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Dual Axis Solar Panel Weather Monitoring System

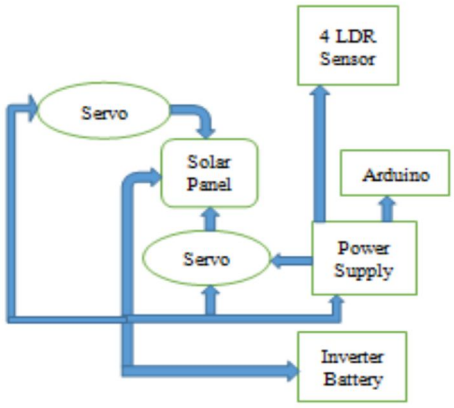
Ms. Nidhi Yadav[1], Sagar Bhatia[2], Mohit Tyagi[3], Rachit Kumar[4], Ajay Kumar[5]
[1]*Assistant Professor, Department of Electronics and Communication Engineering, HMR Institute of Technology and Management, Delhi, India*
[2, 3, 4, 5]*U.G. Student, Department of Electronics and Communication Engineering, HMR Institute of Technology and Management, Delhi, India*

Abstract: ***This analysis presents associate degree analysis of a dual-axis solar chase system with weather updates mistreatment Arduino By 2035 the alternative energy can become the foremost used supply of energy for the generation of electricity or we are able to say the production of electricity within the world. this may conjointly result in greater use of inexpensive digital technology. Most of the star panels area unit mounted kind, thus so as to maximize the facility generation, we tend to area unit mistreatment the star huntsman which can follow the rotation of the sun throughout the day. If we tend to compare the total output of twin also as single-axis star huntsman system, we found that it's higher performance in terms of current, voltage, and power output. there's a rise in performance of around twenty fifth of the facility. we tend to area unit mistreatment the light-dependent resistors (LDRs) as a detector as a chase mechanism for the sun radiations and 2 servomotors connected vertically and horizontally to direct the position of the panel. The planned automatic huntsman is that it controls the elevation and orientation angles of electrical device specified the panel can maintain perpendicular to the daylight for the maximum absorption of sunshine rays. And computer code half is completed with the assistance of code written in Arduino Uno controller.***

Keywords: Solar panel, Arduino UNO, Light detecting resistors (LDRs), servo motors, temperature sensors, humidity sensors, rain drop sensors.

I. INTRODUCTION

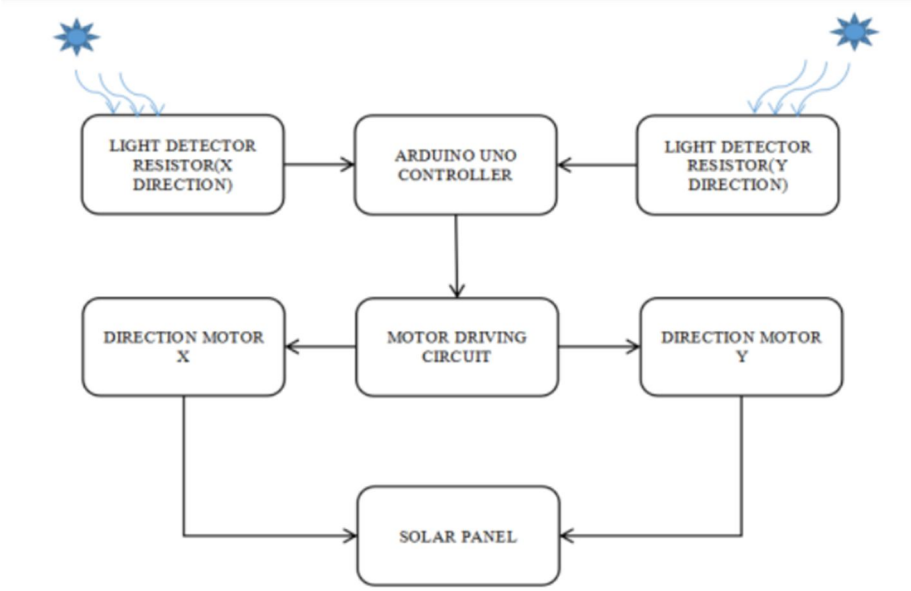
Sun is that the most valued supply of renewable energy. solar energy is that the quickest growing suggests that of renewable energy. The demand for reliable and copious supply of energy has been increasing day by day. So, government improved the usage of renewable energy supplys there by curtailing the usage of typical source of energy. The project is intended and enforced victimization easy twin axis star hunter system. so as to maximise energy generation from sun, it's necessary to introduce star chase systems into solar energy systems. A dual-axis hunter will increase energy by chase sun rays from shift solar battery in numerous directions. This solar battery will rotate all told directions. This twin axis star hunter project may be wont to sense weather, and it'll be displayed on LCD. this method is hopped-up by Arduino, consists of servo motor, stepper motor, rain drop detector, temperature and humidness detector and LCD. It consists of 2 motors for perpendicular still as for horizontal axis rotation. we tend to ar victimization Arduino (AT mega 328P) to regulate each the motors for the vertical and horizontal axis in such some way that the most quantity of sunshine that ensures that the solar battery is additionally receiving the most daylight for optimum power generation. solar battery ar exposed to daylight, the angle at that the rays can meet at the surface of the solar battery. So, we tend to ar victimization this star hunter, which is able to facilitate United States of America to reduce the angle to the panel in such some way that light weight strikes them perpendicular to the surface.



