CONSTRUCTION OF DUAL AXIS SOLAR TRACKER DEVICE SYSTEM

A Project Work submitted in incomplete satisfaction of the Prerequisites for the Award of Degree of Four year education in science in Electrical and Electronic Engineering

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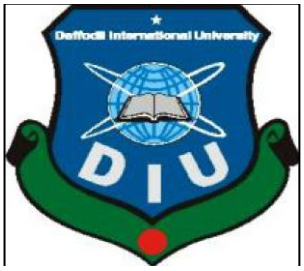

DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING

FACULTY OF ENGINEERING

DAFFODIL INTERNATIONAL UNIVERSITY

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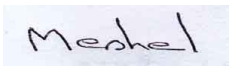
Certification

This is to guarantee that this venture and proposal entitled "Development Of Dual Axis Solar Tracker framework" is finished by the accompanying understudies under my immediate supervision and this work has been completed by them in the Department of Electrical and Electronic Engineering under the Faculty of Engineering of Daffodil International University in fractional satisfaction of the necessities for the level of Bachelor of Science in Electrical and Electronic Engineering. The introduction of the work was hung on November 2018.

Signature of the candidate



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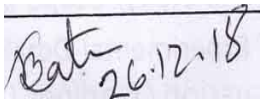

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Authors

ABSTRACT

These days, Sunshine risen board has been fulfilled gradually as of late to change above sun risen vigour to electrical vigour.The sun based board can be fulfilled either as an independent case or as a hugely goliath framework that is attached with the energy fake. The globe gets 84 Terawatts of strength and our fact expends in the region of 12 Terawatts of puissance for every day. We are attempting to eat up greater essentialness from the sun using sun oriented board. With the ultimate objective to extend the change from sun based to electrical imperativeness, the sun based board must be orchestrated inverse to the sun .as needs be the accompanying of the sun's territory and organizing of the sun fueled board are fundamental. The goal of this assignment is to design a customized system, which can discover position of the sun and utilize the sun based vitality to store battery and changes over dc to air conditioning power on the off chance that we require air conditioning power; yet in our ventures we indicating just dc control that we can store with battery. Our framework will yield up to 15% effectiveness . So this framework will enable us to utilize more sun vitality.

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LIST OF ABBREVIATION

PCB	Printed Circuit Boar
LED	Light emitting Diode
LCD	Liquid Crystal Display
LDR	Light-Dependent Resistor
VCC	Voltage Common Collector
AC	Alternating Current
DC	Direct Current

CHAPTER 1

INTRODUCTION

1.1 Introduction

This is a sun based following framework which can be used as a puissance inciting strategy from daylight. This strategy for intensity age is straightforward and is taken from characteristic asset. This needs just most extreme daylight to cause puissance. This venture benefits for power age by setting the gear to get most extreme daylight consequently. This framework is following for most extreme power light. That spot when there is diminish in force of flame, these framework naturally changes its course to get generally extraordinary power of light. We are using two sensors in two ways to distinguish the course of most outrageous intensity of light. The qualification among the yields of the sensors is given to the smaller scale comptroller dimensio. Here we are using the smaller scale comptroller for following and causing energy from sunshine . It will Scheme the info voltage from the oscillator's circuit and Scheme the heading in which the engine must be turned with the aim that it will get most energy of shine from the sun.

1.2 Problem Statement

A sunlight based tracker is used in sundry case for the alteration of harnessing. sun oriented dispersion. The bind that is presented is the behavior of a case which is suitable for improving engenderment of puissance by 30 to 40%. The monitoring circuit is executed by the microcontroller. The monitoring circuit at that point locations the engine that is used to put in the sun powered board.

1.3Aim of the Project

The utilization of sun-based radiation for enthusiastic working terminations essentially aludes. As it might be other practical vitality sources, other than the geothermal and tide, get their accounts from the sun. They are broadly portrayed as being lethargic or dynamic in the manner in which they catch, convert and spread the sun-based advances. The photovoltaic sheets, cypones, and vaques are in dynamic sun-put together frameworks Changes with respect to the sunlight in the usable yield. Distinctive daylight based frameworks indicate diverse materials with ideal warm properties, by and large arrangement air investigation, and the sun alludes to a working circumstance. At the point when the dynamic sun-based

advancement expands the incredible supply and the supply is viewed as side advancement Sunlight based developments are elective alternatives That lessens the objective and are commonly viewed as interest side advances. Sun based following framework will benefit us use all of sun based vitality in most effective way.

1.4 Scopes

The sunlight based venture was executed using a dc servo engine. The winnow was notified by the way that the servo engine is quick, can continue high torque, includes exact revolution inside encompassed edge and does not cause any clamor. There is the implanted programming segment where the pic-16F877A is modified using the C dialect. The Arduino IDE was used for the coding. The plan is repressed to Single Pivot following in light of the fact that the use of a double hub following framework would not incorporate much esteem. Dhaka has directions of 23.8103º N, 90.4125º E and thus the situation of the sun won't change principally amid the year. In the tropics, the sun position changes significantly amid specific seasons. There is the plan of an information organize that encourages transformation of light into a voltage by the light reliant resistances, LDRs. There is a exam of the two voltages, at that point the microcontroller uses the variety as the blunder. The dcservo apparatus uses this mistake to variation via a comparing plot for the alteration of the situation of the sun based board, to the point that the volt yields in the LDRs are equipollent. The thing that matters is transmitted to the servo engine and it in this way pergrinates to discover the two LDRs are an equivalent tendency. This means they will get a similar measure of light. The system is repeated for the current time of the day.

1.5 Methodology

The circuit of the sun oriented tracker framework is separated by three segments.There's the information arrange that is made out of sensors and potentiometers, a program in implanted programming in the microcontroller and in conclusion the operating circuit that bear the dc engine. The information organize bear two LDRs that are so masterminded to create a voltage divider circuit. A C program stacked into the pic-16F877A structures the inserted programming.The three phases are planned freely in advance of being joined into one framework. These methodology, homogeneous to stepwise refinement in Special programming, has been utilized as it finds out the right and legitimate methodology that make it straight & effortless to get it. This assistant finds that if there is a mistake, they are considered free and reviewed.

1.6 Organization of the Report

These report has seven chapters in total. The first chapter describes a conception about our project“Construction & Performance Test of a SolerTraker Contrivance (Dual Axis) system”,Brief description of the project, quandary verbal expression, scopes and methodology.The second chapter about history, block diagram, circuit diagram, list of components.The chapter third about component description, cost analysis of our system.The chapter fourth software analysis &programexplanation. The chapter fivehardware implementation. Thenchaptersix describes result& discussion felicitously. Determinately, chapter seven gives the concluding remarks, constraint of our systemand suggestion for the future works.

CHAPTER 2

COMPONENT DESCRIPTION

2.1 Prelude

Light distinguishing sensor that might be utilized to fabricate sunlight based tracker incorporate; phototransistors, photodiodes, LDR. A well suited, economical, basic and smooth to method photographs sensor is simple LDRs that are the best ordinary in gadgets. Ihis is customarily varius type of a photographs resistors made out of Cds (cadmium sulfide) or GaAs (gallium arsenide).

