

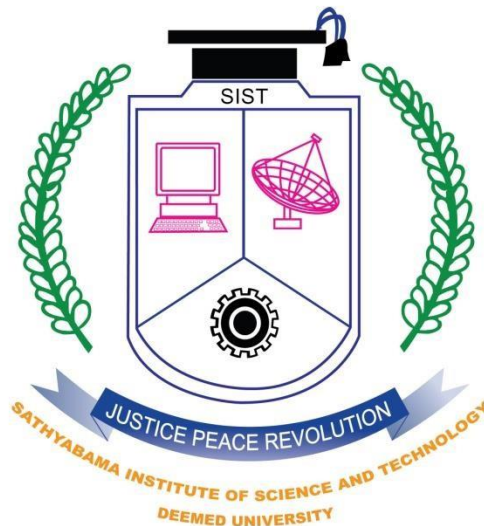
IOT BASED AUTOMATIC SOLAR TRACKER WITH POWER MONITORING SYSTEM

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Engineering Degree in
Electrical and Electronics Engineering

by

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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
SCHOOL OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY) Accredited
with Grade "A" by NAAC
JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI - 600 119**

**MARCH
2022**



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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **MOHAMED IRFAN M** (Reg. No. 38140029) and **VIJO V** (Reg. No. 38140063) who carried out the project entitled "**IOT BASED AUTOMATIC SOLAR TRACKER WITH POWER MONITORING SYSTEM** " under our supervision from December 2021 to March 2022.

Mrs.D.RAMYA

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Submitted for Viva voce Examination held on _____

Name:

Signature:

Internal Examiner

External Examiner

DECLARATION

We **MOHAMED IRFAN M** (Reg. No. 38140029) and **VIJO V** (Reg. No. 38140063) hereby declare that the Project Report entitled “**IOT BASED AUTOMATIC SOLAR TRACKER WITH POWER MONITORING SYSTEM**” done by us under the guidance of **Mrs.D.RAMYA** is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Electrical and Electronics Engineering.

1. 

2. 

DATE: 20/04/2022

SIGNATURE OF THE CANDIDATES

PLACE: Chennai

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ABSTRACT

Nowadays electricity is one amongst the elemental necessities of mankind because the demand of electricity is increasing, there's need to exploit renewable sources of energy. within the present era of power shortage in India, the use of different energy could be beneficial to great extent. For this reason, the quantity and size of the Photovoltaic (PV) systems are growing and consequently the quantity of investments and also related opportunities and risks are increasing. to make alternative energy more fruitful, the efficiency of device systems must be maximized. The efficiency evaluation of PV panels, has been discussed with particular attention to the presence of dust and maximum intensity of sunshine on the panel surface. Mainly, the implications of the dust and intensity of sunshine.

This paper gives a brief description of the design and construction of microcontroller-based cleaning and tracking system to possess solar systems energy more viable, the efficiency of solar panel systems should be maximized by follow the sun radiations using sun-tracking systems. Our studies target controls of the electrical device movement towards the direction of the sun radiation. Our project deals with the design and construction a solar tracking system by employing a DC gear motor, photodiode. This project presents the tactic of solar tracking with the help of LDR sensors and attains maximum efficiency. The Sensor unit sends information to the microcontroller which controls the direction of the dc gear motor attached to the device. solar array voltage is measured and displayed within the LCD display and might also monitor through IOT app from remote place.

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CHAPTER 1

1.1 INTRODUCTION

In the past decade of years there is an increase in demand for reliable and abundant power derived from renewable energy sources renewable energy plays important role in the energy crisis of the country. the govt began to decrease the usage of conventional energy sources and inspiring people to use renewable energy sources like hydro and solar. One such example of renewable energy is alternative energy. solar power could be a very large, inexhaustible source of energy. A solar tracker could be a device used for orienting a photovoltaic array solar battery or for concentrating a solar reflector or lens toward the sun. during this project, light-dependent resistor (LDR) has been wont to trace the synchronization of sunlight by detecting luminance of sunlight. For rotation part, standard Solar tracking is important for many of solar systems to gather the maximum amount radiation. Tracking requires an occasional degree of accuracy to confirm that the daylight is directed to the absorber, which is at the point of interest of the radiation. There's a requirement of improving the efficiency of solar energy generation in industries today. Renewable energy is rapidly gaining importance as an energy resource as fuel prices fluctuate. the globe population is increasing day by day and also the demand for energy is increasing accordingly. Electricity is one amongst the foremost important factor of our everyday life. It should be in a proper way for complete and proper utilization of our electricity. But just in case of our country there's surplus supply with electricity in many areas but there are such a lot of areas which couldn't even access of electricity. Internet of Things (IoT) technologies, together with economies of scale and advances in hardware, software, and network technologies, have accelerated the explosion of connected objects across the web. A connected object is controlled online from an IoT platform and might send, receive, and process various and varied data. We leverage a number of the IoT technologies to propose an easy and low-cost IoT solution to observe and control a wise dual-axis solar tracker system for performance evaluation.

CHAPTER 2

LITERTATUR SURVEY

2.1 “AUTOMATIC SOLAR TRACKING SYSTEM”

Nikesh.D.Watane et al projected the daintiness of the prevailing system is that instead of taking the globe as its reference, it takes the sun as a guiding supply. the sunshine dependent resistor's do the task of sensing the amendment within the position of the sun that's dealt by the varied amendment within the star panel's position by change on and off the geared motor the electrical circuit will the task of winning the input from the device and provides command to the motor to run so on tackle the amendment within the position of the sun. With the implementation the projected system the additional energy generated is around twenty fifth to half-hour with terribly less consumption by the system itself.

2.2 “On the PV huntsman Performance: chase the Sun Versus chase the most effective Orientation”

Carlos D. Rodríguez-Gallegos, Oktoviano Gandhi et all projected this text models the performance of physical phenomenon chase algorithms worldwide, supported the insolation assortment, by comparison 2 chase algorithms, particularly chase the sun (TS) and chase the foremost effective orientation (TBO). In general, the latter is anticipated to receive higher irradiance with the disadvantage of requiring an improved installation and maintenance value (due to the extra sensors). The aim of this analysis is then to quantify however huge the excellence is on irradiance assortment from these 2 trackers worldwide by analyzing the data from sixty one ground weather stations

2.3 “Automatic star chase System International Journal Of Core Engineering & Management”

Mayank Kumar Lokhande projected this existing system design it comprises a LDR sensor senses goop energy that's being given to the Microcontroller through the ADC that digitizes the LDR output. Controller then takes the selection in line with then formula

and tilts the panel towards the direction of the simple lay energy given by LDR with the help of DC Motor. The Motor is used to rotate the LDR to sense the simple lay energy. A star huntsman is basically a tool onto that star panels unit of measurement fitted that tracks the motion of the sun across the sky making sure that the utmost quantity of daylight strikes.