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Energy absorption is most once the panel is perpendicular to the sun. thus we tend to ar employing a star hunter to maximise the energy generation and improve the potency four-hundredth quite the mounted panel. In general, throughout the day the only axis hunter moves from east to west with one degree of freedom. whereas the trendy hunter tracks east west and north south movement of the sun. during this project we tend to ar desegregation twin axis star chase system with weather detector. It detects temperature, drop and humidness by victimization sensors and also the output of those sensors is seen in liquid display(LCD).Light detective work resistors(LDR's) which might sense the most intensity of sunshine and also the Arduino that guides the rotation of servomotors towards the most intensity of sunshine is employed. Servomotors ar wont to rotate the solar battery. Sensors ar wont to sense the climatic conditions from the past million years man has required associated used Energy at an increasing rate for his existence and well-being. solar power guarantees of changing into reliable energy supply with none polluting effects. thus getting of most energy with this methodology is a lot of economical and useful.

II. METHODOLOGY



The diagram is showing that LDR sensors once sensing the sunshine forward the signal to Micro-controller. The micro-controller could be a logical device that is engaging dealings on device place in and starting the motor driver's track consequently. Assume if the sun changes its vicinity and go from east to west, it's going to cause lightweight absorption to vary on one device as related to a very completely different one. On all-time low of the daylight intensity feature on sensors, the controller starts driver circuits and moves the servo motor to new positions wherever lightweight falling on device pairs is that the same. The constant technique can maintain it up with a modification within the sun's vicinity penned by the sky. As a result, this planned model is in an exceedingly position to capture supplementary sun rays and also the system's alternative energy conversion capability is greatly superior.

It consists of 4 lightweight police investigation resistors every forming a try of 2. It measures the sunshine intensity and converts it into analog voltage and offers the input to the controller. One try of LDR trace the placement of sun in east- west direction and also the alternative try senses within the north-south direction. Resistance is reciprocally proportional to intensity of sunshine and thus it decreases with increase in intensity. the link between intensity and resistance is given within the equation RL = 500/LUX. Arduino is that the main observance unit of the whole equipment as showed in fig.1..LDR is connected to the primary four pins of Arduino i.e. A0- A4.Arduino takes the input from the LDR and supported that it provides directions to servomotors to rotate either in horizontal or vertical directions. The movement dominant unit includes of 2 servo motors. The Arduino provides associate degree output of 5v that is employed to drive the servo motor which might be driven by associate degree input of concerning four.5 volts. one in every of the motor controls the horizontal rotation whereas the opposite controls the vertical rotation. just one motor functions at a time therefore on scale back the facility consumption. It comprise of a weather sensing unit {in that|during which|within which} arduino is employed as associate degree interfacing device and indicates the encircling temperature conditions and humidness which is showed on LCD display device.