2.2 6v 1w solar panel

Sun powered boards retain daylight as a well-spring of vigor to cause energy. A photovoltaic (PV) module is a packaged, related party of conventionally 6x10 photovoltaic sun based cells. Photovoltaic modules include the photovoltaic display of a photovoltaic system that instigates and supplies sun based power in business and private applications.Each module is assessed by its dc yield control under standard test conditions (stc), and generally keeps running from 100 to 365 watts (w). The viability of a module chooses the locale of a module given the comparable evaluated yield – a 8% capable 230 w module will have twofold the area of a 16% beneficial 230 w module. There are a couple monetarily available sun fueled modules that outperform profitability of 24% A singular sun arranged module can initiate only an obliged proportion of puissance; most foundations contain diverse modules. A photovoltaic structure ordinarily consolidates an assortment of photovoltaic modules, an inverter, a battery pack for limit, interconnection wiring, and on the other hand a sun based after framework. The most regular use of sun controlled sheets is daylight based dihydrogen monoxide warming structures.

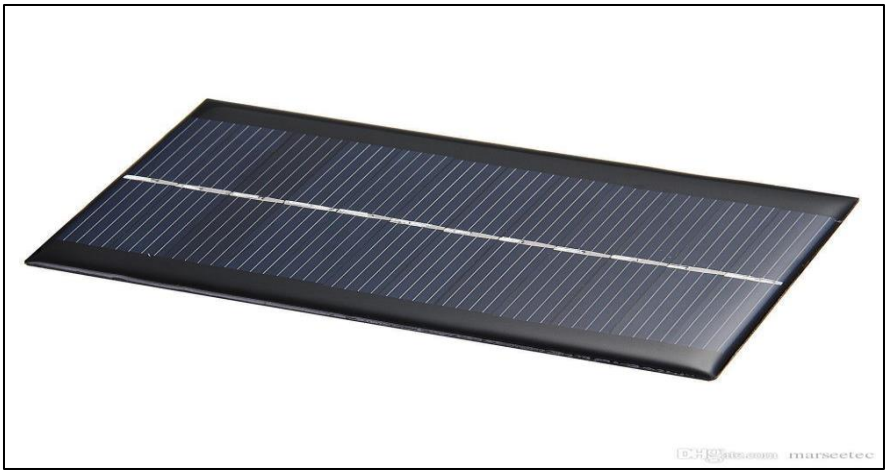


Fig 2.1: 6v 1w solar panel

Features

89mm x 113mm x 5mm) 2.4 oz / 67g

Output

- Open Circuit Voltage: 7.7V
- Pinnacle Voltage: 6.5V
- Pinnacle Current: 180mA
- Power Tolerance: +/ - 10%
- For greatest power yield, situate the board towards the sun.

2.3 Description of Sensor (LDR)

The least difficult visual sensor is a photon resistors or photo sensitivity which is a light delicate resistor they are shaped out of two kinds, Cds (cadmium sulfide) and GaAs(gallium arsenide). The solar tracker framework structured hither utilizations two cadmium sulfide (CdS) photocells for detecting the shine. The photo sensitivity is an inactive part whom opposition is contrarily corresponding to the measure of shine power coordinated along it. This is associated in arrangement with capacitor. The photocell to be used for the tracker is predicated on its dull obstruction and light immersion opposition. The term light immersion indicates that further augmenting the light power to the CdS cells won't decrement its opposition any further. Light power is evaluated in Lux; the brightening of daylight is around 30,000Lux.

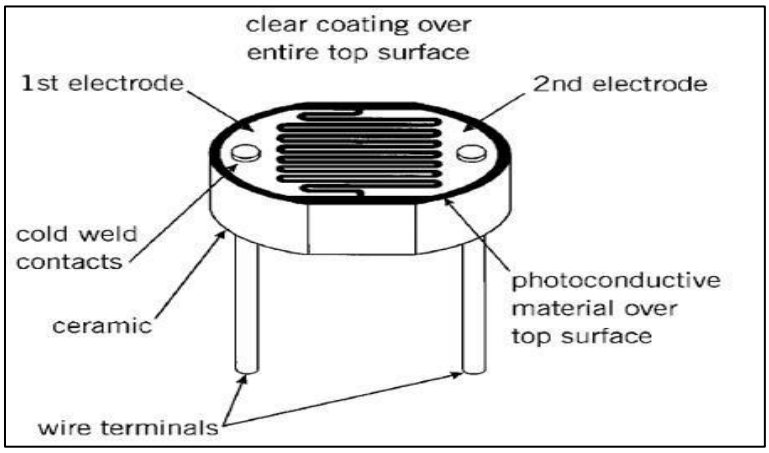


Fig 2.2: LDR construction

Customarily the opposition of a LDR is high, here and As high as 1000 000 ohms, they are fixed with light resistance, definitely drop. Just when light measurement is low, the barrier of LDR is high. Turn off current from this transistor base. This line does not have LED lighting along. However, when shimmers of light on LDR collapse their resistance.

2.3.1Construction of Sensor (LDR)

Light sensor plan The sun oriented system builds usage of a Cds photo sensitivity for distinguishing shine. Here was use of a correlative resistors with an estimation of 10k. the subsequent setup, the yield voltage are increase with increment in shine power.

The photo sensitivity obstruction is evaluated under blazing shine, ordinary shine and dim shine conditions. The results are recorded in the table underneath.

Table 2.1 Photocell Resistance Testing Data

Measured Resistance	Comment
50 KΩ	Shaded light conditions (shaded vinyl tape placed over cell)
4.35 KΩ	Mediocre light conditions (unstrained room lighting level)
200 Ω	Shiny light conditions (flashlight outright in front of cell)

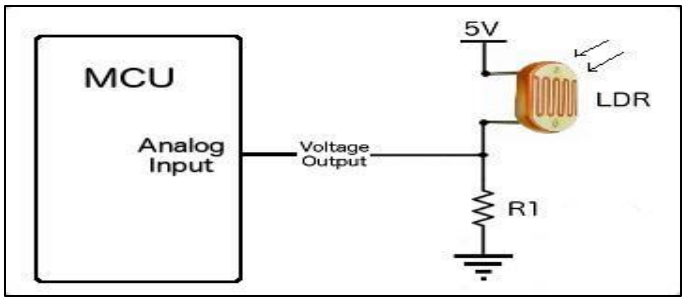


Figure 2.3: The input circuit that employs a voltage divider

From the given reference , the information yield reference for the voltage divider circuit is given by:

□□=□□□ {□□□□ _____ □□□ + □□□□ }

For this situation, Vi =- input voltage into the microcontroller

R=Resistance of the [potentiometer which is10K]

Vcc= Supply voltage to Microcontroller and LDRs

Vi=Input voltage to the Microcontroller

2.4 Ardunio UNO

The Arduino UNO is a by and large used open-source microcontroller board predicated on the ATmega328P microcontroller and made by Arduino. The board is equipped with sets of cutting edge and basic data/yield (I/O) sticks that may be interfaced to sundry advancement sheets (shields) and diverse circuits. The board features 14 Digital pins and 6 Analog pins. It is programmable with the Arduino IDE (Integrated Development Environment) by methods for a sort B USB connect. It will in general be controlled by a USB interface or by an outside 9 volt battery, anyway it recognizes voltages some place in the scope of 7 and 20 volts. It is besides homogeneous to the Arduino Nano and Leonardo. The gear reference arrangement is scattered under an Ingenious Commons Attribution Share-Homogeneous 2.5 allow and is available on the Arduino site. "Uno" allots one in Italian and was chosen to stamp the surrender of Arduino Software (IDE) 1.0. The Uno board and frame 1.0 of Arduino Software (IDE) were the reference variations of Arduino, now created to increasingly incipient releases. The Uno board is the first in a movement of USB Arduino sheets, and the reference appear for the Arduino organize. The ATmega328 on the Arduino Uno comes prearranged with a bootloader that consents to exchange starting code to it without the utilization of an external gear designer. It passes on utilizing the impeccable STK500 tradition. The Uno withal fluctuates from each and every going before board in that it doesn't utilize the FTDI USB-to-successive driver chip. Or maybe, it incorporates the Atmega16U2 (Atmega8U2 up to variation R2) altered as a USB-to-consecutive converter.