2.4 “Sun Tracking Solar Panel”

Arbaj N.Aga projected the system solved this drawback by an appointment for the solar panel to trace the Sun. This chase movement is achieved by coupling a stepper motor to the solar panel such the panel maintains its face forever perpendicular to the sun to induce most energy. this will be achieved by employing a programmed microcontroller to deliver stepped pulses in periodical time intervals for twelve hours for the stepper motor to rotate the mounted panel in one direction then come to the start purpose for next day light-weight as desired. The Arduino controller employed during this project is from the Arduino family. The Stepper motor is driven by AN interfacing IC because the controller isn't capable of handling the ability needs of the stepper motor. moreover, this project is also increased by mistreatment AN RTC (Real Time Clock) to follow the sun

2.5 “Investigation of maximum power point tracking of different kinds of solar panels under partial shading conditions”

Ibrahim Saiful Millah, Ramadhani Kurniawan Subroto et all projected this text, we've created the one diode model of these 3 totally different materials so on find their I-V characteristic curves underneath partial shading conditions (PSCs). we've incontestable that a most outlet (MPP) huntsman, underneath an identical PSCs spends less time and has higher chase potency in chase the MPP of a electrical device, manufactured from amorphous element, as a results of this sort of electrical device has the lowest curvature price compared to the monocrystalline and also the crystalline element panels. numerous progressive most outlet chase algorithms square measure used to validate this finding. Experimental validation for every static and dynamic PSCs unit of measurement conducted

2.6 “Investigated maximization of collected energy from AN on-board PV array”

Hossein Mousazadeh et al. presented a sun-tracking system on a mobile structure. The system used four light-weight dependent resistive sensors (LDRs) to sense the direct beams of the sun. Every pair of LDRs was separated by an obstruction as a shading device. A microcontroller primarily based electronic drive board was used as an interface between the hardware and also the code. For driving of each motor, an influence MOSFET was accustomed management the actuators. The experimental results indicated that the designed system was terribly sturdy and effective.

CHAPTER 3

3.1 AIM

The global energy crisis and continued supporting proof of world global climate change have begun to shift the globe economies towards solutions that solve each challenges. alternative energy has become one in all the foremost recognizable and popularized renewable energy strategies to this point. compared to different electrical phenomenon systems, this project demonstrates the performance benefits of a dual-axis star hunter. It conjointly addressing its viability on a non-commercial scale. the target was to enhance upon previous star hunter comes at Central Washington University by adding another axis to the system supported the deliverables come into being by the planning needs, the project provided for the most part winning results. The complete project was developed underneath budget, on schedule, with each axes functioning as meant, and underneath the burden limits. The electrical phenomenon was able to maintain a perpendicular relationship with daylight at intervals three-dimensional tolerance. The energy collected was just about 38.9% over the PV cell while not the trailing system.

3.2 SCOPE

The star project was enforced victimisation 2 servo motors. the selection was wise by the very fact that the motor is quick, will sustain high torsion, has precise rotation at intervals restricted angle and doesn't turn out any noise. The Arduino IDE was used for the secret writing. Calcutta has coordinates of twenty-two.5726°N, 88.3639°E and thus the position of the sun can vary in exceedingly vital method throughout the year. within the tropics, the sun position varies significantly throughout sure seasons. there's the planning of AN input stage that facilitates conversion of sunshine into a voltage by the sunshine dependent resistors, LDRs. there's comparison of the 2 voltages, then the microcontroller uses the distinction because the error. The servo motor uses this error to rotate through a corresponding angle for the adjustment of the position of the electrical device till such a time that the voltage outputs within the LDRs ar equal. The distinction between the voltages of the LDRs is received as analog readings.

- To observe the electrical device with numerous sensors
- The most aim of the Project is to harness the almost quantity of solar power through Sun.