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A. Arduino Embedded C code written in Arduino IDE

```
 #include <ESP8266WiFi.h>
 #include "DHT.h"        // DHT11 temperature and humidity sensor Predefined library

#define DHTTYPE DHT11   // DHT 11
#define dht_dpin 0      //GPIO-0 D3 pin of nodemcu

const char* ssid = "xyz";
const char* password = "123456789";


DHT dht(dht_dpin, DHTTYPE);
WiFiServer server(80);

void setup(void)
{

  Serial.begin(9600);
  delay(10);

  // Connect to WiFi network
  Serial.println();
  Serial.print("Connecting to ");
  Serial.println(ssid);
  WiFi.begin(ssid, password);     //Begin WiFi

 while (WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(".");
  }
  Serial.println("");
  Serial.println("WiFi connected");

  // Start the server
  server.begin();
  Serial.println("Server started");

  // Print the IP address on serial monitor
  Serial.print("Use this URL to connect: ");
  Serial.print("http://");    //URL IP to be typed in mobile/desktop browser
  Serial.print(WiFi.localIP());
  Serial.println("/");
}

void loop() {
  // Check if a client has connected
  WiFiClient client = server.available();
  if (!client) {
    return;
  }
```

```
// Wait until the client sends some data
Serial.println("new client");
while(!client.available()){
  delay(1);
}
// Read the first line of the request
String request = client.readStringUntil('\r');
Serial.println(request);
client.flush();

float h =0.0;  //Humidity level
float t =0.0;  //Temperature in celcius
float f =0.0;  //Temperature in fahrenheit

// Match the request
int value = LOW;
if (request.indexOf("/Up=ON") != -1)  {
   h = dht.readHumidity();    //Read humidity level
   t = dht.readTemperature(); //Read temperature in celcius
   f = (h * 1.8) + 32;        //Temperature converted to Fahrenheit
  value = HIGH;
}

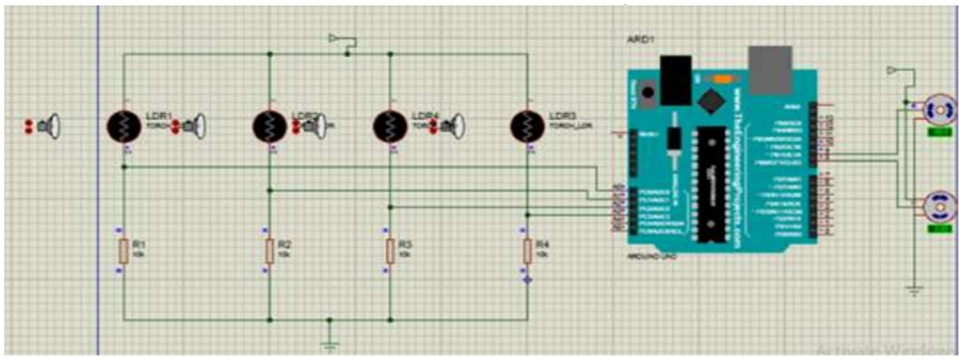
// Return the response
client.println("HTTP/1.1 200 OK");
client.println("Content-Type: text/html");
client.println(""); //  do not forget this one
client.println("<!DOCTYPE HTML>");
client.println("<html>");
client.println("<h1 align=center>Temperature & Humidity Monitoring with DHT11</h1><br><br>");
client.print("Temperature in Celsius =");
client.println(t);
client.println("<br>");
client.print("Temperature in Fahrenheit =");
client.println(f);
client.println("<br>");
client.print("Humidity =");
client.println(h);
client.print(" %");
client.println("<br>");
client.println();

if(value == HIGH) {
  client.println("Updated");
} else {
  client.print("Not Updated");
}
client.println("<br><br>");
client.println("<a href=\"/Up=ON\"\"><button>Update Temperature & Humidity</button></a><br />");
client.println("</html>");
```

```
  delay(1);
  Serial.println("Client disconnected");
  Serial.println("");
}
```

III. EXPERIMENTAL RESULT

In the dual axis solar tracking system the solar panel which is fixed on a structure rotates based on the position of the sun which is sensed by the sensor.