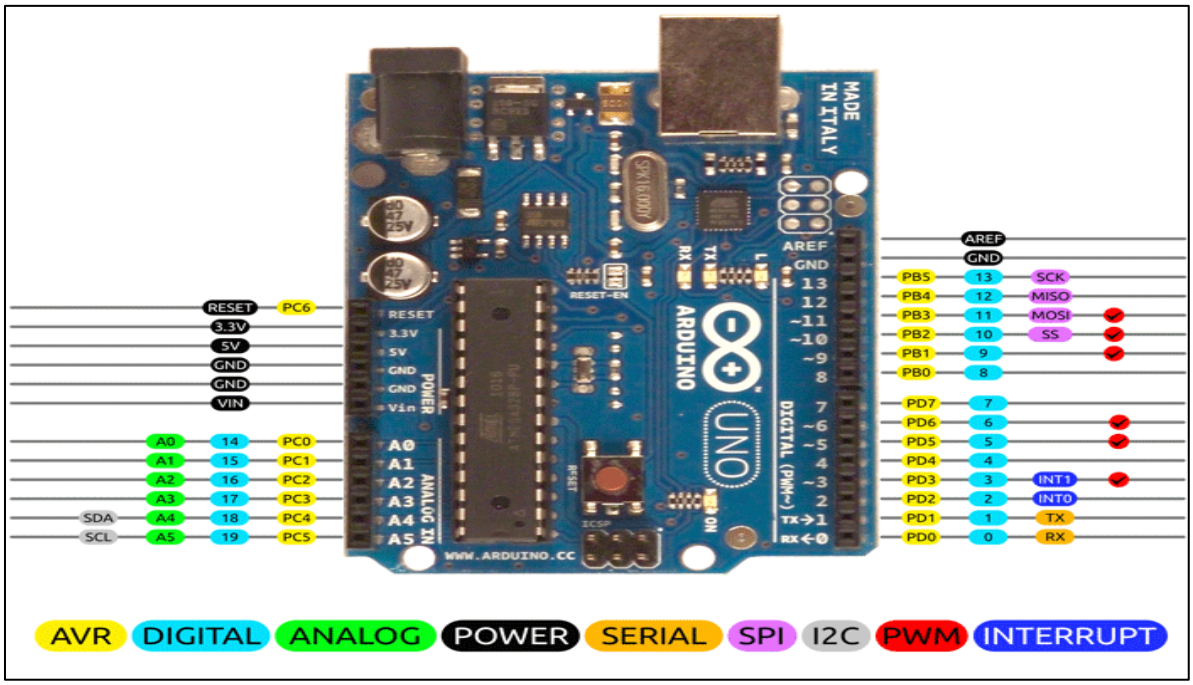


Fig 2.4: Pin diagram of Arduino UNO

2.5 100k resistance

Resistance Description

At the point when electrons move through a knob or another conductor, the conductor does offers some deterrent to the current. This deterrent is called electrical obstruction.

- ➢ The more drawn out the conductor higher the opposition.
- ➢ The littler its zone the higher its opposition.

Each material has an electrical obstruction and the reason the conduit give out warmth when the flow goes through it.

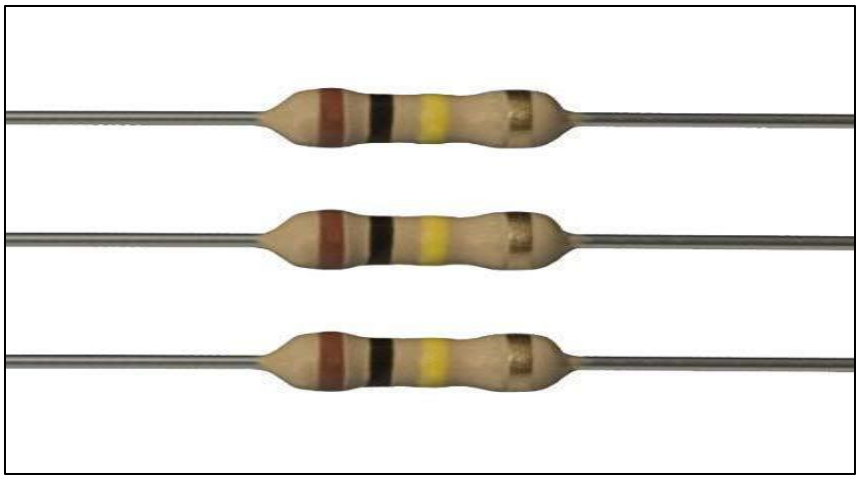
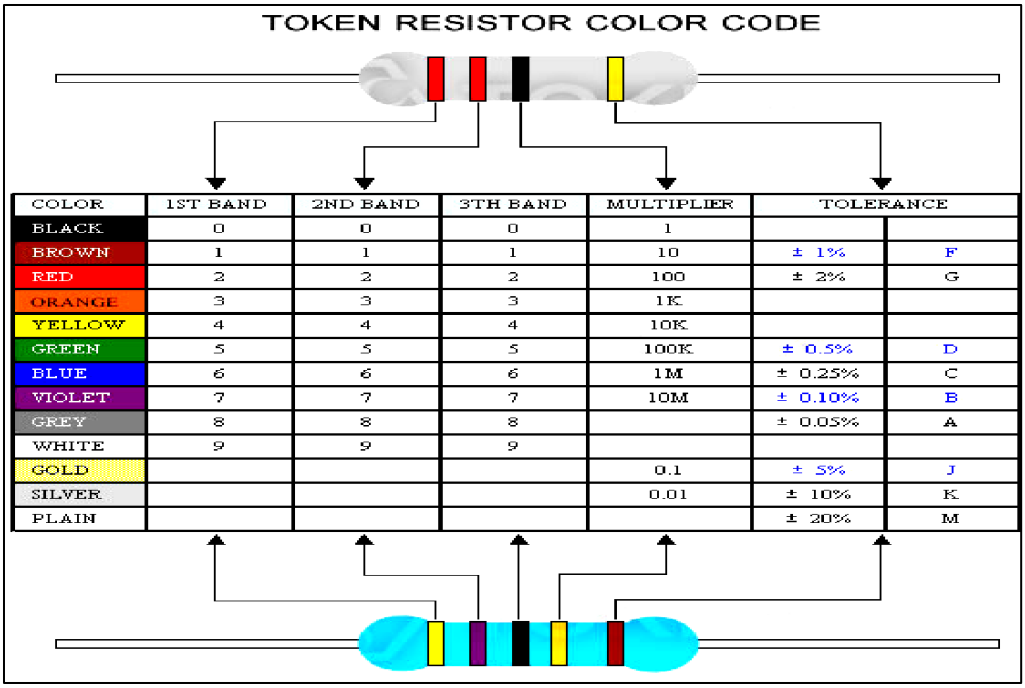


Fig 2.5: 100K Resistance.

Block is the opposition that a substance offers to the flood of electric stream. It is addressed by the uppercase letter R. Right when an electric stream of one ampere experiences a section across over which a potential difference (voltage) of one volt subsists, by then the check of that fragment is one ohm. All things considered, when the associated voltage is held enduring, the stream in a quick stream (DC) electrical circuit is on the other hand comparing to the restriction. This standard withal stays steady for most low-repeat substituting current (AC) structures, for instance, nuclear family utility circuits. In some AC circuits, especially at high frequencies, the situation is progressively versatile, in light of the way that a couple of sections in these structures can store and surrender essentialness, and furthermore dissipating or changing over it. The electrical restriction per unit length, region, or volume of a substance is knownas resistivity. Resistivity figures are every now and again relegated for copper and aluminum wire, in ohms per kilometer.Opposition to AC, yet not to DC, is a property kenned as reactance. In an AC circuit, the restriction and reactance blend vector accomplice to yield impedance.to AC, yet not to DC, is a property kenned as reactance. In an AC circuit, the opposition and reactance combine vector partner to yield impedance.

