximum power from the sun.

This project will have to modes:

* A manual mode – controlled by two potentiometers.
* An auto mode – controlled with four LDRs.

In order to achieve that we program the device in such a way that it changes between modes with the help of a push button and two indicator leds. When the device is in **manual mode** the red light is on and we can control the rotation of the panel in two axis with the help of two potentiometers. When the device is in **auto mode** the blue light is on and the rotation of the panel is determined by the light collected from the four LDRs.

**ARDUINO CODE:**

#include <Servo.h>

//Initialize variables

int mode = 0;

int buttonState = 0;

int prevButtonState = 0;

int topLeftLight = 0;

int topRightLight = 0;

int bottomLeftLight = 0;

int bottomRightLight = 0;

int LeftLight = 0;

int RightLight = 0;

int TopLight = 0;

int BottomLight = 0;

//Declare two servos

Servo servo\_9;

Servo servo\_10;

void setup()

{

pinMode(7, INPUT); //Mode Button

pinMode(12, OUTPUT); //Led indicator for manual mode

pinMode(11, OUTPUT); //Led indicator for auto mode

pinMode(A0, INPUT); //Potentiometer for right-left movement

pinMode(A1, INPUT); //Potentiometer for up-down movement

pinMode(A2, INPUT); //Light sensor up - left

pinMode(A3, INPUT); //Light sensor up - right

pinMode(A4, INPUT); //Light sensor bottom - left

pinMode(A5, INPUT); //Light sensor bottom - right

servo\_9.attach(9); //Servo motor right - left movement

servo\_10.attach(10); //Servo motor up - down movement

}

void loop()

{

buttonState = digitalRead(7);

if (buttonState != prevButtonState) {

if (buttonState == HIGH) {

//Change mode and ligh up the correct indicator

if (mode == 1) {

mode = 0;

digitalWrite(12, HIGH);

digitalWrite(11, LOW);

} else {

mode = 1;

digitalWrite(11, HIGH);

digitalWrite(12, LOW);

}

}

}

prevButtonState = buttonState;

delay(50); // Wait for 50 millisecond(s)

if (mode == 0) {

//If mode is manual map the pot values to degrees of rotation

servo\_9.write(map(analogRead(A0), 0, 1023, 0, 180));

servo\_10.write(map(analogRead(A1), 0, 1023, 0, 180));

} else {

//if mode is auto map the sensor values to 0-100 ligh intensity.

//Every light sensor has different sensitivity and must be first tested

//for it's high and low values

topLeftLight = map(analogRead(A2),50,980,0,100);

topRightLight = map(analogRead(A3),200,990,0,100);

bottomLeftLight = map(analogRead(A4),170,970,0,100);

bottomRightLight = map(analogRead(A5),250,1000,0,100);

//Calculate the average light conditions

TopLight = ((topRightLight + topLeftLight) / 2);

BottomLight = ((bottomRightLight + bottomLeftLight) / 2);

LeftLight = ((topLeftLight + bottomLeftLight) / 2);

RightLight = ((topRightLight + bottomRightLight) / 2);

//Rotate the servos if needed

if (abs((RightLight - LeftLight)) > 4) { //Change position only if light difference is bigger then 4%

if (RightLight < LeftLight) {

if (servo\_9.read() < 180) {

servo\_9.write((servo\_9.read() + 1));

}

}

if (RightLight > LeftLight) {

if (servo\_9.read() > 0) {

servo\_9.write((servo\_9.read() - 1));

}

}

}

if (abs((TopLight - BottomLight)) > 4) { //Change position only if light difference is bigger then 4%

if (TopLight < BottomLight) {

if (servo\_10.read() < 180) {

servo\_10.write((servo\_10.read() - 1));

}

}

if (TopLight > BottomLight) {

if (servo\_10.read() > 0) {

servo\_10.write((servo\_10.read() + 1));

}

}

}

}

}

**RESULTS:**

It is observed that the efficiency of a Solar Panel can be increased by **40%** which is a huge gain on daily basis.