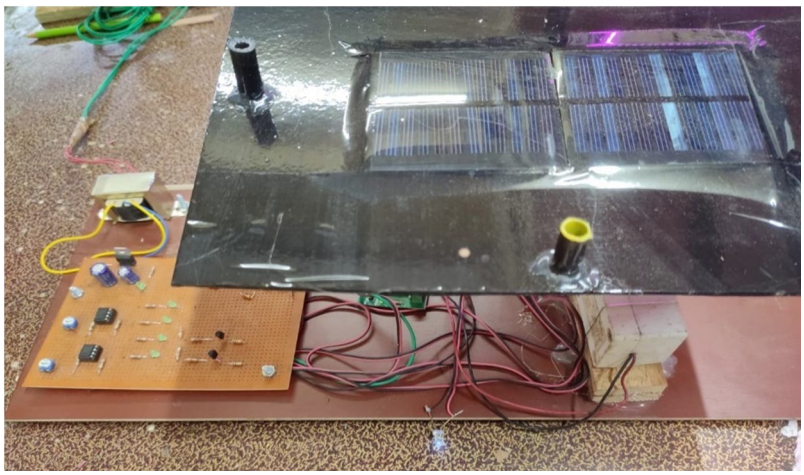
Four analog pins of Arduino i.e. A1, A2, A3, A4 are connected to four resistors and four LDR's respectively which are internally connected in a voltage divider pattern as shown in fig 3.The two servo motor gets PWM inputs from digital pins 9 and 10 of Arduino as shown in fig .3.LDR's serves as the main light sensors. Servo motor is supported by two solar panels which are fixed to the structure. Arduino program is uploaded to the microcontroller. The performance of the model is as follows:-When sun light falls on LDR, it senses the amount of sunlight falling on it and each LDR senses in top, bottom, left, right directions respectively. For north-south tracking, the analog values from two top LDR's and two bottom LDR's are compared and if the bottom set of LDR's receive more light, the vertical servo will move in that direction. If more light is sensed by top LDR's then the servo motor moves in that direction. The analog values from two left LDRs and two right LDRs are compared for angular deflection. If the right set of LDRs receives more light than the right set, the horizontal servo will move in that direction.



Temperature & Humidity Monitoring with DHT11

Temperature in Celsius =35.00
Temperature in Fahrenheit =163.40
Humidity =73.00 %
Updated