2.5.1 Resistor Color Code:



COLOR	1ST BAND	2ND BAND	3TH BAND	MULTIPLIER	TOLERANCE	
BLACK	0	0	0	1		
BROWN	1	1	1	10	± 1%	F
RED	2	2	2	100	± 2%	G
ORANGE	3	3	3	1K		
YELLOW	4	4	4	10K		
GREEN	5	5	5	100K	± 0.5%	D
BLUE	6	6	6	1M	± 0.25%	C
VIOLET	7	7	7	10M	± 0.10%	B
GREY	8	8	8		± 0.05%	A
WHITE	9	9	9			
GOLD				0.1	± 5%	J
SILVER				0.01	± 10%	K
PLAIN					± 20%	M

Fig 2.6: Resistor color code.

2.6 Tp-4056 charger module:

This charger is a minutely minor module for DIY individuals, it uses the TP4056 controller and standard arrangement is with 1A charge current. It does exclude any intensity supply or plate. It did exclude any documentation either, only a few sheets. The survey is about an unmitigated charger module, however any module with the TP4056 will have indistinguishable performance.I got it in an envelope with 5 circuits on 2 sheets and that's it. Underneath 2.85 volt the charger will accuse of about 80mA in 1A design (blue drove is on). Above 2.85 volt the charger is applying standard charge current (Optically recognize bend beneath). At the point when charger is detached from power, however with a battery in, it will draw beneath 1uA from the battery.When the charge current goes underneath the end current the charging is stopped and it will accuse of around 4 uA.The charger will restart charging when the cell drops to 4.0 volt. The charger won't restart after a power misfortune or battery inclusion, aside from if the battery voltage is underneath 4.0 volt.First test is with a 3400mAh battery, the charger completes a decent CC/CV, with the exception of the change from CC to CV is barely delicate, this incrementation charge time however has no shocking

impact on the battery. The charger is withal hardly underneath the 1A current, it just accuses of 0.85A. The CV voltage is barely beneath 4.2 volt,that isn't astonishing, in light of the fact that the datasheet for the TP4056 assign that it tends to be somewhere in the range of 4.137 and 4.263 volt. This chip uses 1/10 of the charge present as end current. I coordinated a temperature measurement to the test this time, as can be optically observed the chip warms up quick and after that step by step drops in temperature when the battery voltage increments.

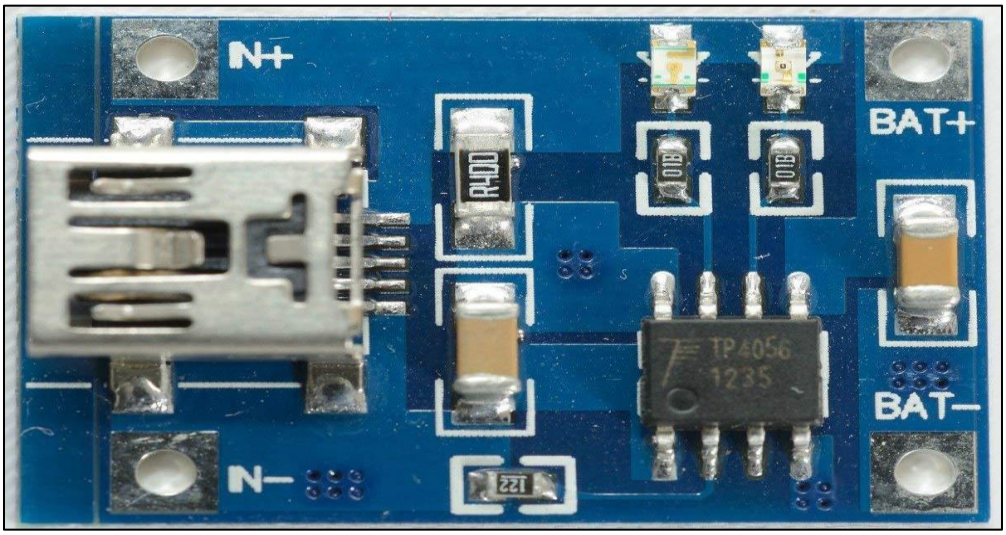


Fig 2.7:Tp4056 charger module.

2.7 Toggle switch

A switch is an electrical part that can "make" or "break" an electrical circuit, encroaching upon the stream or possessing it beginning with one conductor then onto the following. The arrangement of a switch modified works or recoups the coordinating path in a circuit when it is worked. It may be worked physically, for example, a light switch or a support get, may be worked by a moving thing, for instance, a door, or may be worked by some distinguishing segment for weight, temperature or stream. A switch will have no less than one courses of action of contacts, which may work in the meantime, progressively, or then again. Switches in incredible circuits must work rapidly to avoid ruinous arcing, and may fuse one of a kind features to benefit in rapidly

barging in on an ungracefully profound current. Diverse kinds of actuators are utilized for movement by hand or to identify position, level, temperature or stream. Exceptional sorts are utilized, for example, for control of mechanical assembly, to revamp electric motors, or to recognize liquid measurement. Numerous explicit structures subsist. An ordinary use is control of lighting, where distinctive switches may be wired into one circuit to approve supportive control of light establishments.

Fig 2.8: A Toggle Switch.

A flip switch is a class of electrical switches that are physically actuated by a mechanical switch, handle, or shaking framework. Flip switches are open in an extensive variety of styles and sizes, and are utilized in different applications. Many are expected to give the synchronous incitation of various plans of electrical contacts, or the control of sizably voluminous proportions of electric stream or mains voltages. "Flip" is a reference to a kind of segment or joint containing two arms, which are basically as per each other, related with an elbow-like turn. In any case, the articulation "flip change" is associated with a switch with a short handle and a positive snap-action, paying little respect to whether it honestly contains a flip framework or not. In like manner, a switch where a definitive snap is aurally observed is known as a "positive on-off switch". An amazingly unremarkable utilization of this sort of progress is to switch lights or other electrical equipment on or off. Different flip switches may be mechanically interlocked to square verboten blends. In a couple of settings, totally enrolling, a flip switch, or the action of flipping, is appreciated in the particular sentiment of a mechanical or programming switch that shifts forward and backward between two communicates each time it is impelled, paying little regard to mechanical improvement. For example, the tops jolt key on a PC makes all letters be prompted in capitals after it is crushed once; pressing it again comes back to cut down case letters.

2.8 1n400n Diode

Diode: A diode is a two-terminal electronic segment that conducts current fundamentally one way (topsy-turvy conductance); it has low (in a perfect world zero) opposition in one bearing, and high (preferably illimitable) obstruction in the other. A vacuum tube diode uses thermionic emanation of electrons and unidirectional conduction between the cathode and plate. A semiconductor diode, the most commonplace sort today, is a crystalline bit of semiconductor material with a p-n intersection associated with two electrical terminals. Semiconductor diodes were the principal semiconductor electronic contraptions. The disclosure of uneven electrical conduction over the contact between a crystalline mineral and a metal was made by German physicist Ferdinand Braun in 1874. Today, most diodes are made out of silicon, however different materials, for example, gallium arsenide and germanium are used. The most commonplace capacity of a diode is to endorse an electric flow to go one way (called the diode's forward course), while blocking it the absolute opposite way (the reversal heading). In that capacity, the diode can be seen as an electronic form of a check valve. This unidirectional comportment is called correction, and is used to change over exchanging current (air conditioning) to coordinate current (dc). Types of rectifiers, diodes can be used for such assignments as separating tweak from radio flags in radio recipients.