CHAPTER 4

HARDWARE IMPLEMENTATION

4.1 CIRCUIT DIAGRAM

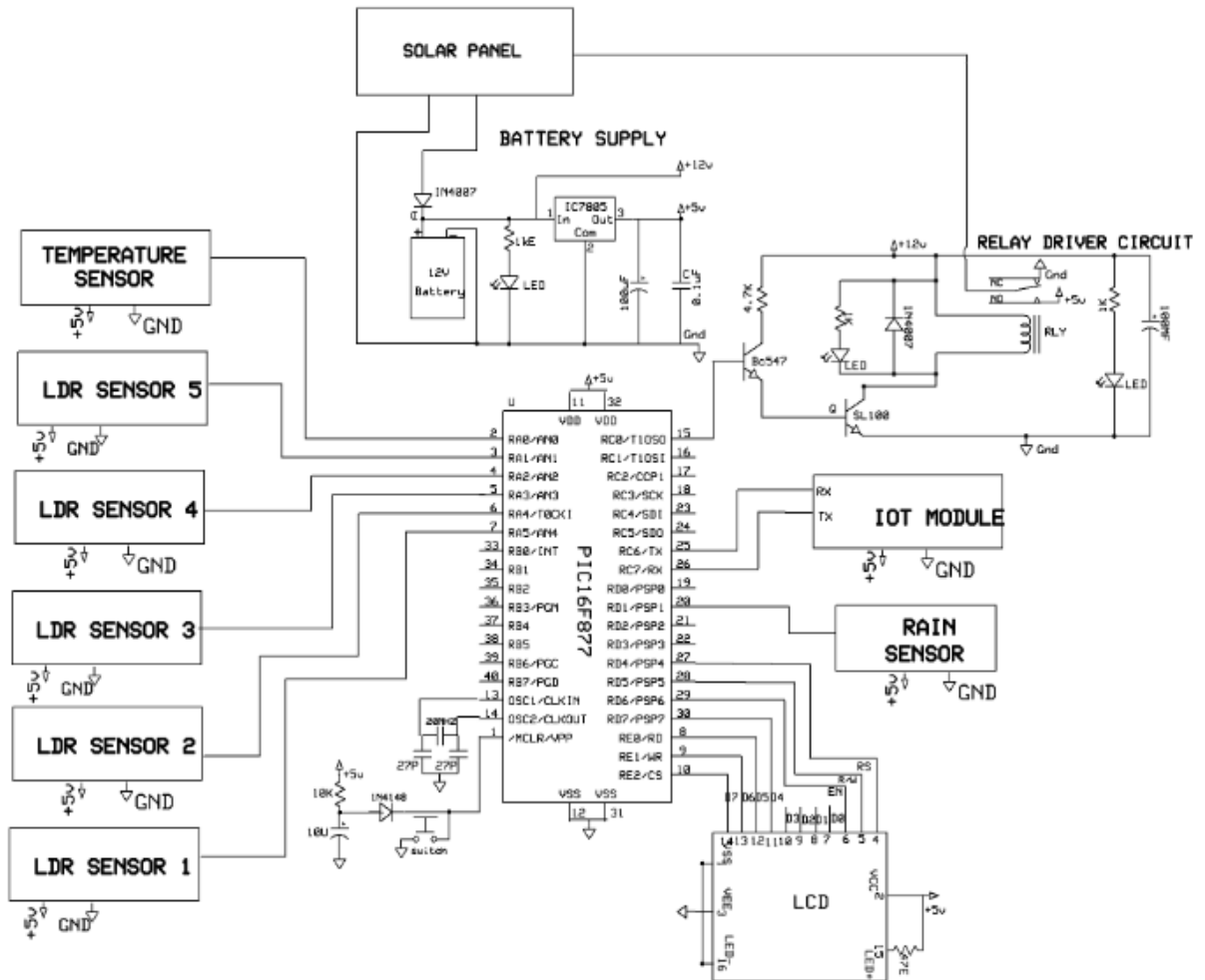


fig 4.1 circuit diagram

4.2 HARDWARE

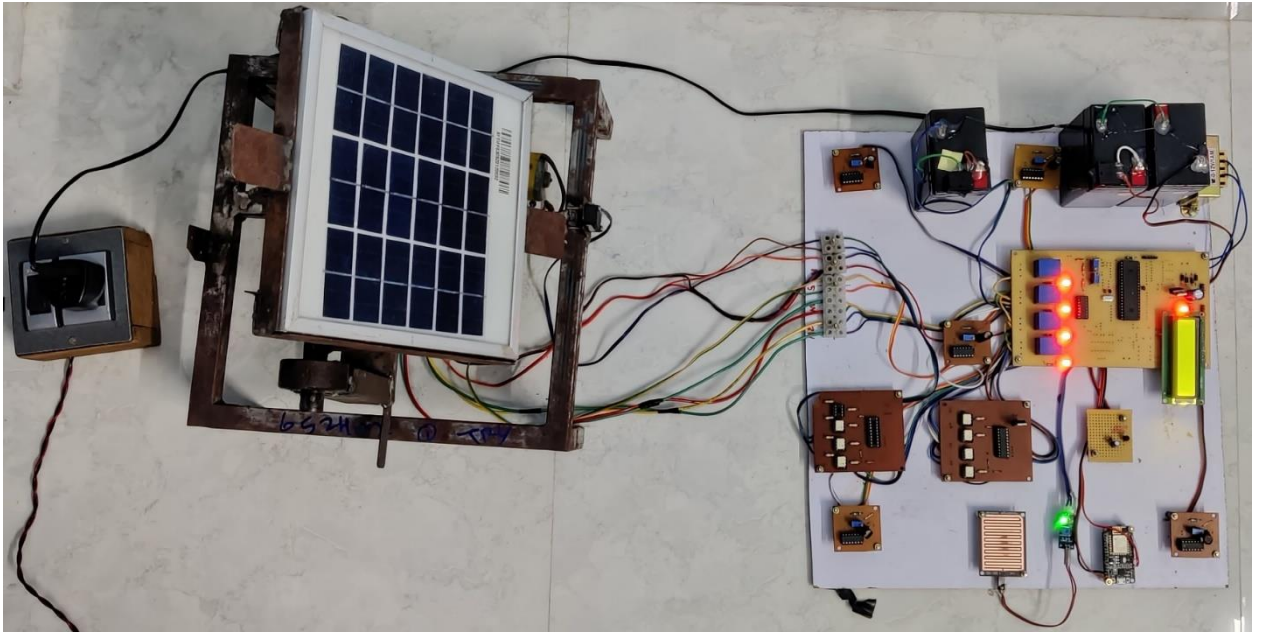


Fig 4.2 hardware

4.3 BATTERY

Lead acid batteries are the foremost commonly used style of battery in photovoltaic systems. Although lead acid batteries have an occasional energy density, only moderate efficiency and high maintenance requirements, they even have a protracted lifetime and low costs compared to other battery types. one among the singular advantages of lead acid batteries is that they're the foremost commonly used type of battery for many rechargeable battery applications (for example, in starting car engines), and thus have a well-established established, mature technology base.



Fig 4.3 lead acid battery

4.4 PIC MICROCONTROLLER

PIC microcontrollers (Programmable Interface Controllers), are electronic circuits which will be programmed to hold out an unlimited range of tasks. they'll be programmed to be timers or to manage a mechanical system and far more. they're found in most electronic devices like alarm systems, computer control systems, phones, of course almost any device. many varieties of PIC microcontrollers exist, although the simplest are probably found within the GENIE range of programmable microcontrollers. PIC Microcontrollers are relatively cheap and may be bought as pre-built circuits or as kits which will be assembled by the user.

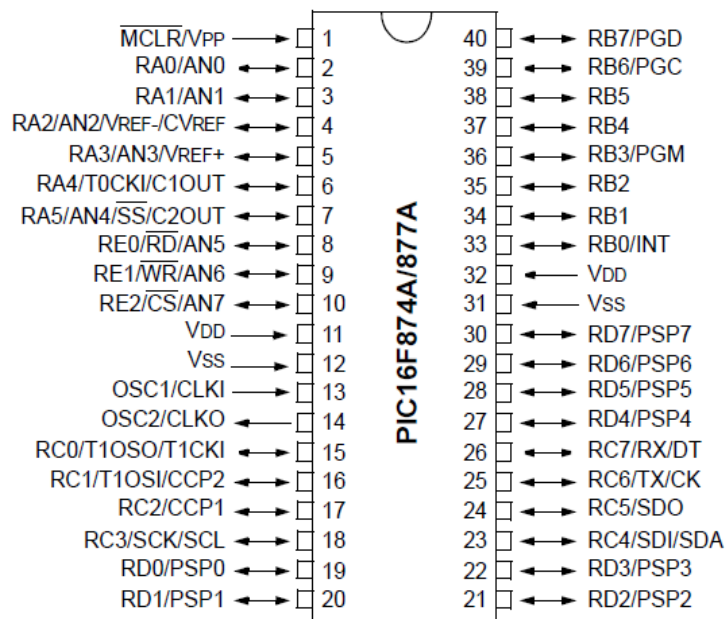


Fig 4.4 pin diagram

4.5 LDR sensor

LDR could be a element that includes a (variable) resistance that changes with the sunshine intensity that falls upon it. this enables them to be employed in light-weight sensing circuits. Light Dependent Resistors (LDR) also are referred to as photoresistors. they're made from high resistance semiconductor material