Update Temperature & Humidity



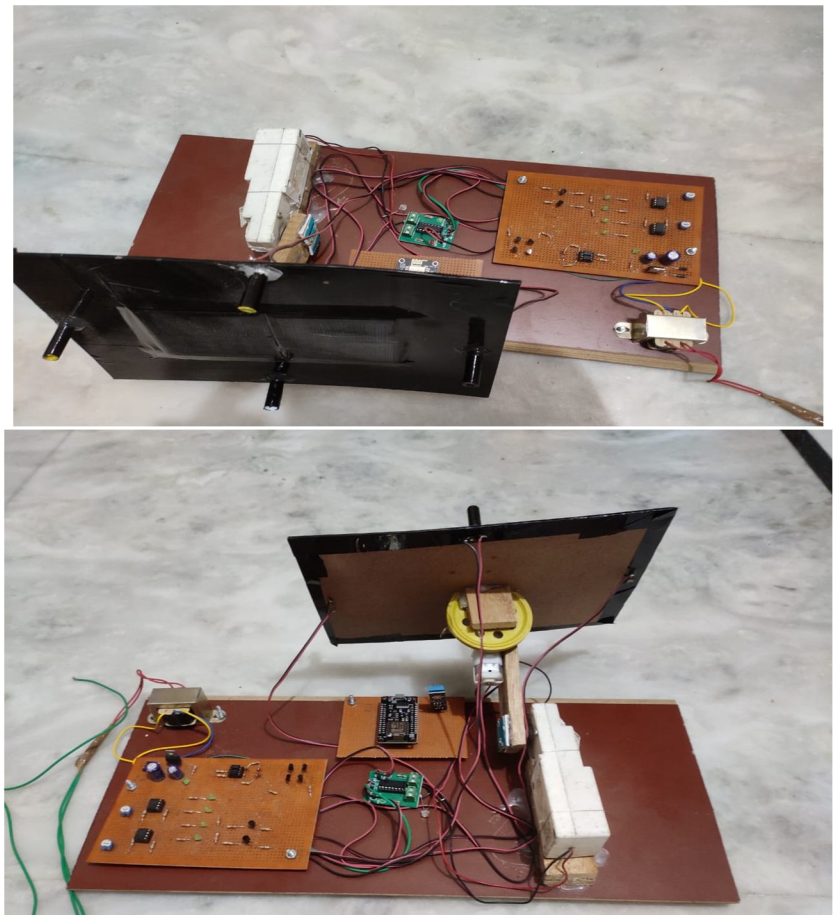


Figure. Model

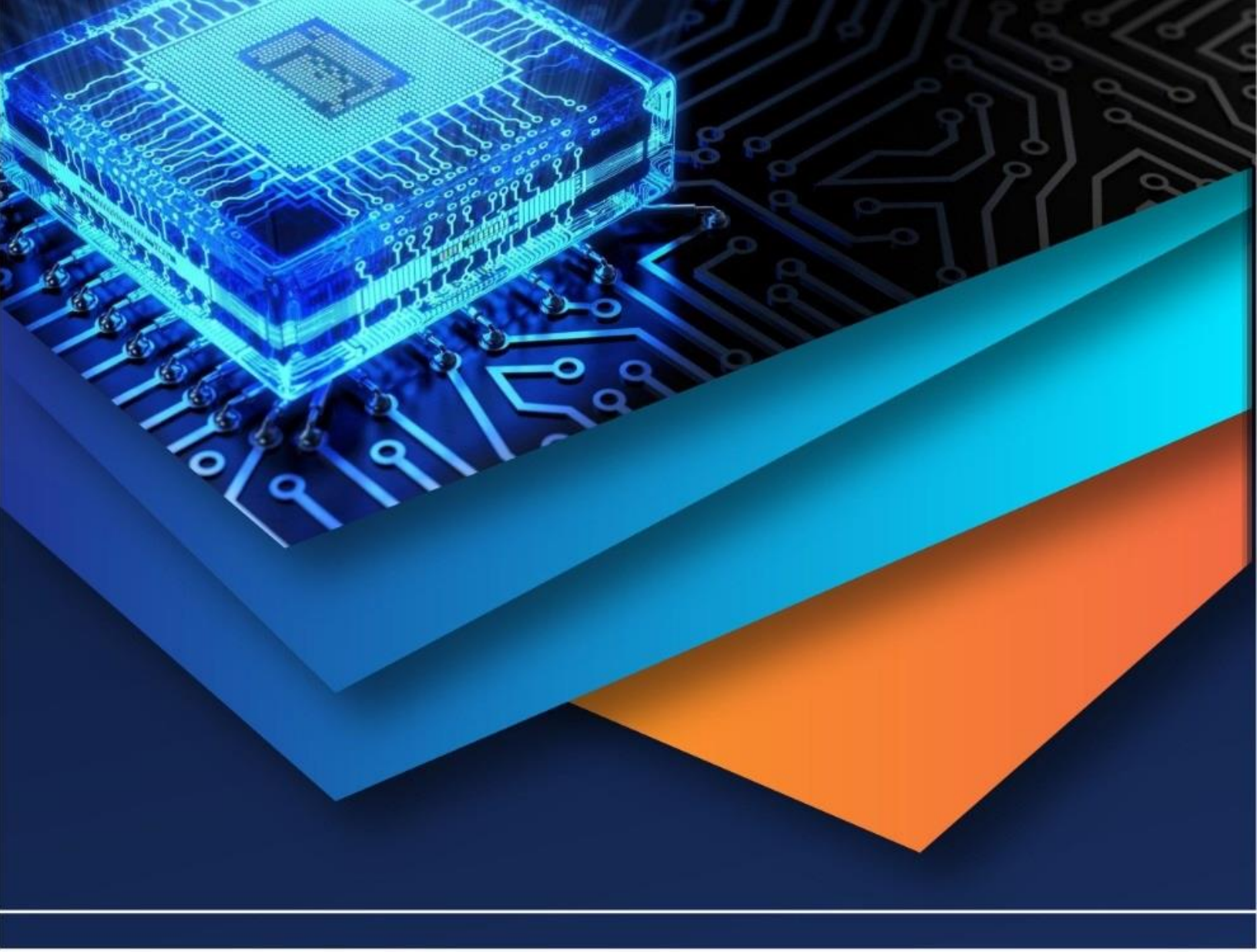
IV. CONCLUSION

Dual axis star huntsman is placed so as to trace the suns radiations altogether the directions with most intensity to supply electricity. it's the foremost economical methodology for the energy conversion and fewer economical when put next to different systems. during this project, we've developed a demo model of a star huntsman to trace {the most|the utmost|the most} intensity purpose of the sunshine supply in order that the voltage gain at that time by the electrical device is maximum. The project is meant to be enforced with negligible resources. The electronic equipment is unbroken straightforward, perceivable and user friendly.

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