Fig 2.9: 1n400n diode

Features of 1N400n diode

- Low forward voltage drop
- Low spillage current
- High forward flood capacity
- High temperature patching ensured
- Redundant pinnacle turn around voltage: max. 1000 V
- Redundant top forward current: max. 1 A

2.9 Jumper Ware:

A ricochet wire (withal kenned as jumper, jumper wire, jumper interface, DuPont wire, or DuPont connect – allocated for one maker of them) is an electrical wire, or assembling of them in a connection, with a connector or stick at each end (or all over without them – simply "tinned"), which is normally used to interconnect the parts of a breadboard or other model or test circuit, inside or with other equipment or portions, without authoritative. Particular ricochet wires are fitted by embeddings their "end connectors" into the spaces gave in a breadboard, the header connector of a circuit board, or a touch of test adapt.

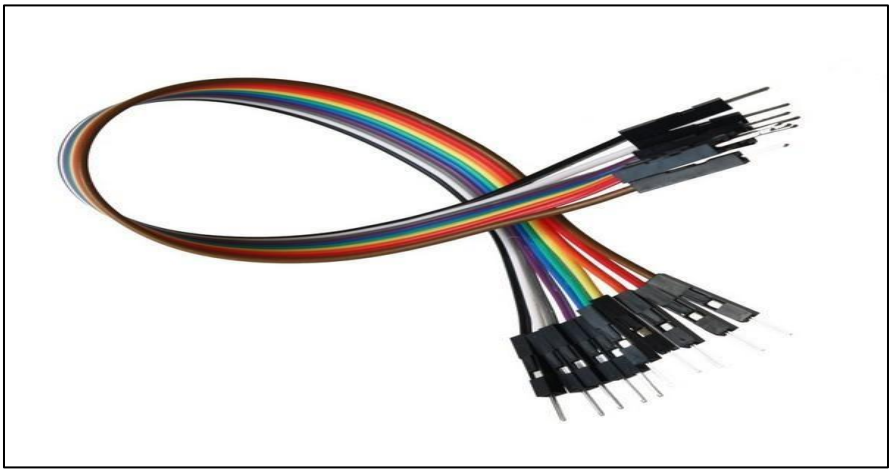


Fig 2.10: Jumper Ware.

2.10 lithium battery (3.7 V)

Lithium batteries are basic batteries that have lithium as an anode. These sorts of batteries are withal implied as lithium-metal batteries. They stand isolated from various batteries in their high charge thickness (long life) and amazing cost per unit. Dependent upon the arrangement and creation blends utilized, lithium cells can prompt voltages from 1.5 V (commensurable to a zinc– carbon or dissolvable battery) to about 3.7 V. Nonessential basic lithium batteries must be perceived from assistant lithium-molecule and lithium-polymer, which are battery-controlled batteries. Lithium is especially utilizable, in light of the way that its particles can be organized to move between the anode and the cathode, utilizing an intercalated lithium compound as the cathode material anyway without utilizing lithium metal as the anode material. Flawless lithium will immediately react with dihydrogen monoxide, or even moistness observable all around; the lithium in lithium molecule batteries is in a less responsive compound. Maltreatment in the midst of charging or discharging can cause out gassing of a segment of their substance, which can cause impacts or fire.

Fig 2.11: 3.7V lithium battery

2.11 Servo Motor

A servomotor is a spinning actuator or direct actuator that sanctions for correct control of exact or straight position, speed and attempt. It contains a perfect motor coupled to a sensor for position analysis. It withal requires a tolerably current controller, as often as possible a gave module organized decidedly for use with servomotors.Servomotors are not an obvious class of motor but rather the term servomotor is routinely used to insinuate a motor perfect for use in a close circle control structure.

Fig 2.12: Servo Motor

2.11.1 Mechanism

A servomotor is a closed circle servomechanism that utilizes position contribution to control its kineticism and last position. The commitment to its control is a banner (either straightforward or modernized) addressing the position coordinated for the yield shaft.The motor is joined with some kind of encoder to give position and speed analysis. At all troublesome case, only the position is assessed. The deliberate position of the yield is diverged from the heading position, the external commitment to the controller. If the yield position shifts from that required, an error hail is affected which by then makes the motor turn in either heading, of course to pass on the yield shaft to the agreeable position. As the positions approach, the screw up banner decreases to zero and the motor stops. The outstandingly most straightforward servomotors use position-simply distinguishing by methods for a potentiometer and shoot control of their motor; the motor reliably turns at full

speed (or is ceased). This kind of servomotor isn't comprehensively utilized in present day kineticism control, yet it makes the substratum out of the clear and efficient servos utilized for radio-controlled models. Progressively present day servomotors use optical swinging encoders to assess the celerity of the yield shaft and a variable-speed drive to control the motor celerity. Both of these enhancements, by and large in amalgamation with PID control estimation, approve the servomotor to be passed on to its coordinated position even more quickly and even more precisely, with less overshooting.

2.12 USB Module (5V):

The Ecumenical Serial Bus was produced to rearrange and change the interface between PCs and fringe contraptions, when contrasted and aforetime subsisting standard or specially appointed restrictive interfaces. From the PC utilizer's point of view, the USB interface enhanced simplicity of benefit in a few different ways.The USB interface is self-planning, so the utilizer require not alter settings on the creation and interface for speed or data compose, or organize meddles with, input/yield addresses, or direct memory get to channels. USB connectors are standardized at the host, so any periphery can utilize any available vault. USB totally benefits by the supplemental planning power that can be financially put into periphery contraptions with the objective that they can direct themselves; USB manifestations frequently don't have utilizer-adaptable interface settings. The USB interface is "sultry pluggable", doling out contraptions can be exchanged without rebooting the host PC. Minute innovations can be filled explicitly from the USB interface, dislodging extra power supply joins. Since utilization of the USB logos is simply approved after consistence testing, the utilizer can have assurance that a USB innovation will capacity obviously without wide relationship with settings and plan; the USB interface describes traditions for instauration from unremarkable mix-ups, changing faithful quality over forerunner interfaces. Foundation of a development relying upon the USB standard requires inconsequential head action. Exactly when a creation is associated with a port on a running PC system, it is either inside and out therefore masterminded utilizing subsisting contraption drivers, or the structure prompts the utilizer to discover a driver which is then presented and planned normally.

Fig 2.13: 5V USB Module.

2.13 9V Adapter:

An AC connector, AC/DC connector, or AC/DC converter is a sort of outside power supply, habitually encased for a circumstance like an AC plug. Other prevalent names join fitting pack, module connector, connector square, neighborhood mains connector, line control connector, divider mole, control square, and power connector. Connectors for battery-energized apparatus may be delineated as chargers or rechargers (apparently observe also battery charger). Cooling connectors are utilized with electrical manifestations that require control anyway don't contain inside fragments to decide the required voltage and power from mains puissance. The inward equipment of an outside power supply is astoundingly identified with the structure that would be utilized for a certain or inside supply.External control supplies are utilized both with rigging with no other wellspring of solidarity and with battery-controlled equipment, where the supply, when associated, can a portion of the time charge the battery in joining to driving the equipment. Utilization of an external power supply sanctions convenientce of equipment controlled either by mains or battery without the consolidated haul of internal power parts, and makes it pointless to actuate intend for use just with a relegated power source; a comparable innovation can be filled from 120 VAC or 230 VAC mains, development or flying machine battery by utilizing a substitute connector.Another preferred standpoint of these structures can be augmented wellbeing; as the perilous 120 or 240volt mains control is changed to a lower more secure voltage at the divider outlet, and the apparatus which is dealt with by the utilizer is fueled by this lower voltage.