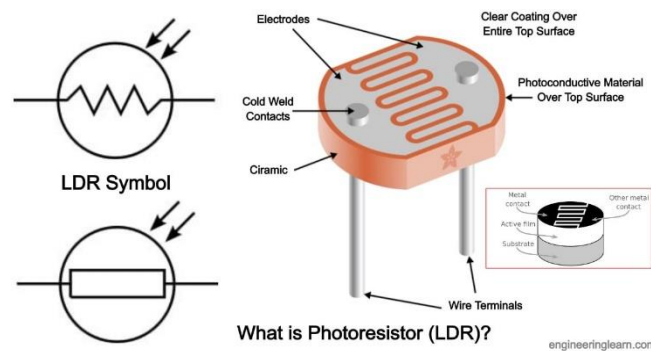


Fig 4.5 LDR sensor

4.6 TEMPERATURE SENSOR

A temperature sensor could be a device accustomed measure temperature. this could be air temperature, liquid temperature or the temperature of solid matter. There are differing kinds of temperature sensors available and that they each use different technologies and principles to require the temperature measurement. A temperature sensor could be a device, typically, a thermocouple or resistance temperature detector, that has temperature measurement during a readable form through an electrical signal. A thermometer is that the most simple kind of a temperature meter that's accustomed measure the degree of hotness and coolness.

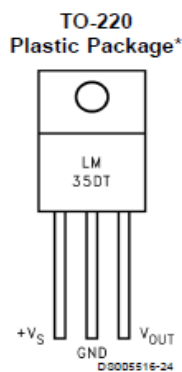


Fig 4.6 Temperature sensor

4.7 RAIN SENSOR

A rain device is one quite shift device that is employed to discover the downfall. It works sort of a switch and also the working rule of this device is, whenever there's rain, the switch are usually closed.

- A device or rain switch may be a shift device activated by downfall.
- The rain device works on the principle of total internal reflection
- These sensors area unit principally employed in the sector like automation , irrigation , vehicles, etc..

- It works on the resistance principle. This device module permits to measure wet through analog output pins & it provides a digital output whereas wet threshold surpasses.



Fig 4.7 Rain sensor

4.8 LCD MODULE

An liquid crystal screen is Associate in Nursing electronic display module that uses liquid to provide a visible image. The 16×2 liquid crystal display could also be awfully basic module ordinarily used in DIYs and circuits. The sixteen×2 interprets a show 16 characters per line in two such lines. throughout this LCD every character is displayed terribly} very 5×7 constituent matrix. 16×2 LCD is thought as therefore because; it's sixteen Columns and a handful of Rows. There square measure lots of mixtures obtainable like, 8×1, 8×2, 10×2, 16×1, etc. however the foremost used one is that the 16×2 LCD. So, it will have (16×2=32) thirtytwo characters in total and each character square measure fictitious from 5×8 constituent Dots.



fig 4.8 LCD module

4.9 RELAY

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a flux which attracts a lever and changes the switch contacts. The coil current will be ON or OFF so relays have two switch positions and most have double throw (changeover) switch contacts. It is a controller that's used to convert small electrical stimuli into larger current. It works on the principle of electromagnetic induction



Fig 4.9 Relay

4.10 IC ULN 2000

ULN2003 IC is one among the foremost normally used Motor driver IC usually used once we got to drive high current hundreds victimization digital logic circuits like Op-amps, Timers, Gates, Arduino, PIC, ARM etc. associate degree example} a motor that needs 9V and 300mA to run can't be hopped-up by an Arduino I/O thus we tend to use this IC to supply enough current and voltage for the load.

- Contains seven high-voltage and high current Darlington pairs
- Each try is rated for 50V and 500mA • Input pins is triggered by +5V
- All seven Output pins is connected to collect to drive hundreds up to (7×500mA) ~3.5A



Fig 4.10 IC ULN 2003

4.11 DC MOTOR

DC motors are a part of the electrical motors using DC power as energy source. These devices transform power into energy. the essential principle of DC motors is same as electric motors generally, the magnetic interaction between the rotor and also the stator that may generate spin.

Working Principle:

When DC current flowing within the coil in accordance with the direction of the arrow, while the direction of the force field B is from north to South Pole, the coil are driven by the force F within the direction. This condition occurs continuously so will end in rotation on the axis of the coil

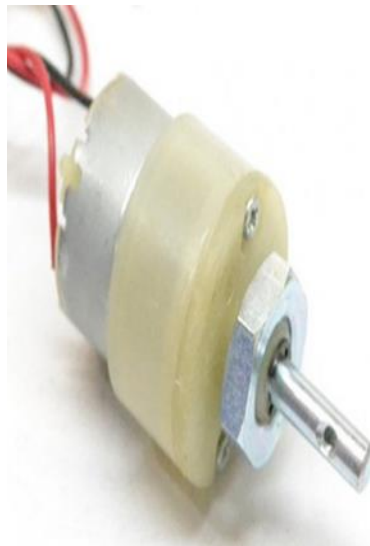


Fig 4.11 DC motor

4.12 IOT MODULE

The Internet of things (IoT) is that the network of physical devices, vehicles, home appliances and alternative things embedded with physical science, software, sensors, actuators, and property that permits these objects to attach and exchange knowledge. every issue is unambiguously distinctive through its embedded ADP system however is in

a position to inter-operate inside the present net infrastructure. Node MCU is associate degree open supply IoT platform supported supported module. The version one.0 is that the fifth style of Node MCU devkit. This uses CP2102 as UART bridge, and may flash computer code mechanically by mistreatment node MCU flasher. conjointly it's a transformer to convert from 5v to three.3v that is that the needed by the esp21e module

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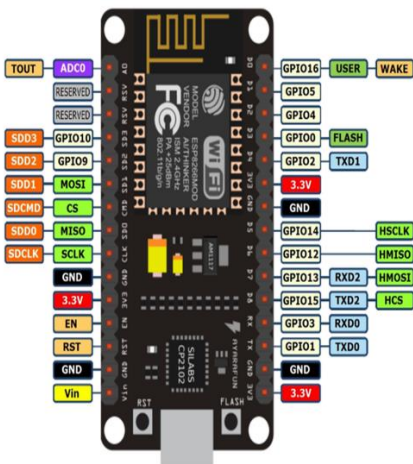