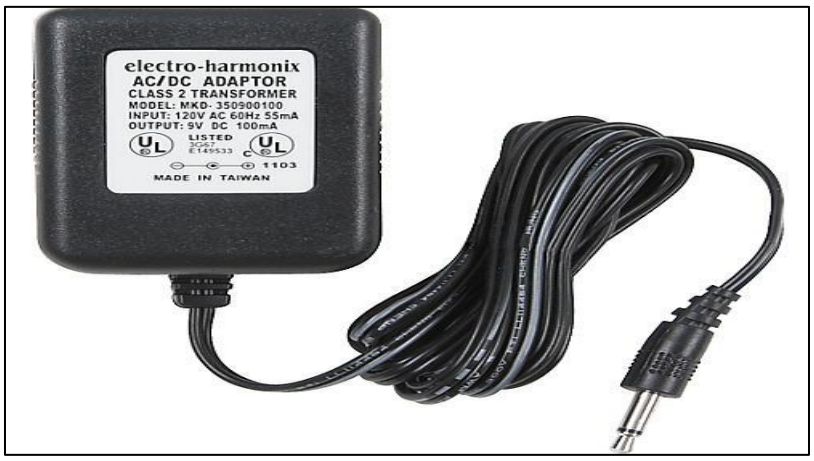


Fig 2.14: 9V Adapter.

2.14 Cost Analysis Purchase Price (TK)

In this section we will show cost of our project that signifies cost sheet representation of our project.

2.15 Conclusion

Five main Component & some implements are utilized in this system to makes it. This Project is utilized to preserve power and gain voltage. Our all component are very simple &available in our country market.

CHAPTER 3

SYSTEM REVIEWS

3.1 Introduction

A sun powered tracker is a creation used for situating a photovoltaic cluster sun oriented board o focal point along the sun.When the sun's condition is mixed with the sun, both the seasons and the day are opposite. Sun based controlled hardware action grestest when they are directed at the sun. Consequently, a sun powered system builds how effective like gear are concerning a bit adjusted site at the expense of supplemental multifaceted nature from the framework. Education of utilizable power from the shine wound up conceivable with the disclosure of the photo electric system & ensuing advancement of the sun based ventricle . sunlight based ventricle is a semiconductor materials that changes over obvious lamp into straight current. Sunlight based exhibits, a progression of sun powered ventricle electrically associated; there is age of a DC voltage that can be used on a heap.

3.2 General Block Diagram

A sun oriented cell, once in a while called a photovoltaic cell, is an invention that changes over light vitality into electrical vitality.A single sun-controlled cell is called the Sun Fuel Board, which unexpectedly starts the infinitesimal proportion of unwanted (about .6 volts DC) so that they are regularly assembled on a planned electrical board. Sunshine is an indispensable variety of essentials and only one part of the sun's light acquired by the sun-based cells varies in electricity. Illumination of illumination groups is called illumination which is known as photon. Properly, when the photos hit the semi-conductor layer (usually a delight-based room of siliconphophhen, a part of the photons is consumed by the material instead of turning it off or facing the material. To electron escape an electron from an electron in space, it is one At the basic level, the atom is introduced into a hole, due to this opening will now be charged from one moving particle to another electron, resulting in the whole one, which is again filled with an electron from another particle, that is one of the relations with sunlight-based energy. The yield is unstable.

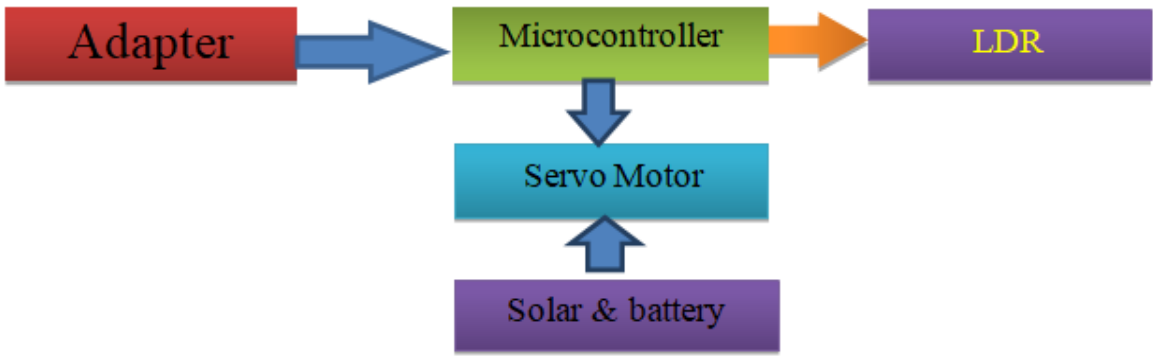


Fig. 3.1: General Block Diagram

Voltage and Current Specification:

Discrete Components	Ratings
Lead Acid Battery Voltage	12V DC
Maximum Solar PV panel open circuit voltage	21V DC

A LDR (Light dependent resistor), as its name recommends, offers obstruction in replication to the surrounding light. The opposition diminishes as the power of occurrence light increments, and the other way around. Without light, LDR displays an obstruction of the request of super ohms which declines to couple of hundred ohms within the sight of light. It can go about as a sensor, since a changing voltage drop can be acquired as per the differing light. It is made out of cadmium sulfide (CdS). A LDR has a crisscross cadmium sulfide track. It is a two-sided invention, i.e., leads in the two headings in same mold.

3.3 Circuit Diagram

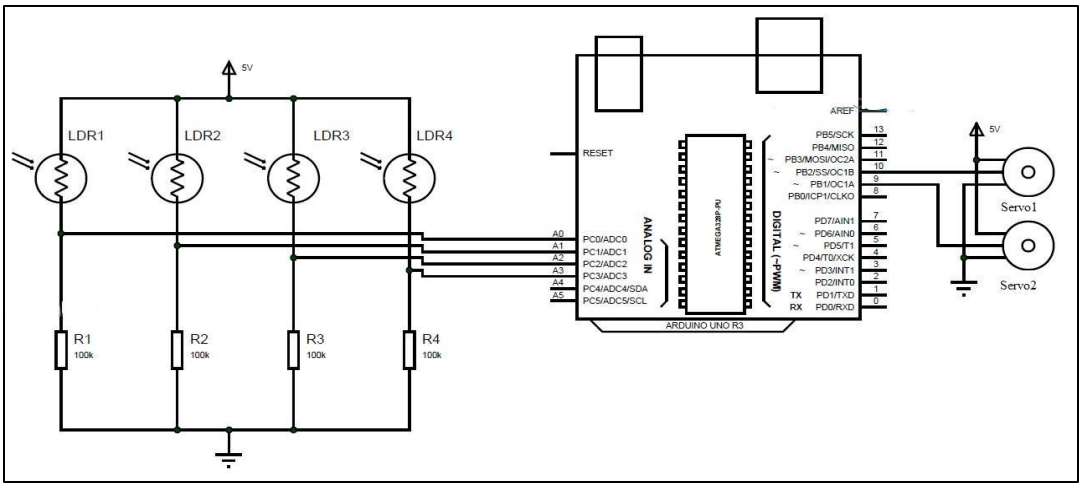


Fig. 3.2: Circuit Diagram

3.3.1 Working Process of our Circuit

LDRs are used as the primary light sensors. Two servo engines are adjusted to the structure that holds the sun powered board. The program for Arduino is transferred to the microcontroller. The working of the task is as per the following. LDRs sense the measure of daylight falling on them. Four LDRs are partitioned into best, base, left and right.Take the cardboard. To open an inner and four holes around the lid so that the LDRT is fit. Hold the dlite-based board on the cardboard and the two dolls of the board appear.Now cut one of the two leads of the LDR with the goal that one lead is shorter and other is longer. Embed these four LDRs into four openings as appeared. Curve the straight punctured metal strip as demonstrated as follows. Place the bowed metal strip on the posterior of the cardboard Apply paste to the LDR to adjust them solidly. Bind the two leads of LDR as appeared To alternate ends of LDR Solder resistors of 10k ohmJoin the four leads of the 4 LDRs by interfacing with a dolls. Presently get a transport wire. This is used to interface the Outputs of four LDRs to Arduino board. Embed it into metal strip as appeared in the picture. Presently patch the four wires to four LDRs anytime among LDR and resistor. Embed another two wire transport into the punctured metal strip as appeared. This is used for providing Vcc and GND to LDR.

3.4 List of Components used in Circuit:

No	Component Name	Quantity	Used
01	6v 1w solar panel	**01**	To Consume Solar Power
02	Arduino UNO	**01**	To Motor Control the System.
03	LDR light sensor	**04**	To intensity of light.
04	100k resistance	**04**	To controlled amounts of resistance into electrical circuits
05	Tp4056 charger module	**01**	To Charge Battery
06	Toggle switch	**01**	To Switching
07	1n400n diode	**01**	To Protect Reverse Voltage
08	Jumper wire	**(---)**	To connection
09	3.7 lithium battery	**01**	To Storage Power
10	Servo Motor	**02**	current to flow in the opposite direction through the panels
11	Voltage regulator	**01**	To regulate voltage
12	5V USB Module	**01**	To Output
13	Adapter	**01**	To Supply Power to Arduino

Table 3.4: List of components used in circuit

3.4.1 Cost Sheet:

No	Component Name	Quantity	Purchase Price (TK)
01	6v 1w solar panel	1	196.00
02	Arduino UNO	1	8.00
03	LDR light sensor	1	95.00
04	100k resistance	4	10.00
05	Tp4056 charger module	1	40.00
06	Toggle switch	1	10.00
07	1n400n Diode	1	15.00
08	Jumper wire	1	120.00
09	3.7 lithium battery	1	24.00
10	Servo Motor	2	80.00
11	Voltage regulator	1	40.00
12	5V USB Module	1	80.00
13	Adapter	1	700
14	**TOTAL**		**= 1418/-**

3.5 Conclusion

The fundamental point of this pilot venture is to configuration, create a solitary hub sunlight based following framework with a light sensor and introduce a sun based board mount with a reflector to sun oriented following framework in a productive and attainable signifies of acquiring ideal sun powered vitality from the sun.

CHAPTER 4

SOFTWARE ANALYSIS

4.1 Introduction

In this part the product utilized and the dialect in which the program code is characterized is referenced and the program code dumping executes are elucidated. The section furthermore records the improvement of the program for the application.

4.2 Description of our Software

The open-source Arduino system makes it easy to edit the code and transfer it to the I / O board. It's running on Windows, Mac OS X, and Linux. The world is based on Java and is based on processing, avr-gcc, and other open source programming. The screen shot of Arduino 1.6.8 is demonstrated as follows…

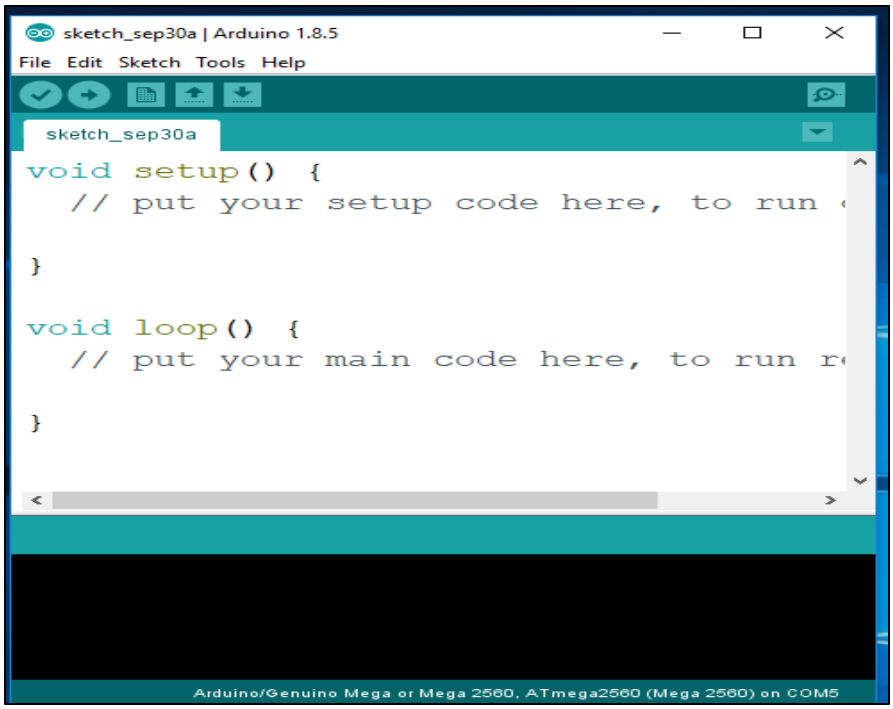
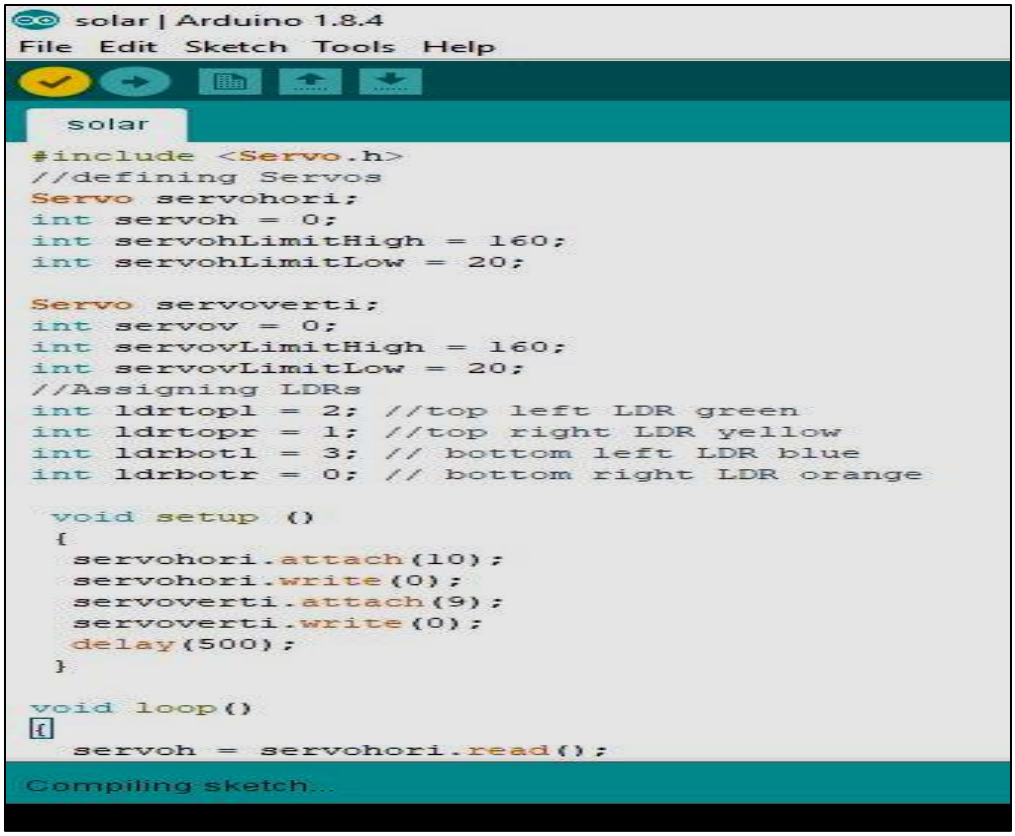


Fig. 4.1: Software Platfor

It is withal fit for assembling and transferring projects to the board with a solitary snap. There is normally no aim to alter make documents or run programs on a direction lineinterface. Though expanding on direction line is conceivable whenever required with some outsider actualizes, for example, Ino. The Arduino IDE accompanies aC/C++library called "Wiring" (from the venture of thesame name), which makes numerous predominant information/yield tasks considerably more effortless. Arduino programs are indited in C/C++.