Fig 4.12 IOT module

4.13 HARDWARE OUTPUT



Fig 4.13 Hardware Output

CHAPTER 5

SOFTWARE IMPLEMENTATIONS

The software used in this project:

1. MPLAB IDE
2. HI-TECH
3. PICKIT 2

5.1 MPLAB IDE

Integrated Development setting (IDE) could be a comprehensive editor, project manager and style desktop for application development of embedded styles . The MPLAB Editor is associate integrated a part of the IDE Integrated Development setting. The editor is often offered once IDE is running. MPLAB could be a proprietary software package integrated development setting for the event of embedded applications on PIC and dsPIC microcontrollers, and is developed by chip Technology

IDE FEATURES

IDE provides the ability to:

- * produce and edit ASCII text file mistreatment the intrinsical editor.
- * Assemble, compile and link ASCII text file.
- * right the practicable logic by looking program flow with the intrinsical machine or in real time with in-circuit emulators or in-circuit debuggers.
- * create temporal arrangement measurements with the machine or mortal.

MPLAB X is that the latest version of the MPLAB IDE designed by semiconductor unit Technology, and is predicated on the ASCII text file NetBeans platform. MPLAB X supports writing, debugging and programming of semiconductor unit 8-bit, 16-bit and 32-bit PIC microcontrollers.

MPLAB X is that the initial version of the IDE to incorporate cross-platform support for waterproof OS X and UNIX system} operating systems, additionally to Microsoft Windows

5.2 HI-TECH

Traditionally, circuit simulation has been a non-interactive affair. Within the amount, netlists were ready by hand, and output consisted of reams of numbers. A pseudo-graphical output premeditated with asterisks to point the voltage and current waveforms. This may be fine if the circuit you're testing is really static in its behavior e.g. Associate in Nursing generator that sits there and oscillates at 1MHz. However, if you're turning out with a thief alarm, and want to go looking out what happens once a would-be thief keys the inaccurate PIN into the device, the fixing needed becomes quite impractical and one should resort to a physical example.

This compiler has been interrupted and is not to any extent further supported. This compiler has been replaced by the MPLAB® XC8 professional (SW006021-2). HI-TECH computer program for PIC10/12/16 MCUs - professional totally implements the optimizations of wise Code Generation™ - a whole-program compilation technology - to provide denser code and better performance on PIC MCUs. This ANSI program integrates into semiconductors MPLAB(R) IDE and is compatible with Microchip debuggers and person

5.3 PICKIT2

PICKit may be a family of programmers for PIC microcontrollers created by semiconductor unit Technology. they're wont to program and rectify microcontrollers, in addition as program EEPROM. Some models additionally feature logic instrument and serial communications (UART) tool. The PICKit two — introduced in could 2005[3] — replaced the PICKit one. the foremost notable distinction between {the two|the two} is that the PICKit 2 features a separate programmer/debugger unit that plugs into the board carrying the chip to be programmed, whereas the PICKit one was one unit. This makes it doable to use the technologist with a custom card via associate degree in-circuit serial programming (ICSP) header. This feature isn't intended[3] for questionable "production" programming, however. The PICKit two uses an indoor PIC18F2550 with FullSpeed USB. the most recent PICKit two microcode permits the user to program and rectify most of the eight and sixteen bit PICmicro and dsPIC members of the semiconductor unit wares. The PICKit two is receptive the general public, as well as its hardware schematic, microcode ASCII text file (in C language) and application programs (in C# language). finish users and third parties will simply modify each the hardware and software package for increased options. e.g. UNIX system version

of PICkit two application software package, DOS vogue CMD support, etc. The PICkit two features a programmer-to-go (PTG) feature, which might transfer the hex file and programming directions into on-board memory (128 KB I²C EEPROM or 256 KB I²C EEPROM), in order that no computer is needed at the top application.

IOT APP



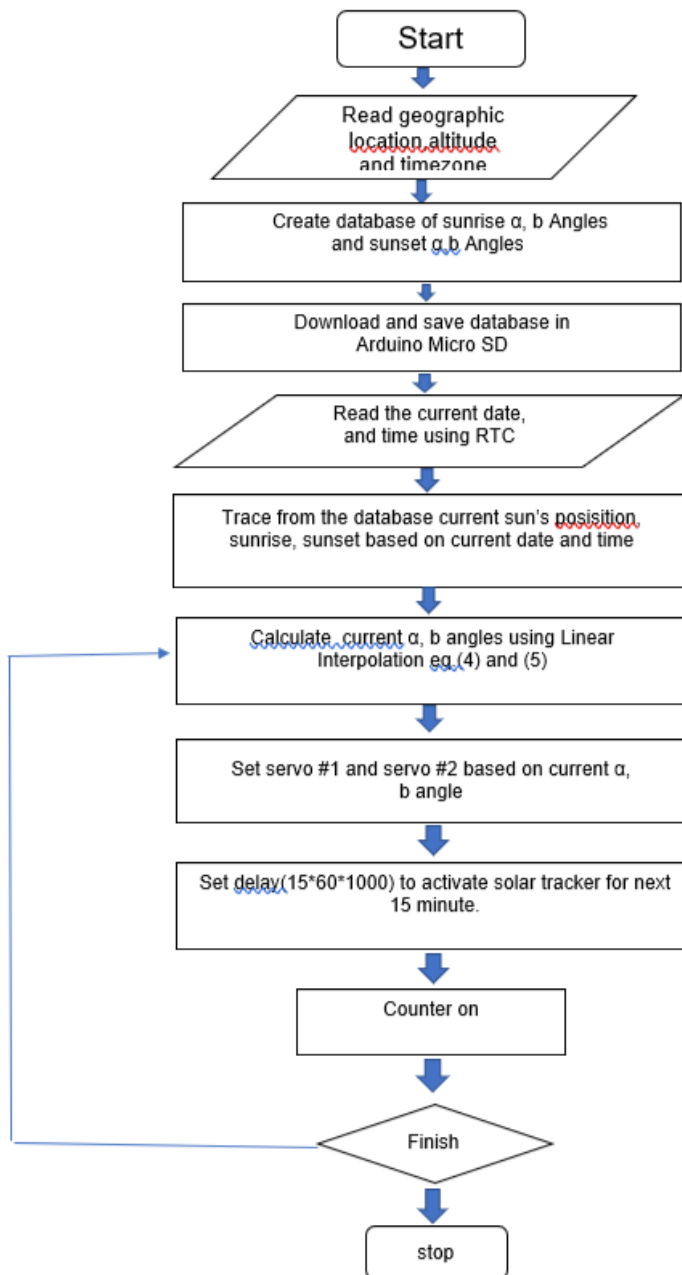
In this project we used a IOT app called CAYENNE APP. Cayenne is an app for smartphones and computers that allows you to control the Raspberry Pi and soon also the Arduino through the use of an elegant graphical interface and a solid nice communication protocol.

5.4 The solar tracker algorithm:

Steps:

1. Read live duration from RTChour60RTCminute
2. SD.open to study the index of sun location.
3. Examine RTC duration with index duration to result in morning, evening time, and variety longitude.
4. Calculate current variety and longitude with the employment of linear Interpolation.
5. Set servo 1 primarily on the stylish range
6. Set servo 2 is primarily on live meridians.
7. SD close to close the index.
8. Set a lag (15601000) to kindle the sun tracking system for the following quarter-hour.

5.5 FLOWCHART



5.6 CODING:

```
#include<pic.h>
__CONFIG(0X3F72);

static bit rs@((unsigned )&PORTD*8+3);
static bit rw@((unsigned )&PORTD*8+0);
static bit en@((unsigned )&PORTD*8+2);

static bit MOTOR1F@((unsigned
)&PORTC*8+0);
static bit MOTOR1R@((unsigned
)&PORTC*8+1);

static bit MOTOR2F@((unsigned
)&PORTC*8+2);
static bit MOTOR2R@((unsigned
)&PORTC*8+3);
static bit LED@((unsigned )&PORTC*8+4);

static bit ldr1@((unsigned )&PORTB*8+0);
static bit ldr2@((unsigned )&PORTB*8+1);
static bit ldr3@((unsigned )&PORTB*8+2);
static bit ldr4@((unsigned )&PORTB*8+3);
static bit ldr5@((unsigned )&PORTB*8+4);

static bit limtswitch1@((unsigned
)&PORTB*8+5);
static bit limtswitch2@((unsigned
)&PORTB*8+6);
static bit limtswitch3@((unsigned
)&PORTB*8+7);

static bit SENSOR@((unsigned )&PORTE*8+0);

//static bit BUZZER@((unsigned
)&PORTC*8+1);
unsigned int
VAL1=0,VAL2=0,VAL3=0,valzz=0,valyy=0;
//unsigned char T,VAL33=0,rf_rxdata;
unsigned int VAL4,VAL5=0, VAL7=0;

unsigned char i,j,k,m;
unsigned int  adc_value,a,b,c,e,f,g,z,h;
unsigned int adc_value2,l,n,o;
unsigned char
H1,H2,H3,T1,T2,T3,M1,M2,M3,L1,L2,L3;

//unsigned char
rain=0,rain1=0,VAL41,gpsdata[50];
//unsigned char
VIK=0,ser=0x37,st=0x01,data_cap=0x00;
//unsigned char adc=0;

unsigned int
VALA=0,VALB=0,VALC=0,VALD=0,VALE=0;

void delay(unsigned int y)//delay prg
{
while(y--);
}

void lcd_command(unsigned char com)
{
unsigned char temp;

PORTD=com&0xf0;
rs=0;
rw=0;
en=1;
```

```

delay(10);
en=0;
temp=com<<4;
PORTD=temp&0xf0;
rs=0;
rw=0;
en=1;
delay(10);
en=0;
}

```

```

void lcd_init()
{
  lcd_command(0x02);
  lcd_command(0x2c);
  lcd_command(0x06);
  lcd_command(0x0c);
  lcd_command(0x01);
  lcd_command(0x80);
}

```

```

void lcd_data(unsigned char data)
{
  unsigned char val1;
  PORTD=data&0xf0;
  en=1;
  rs=1;
  rw=0;
  delay(10);
  en=0;
  val1=data<<4;
  PORTD=val1&0xf0;
  en=1;
  rs=1;
  rw=0;
  delay(10);
}

```

```

en=0;
}
void lcd_display(const unsigned
char*word,unsigned int n)
{
  unsigned char l;
  for(l=0;l<n;l++)
  {
    lcd_data(word[l]);
  }
}

```

```

void adcconvert1()
{
  b=VAL1%10;
  c=VAL1/10;

  e=c%10;
  f=c/10;
  g=f%10;
  h=f/10;
}

```

```

  lcd_data(g+0x30);
  H1=(g+0x30);
  delay(100);

  lcd_data(e+0x30);
  delay(100);
  H2=(e+0x30);

  lcd_data(b+0x30);
  delay(100);
  H3=(b+0x30);
}

```

```

void adconvert2()
{
j=VAL2%10;
k=VAL2/10;

l=k%10;
m=k/10;
n=m%10;
o=m/10;

lcd_data(n+0x30);
delay(100);
T1=(n+0x30);

lcd_data(l+0x30);
delay(100);
T2=(l+0x30);

lcd_data(j+0x30);
delay(100);
T3=(j+0x30);

}

void adconvert3()
{
j=VAL3%10;
k=VAL3/10;

l=k%10;
m=k/10;
n=m%10;
o=m/10;

lcd_data(n+0x30);
delay(100);
M1=(n+0x30);

lcd_data(l+0x30);
delay(100);
M2=(l+0x30);

lcd_data(j+0x30);
delay(100);
M3=(j+0x30);

}

void adconvert4()
{
j=VAL4%10;
k=VAL4/10;

l=k%10;
m=k/10;
n=m%10;
o=m/10;

lcd_data(n+0x30);
delay(100);
M1=(n+0x30);

lcd_data(l+0x30);
delay(100);
M2=(l+0x30);

lcd_data(j+0x30);
delay(100);
M3=(j+0x30);

}

void adconvert5()
{

```

```

j=VAL5%10;
k=VAL5/10;

l=k%10;
m=k/10;
n=m%10;
o=m/10;

lcd_data(n+0x30);
delay(100);
M1=(n+0x30);

lcd_data(l+0x30);
delay(100);
M2=(l+0x30);

lcd_data(j+0x30);
delay(100);
M3=(j+0x30);
}
void delay2()
{
    long i;
    for(i=0;i<10000;i++);
    CLRWDT();
}

// SERIAL INTRRUPT
void IOT_init()
{
    TXSTA=0X24;
    RCSTA=0X90;
    SPBRG=25;
    BRGH=1;
    //GIE=1;
    //PEIE=1;
}

//RCIE=1;
}

void IOT_SEND()
{
    TXREG='S';
    delay(100);

    TXREG=(H1);
    delay(600);

    TXREG=(H2);
    delay(600);

    TXREG=(H3);
    delay(600);

    TXREG='B';
    delay(100);

    TXREG=(T1);
    delay(600);

    TXREG=(T2);
    delay(600);

    TXREG=(T3);
    delay(600);

    TXREG='T';
    delay(100);

    TXREG=(M1);
    delay(600);
}

```

```

TXREG=(M2);
delay(600);

TXREG=(M3);
delay(600);

if(SENSOR==0)
{
    lcd_command(0xC7);
    delay(100);
    lcd_data('R');
    lcd_data(':');
    lcd_data('1');
    TXREG='R';
    delay(100);

    TXREG='1';
    delay(600);
}
else
{
    lcd_command(0xC7);
    delay(100);
    lcd_data('R');
    lcd_data(':');
    lcd_data('0');
    TXREG='R';

    TXREG='0';
    delay(600);
}
}

//*****
*****

// main
void main()

```

```

{

    ADCON1=0X82;
    ADCON0=0x00;

    TRISB=0XFF;
    TRISD=0X00;
    TRISC=0X80;
    TRISA=0X1f;
    TRISE=0X01;

    PORTA=0X00;
    PORTD=0X00;
    PORTB=0X1F;
    PORTC=0X80;
    PORTE=0X01;

    //BUZZER=0;
    delay(100);
    lcd_init();
    lcd_command(0x80);
    delay(100);
    lcd_display("welcome1",8);

    delay(35000);
    IOT_init();
    delay(35000);

    IOT_init();
    delay(35000);
    delay(35000);

    delay(50000);delay(50000);

    VAL5=0;
    //VAL41=0X00;

```

```

VAL1=0;

while(1)
{

lcd_command(0x01);
delay(100);
lcd_command(0x80);

CHS0=0;
CHS1=0;
CHS2=0;

ADON=1;
delay(200);
ADCON0=ADCON0|0X04;
delay(200);
adc_value=ADRESH;
adc_value=adc_value<<8;
adc_value=(adc_value+ADRESL);
VAL1=adc_value;

delay(50000);
//adc_value=adc_value/0x02;
delay(100);
lcd_command(0x80);
delay(100);
lcd_data('S');
lcd_data(':');
adcconvert1();
delay(10000);delay(50000);

CHS0=1;
CHS1=0;
CHS2=0;

```

```

ADON=1;
delay(200);
ADCON0=ADCON0|0X04;
delay(200);
adc_value=ADRESH;
adc_value=adc_value<<8;
adc_value=(adc_value+ADRESL);
VAL2=adc_value;
delay(100);
lcd_command(0x87);
delay(100);
lcd_data('B');
lcd_data(':');
adcconvert2();
delay(10000);delay(50000);

CHS0=0;
CHS1=1;
CHS2=0;
ADON=1;
delay(200);
ADCON0=ADCON0|0X04;
delay(200);
adc_value=ADRESH;
adc_value=adc_value<<8;
adc_value=(adc_value+ADRESL)/0x02;
VAL3=adc_value;
delay(100);
lcd_command(0xC0);
delay(100);
lcd_data('T');
lcd_data(':');
adcconvert3();
delay(10000);
delay(10000);delay(10000);delay(
10000);

```

```

IOT_SEND();delay(50000);
//IOT_SEND();delay(50000);
//*****
**
//SOLR EST
//*****
**
if((ldr1==1)&&(VALA==0))
{
VALA=1;MOTOR1F=1;
while(limtswitch1==1);
MOTOR1F=0;
delay(500);
while(limtswitch1==1);
MOTOR1F=0;

MOTOR1F=0;
VALC=1;VALD=0;
}
if(ldr1==0)
{
VALA=0;
}
//SOLR MT
//*****
**
if((ldr2==1)&&(VALB==0))
{
delay(30000);
VALB=1;
if((VALC==1)&&(VALD==0))
{
MOTOR1R=1;
delay(50000);
delay(20000);delay(5000);
MOTOR1R=0;
VALC=0;

```

```

}
if((VALC==0)&&(VALD==1))
{
MOTOR1F=1;
delay(50000);
delay(20000);delay(30000);
MOTOR1F=0;
VALD=0;
}
delay(50000);
}
if(ldr2==0)
{
VALB=0;
}
//SOLR EST
//*****
**
if((ldr3==1)&&(VALE==0))
{
VALE=1;MOTOR1R=1;
MOTOR1R=1;
while(limtswitch2==1);
MOTOR1R=0;
delay(500);
while(limtswitch2==1);
MOTOR1R=0;

VALC=0;VALD=1;
}
if(ldr3==0)
{
VALE=0;
}

if((ldr4==1)&&(valzz==0))

```

```

{
valzz=1;
MOTOR2F=1;delay(50000);
delay(50000);delay(50000);delay(10000);
MOTOR2F=0;delay(50000);
}
if(ldr4==0)
{
valzz=0;
}
if((ldr5==1)&&(valyy==0))
{
valyy=1;
MOTOR2R=1;
while(limtswitch3==1);

```

```

MOTOR2R=0;
delay(500);
while(limtswitch3==1);

MOTOR2R=0;

delay(50000);
}
if(ldr5==0)
{
valyy=0;
}
delay(50000);delay(50000);

}
}

```

5.7 SOFTWARE OUTPUT

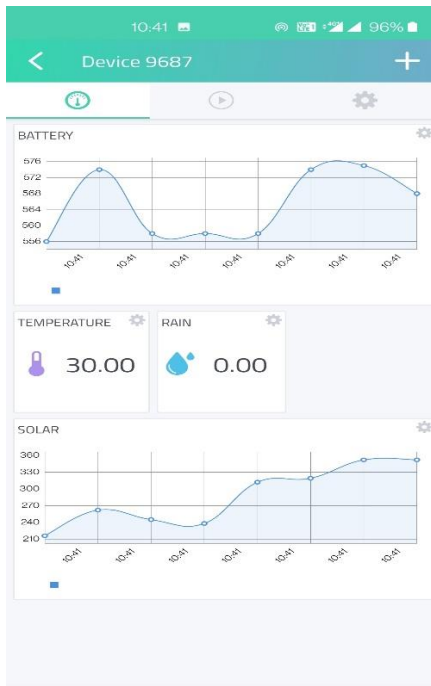


Fig 5.7 software output

CHAPTER 6

RESULT AND FUTURE SCOPE

RESULT

The results for the project were gotten from LDRs for the star pursuit system and also the panel that incorporates a fastened position. The outputs of the LDRs were passionate about the sunshine intensity falling on their surfaces. The planned twin axis star huntsman mechanically tracks position of sun and maximize the alternative energy with facilitate of PIC small controller. As compared to single axis, dual-axis system provides high pr current output in comparison to the fastened mount system. the twin axis huntsman has a lot of potency. the most aim of this work is to develop 2 axis star huntsman systems that use 5 sensors (LDR s) to predict the sun position. In our project, the hardware of the twin axis star pursuit system style and implementation has been planned. this technique will increase the potency of the solar array. it's fully automatic and ensures minimum maintenance at low value. Since, it's a twin axis system most potency are often obtained over a amount of your time. The installation and implementation of twin axis pursuit system are often placed anyplace because it doesn't depends on weather conditions etc. It are often employed in several applications like vehicles, residential areas, industries, establishments etc. so as to put a lot of range of panels, the systems have to be compelled to be designed with a lot of mechanical strength. the facility consumption of the system are often reduced by up the system style As alternative energy production is employed in massive scale worldwide therefore, even associate increment unskillfulness by I Chronicles than letter paper plane can will increase information superhighway power production by great deal. Hence, regardless of by what proportion huntsman will increase associate potency it's perpetually welcome. . This mechanism might be manifested in wide selection of applications thatrequire star pursuit like parabolic trough collector, solar dish, lens and different PVsystems to gather most radiation from sun

FUTURE SCOPE

In this project, twin Axis star hunter, we've developed a demo model of star hunter to trace most the at most the most intensity purpose of sunshine supply so the voltage given at that time by the electrical device is maximum. once plenty of trial and errors we've with success completed our project and that we square measure proud to take a position some effort for our society. Now, like each different experiment, this project has few imperfections. (i) Our panel senses the sunshine during a sensing zone, on the far side that it fails to reply. (ii) If multiple sources of sunshine (i.e. subtle lightweight source) seem on panel, it calculates the vector of sunshine sources & moves the panel therein purpose. This project was enforced with nominal resources. The electronic equipment was unbroken straightforward, comprehensible and user friendly

- within the future, ready to} ready to store most quantity of energy and may able to use in great deal.
- lot based mostly star hunter system may be utilised for each industrial purpose and additionally house purpose.
- The outputs in storage of IOT system will improve within the future by improve or amendment the platform.
- Lastly, the star hunter will have created a game changer to our world and it safe a lot of to use as a result of it doesn't have any pollution
- As the result the twin axis star hunter mechanically tracks position of sun and maximize the solar energy with facilitate of PIC small controller.
- As compared to single axis, dual-axis system provides high exuberant current output in comparison to the mounted mount system
- A dual-axis star hunter produces thirty to forty fifth a lot of energy yield than fixed-tilt star systems.

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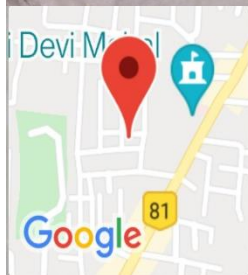
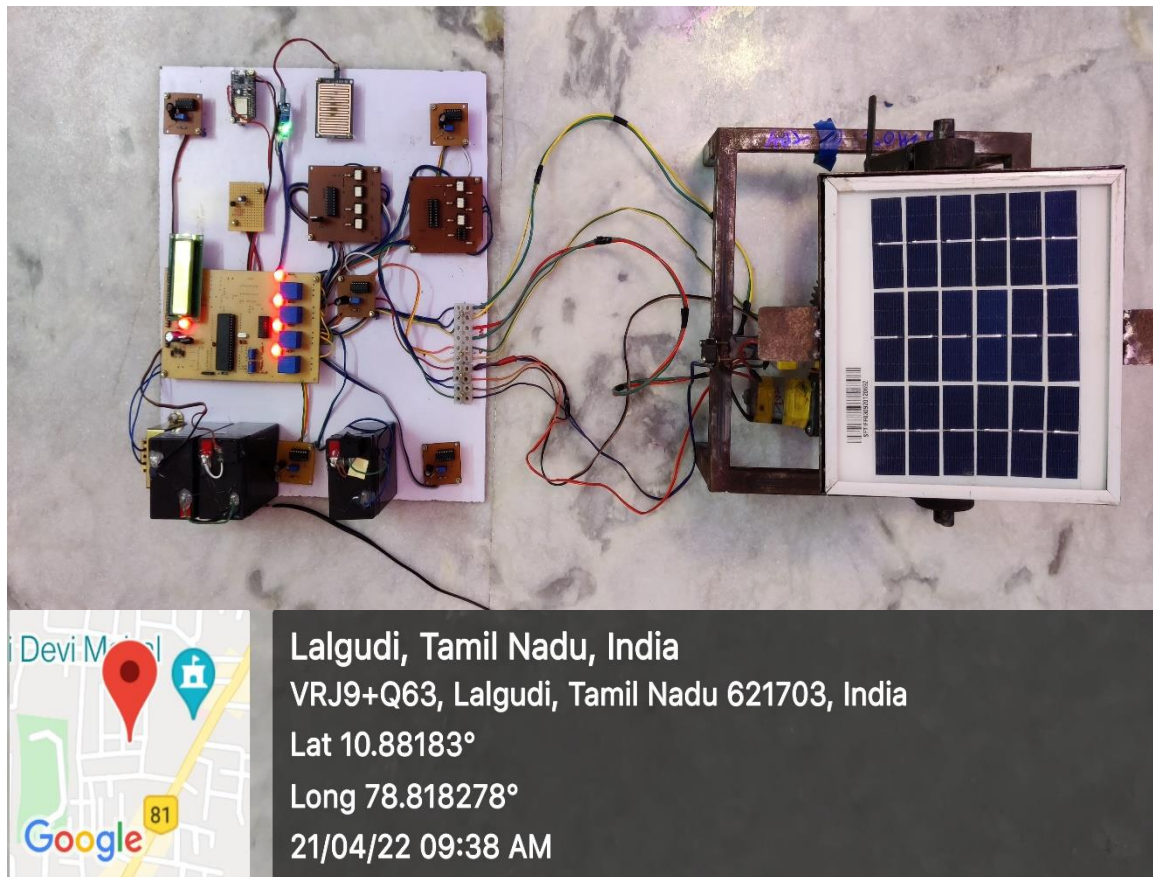
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GEOTAGGED PHOTO:



Lalgudi, Tamil Nadu, India
VRJ9+Q63, Lalgudi, Tamil Nadu 621703, India
Lat 10.88183°
Long 78.818278°
21/04/22 09:38 AM