4.3 The compiled window of my code is shown below.



In This application we utilize a brilliant Fire base Data reestablish framework .Our everything configuration is exceptionally straightforward and it simple to use for all Customer .it has Menu bar and Food menu show .it additionally a mini-computer framework .each sustenance list is anything but difficult to utilize and all information is store in our information base framework. It has likewise an administrator Login Panel .Every request rundown and table no will be appear from that point

4.4 Flow Chart of Diagram:

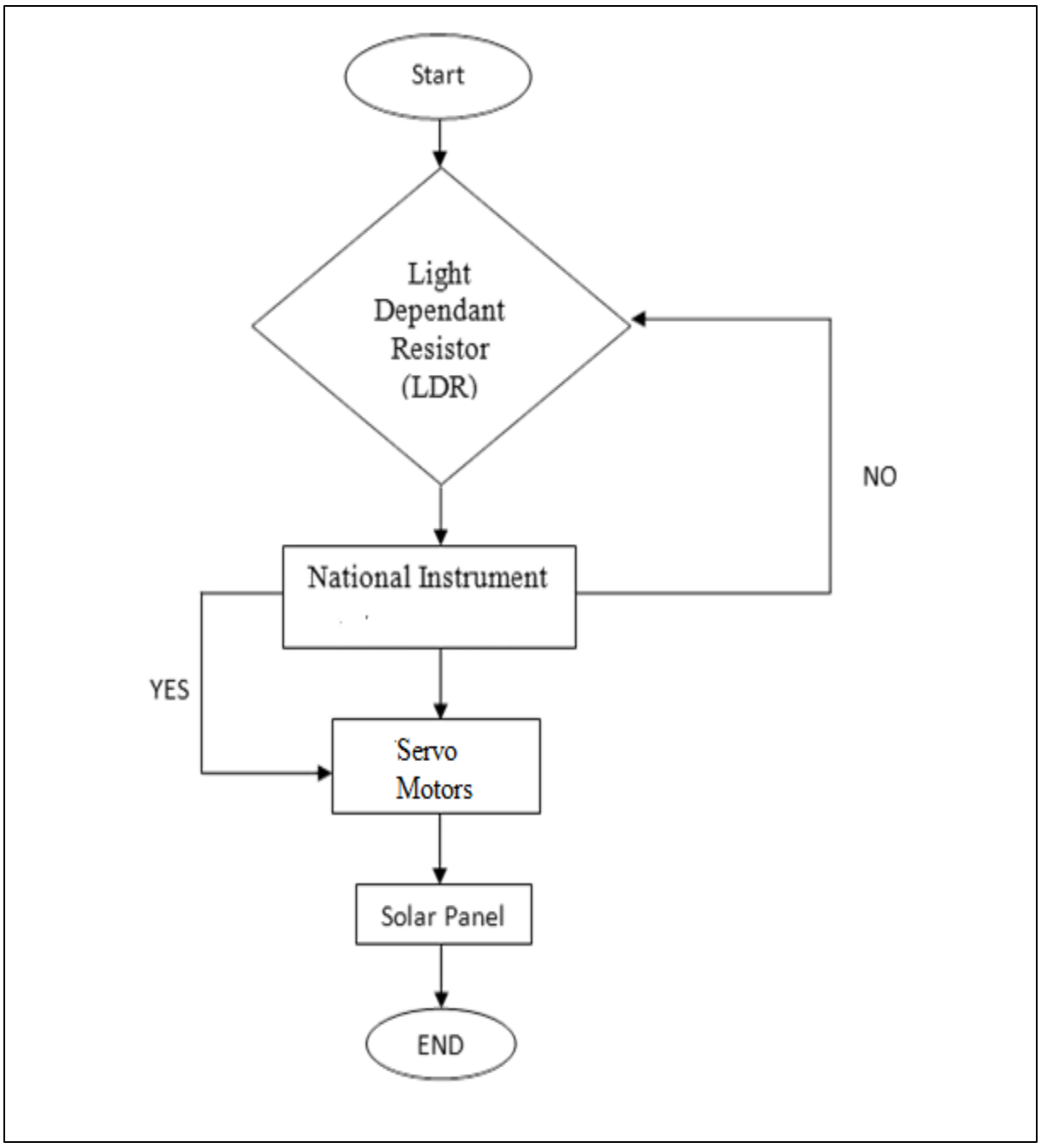


Fig 4.4: Flow Chart of our system.

CHAPTER 5

Result & Analysis

This chapter explains the overview of this project which includes the information of the list below:

5.1. Calculating Output

5.2. General output

5.3. Designed instruments output

5.7. Result

5.8. Future Scope

5.1 Calculated output:

Here we have utilized dc equipped engine of 10 R.P.M, 12Vdc, to pivot the sunlight based board from east to west and transform bearing.

The circuit takes 24mA at 12Vdc.

Along these lines, the required Power= 24mA*12V = 288mW/sec.

For 6 sec, the required power=288*6=1728mW=1.8W.

In multi day the board (or we can verbalize engine) moves east to west and back to east.

For 10 turns the engine takes 1 min/60 sec.

Thusly, for 1 turn (360 degree) the engine takes (60/10) =6 sec.

To turn from east to west (180 degree) the engine takes 3 sec. In this way, for 10 degree relocation

It takes (3000ms*10degree)/180degree= 167msec.

When all is said in done, the peregrinates from east to west i.e. 180degree in 12 hours (6am to 6pm) or 720mins.

For 10degree dislodging, the sun takes 720/180= 40 mins.

In this way, in 2 hrs the sun peregrinates 30degree. To cover this 30degree dislodging the board takes (167*3) msec= 501msec.

5.2 First Day Designed instrument output:

Table 5.1: First Day output

Time of day	Voltage(V)	Current(I)	Power(P)
8.00 AM	1.2V	0.266A	0.12W
10.00 AM	2.7V	0.206A	0.27W
11.00 AM	3.51V	0.247A	0.87W
12.00 PM	3.7V	0.248A	0.92W
1.00 PM	4.9V	0.195A	0.96W
2.00 PM	5.9V	0.164A	1W
4.00 PM	4.2V	0.229A	0.93W

5.2.1 Second Day Designed instrument output:

Table 5.2: Second day output

Time of day	Voltage(V)	Current(I)	Power(P)
8.00 AM	1.63V	0.276A	0.45W
10.00 AM	2.92V	0.263A	0.77W
11.00 AM	4.01V	0.221A	0.89W
12.00 PM	5.22V	0.183A	0.96W
1.00 PM	5.37V	0.186A	1W
2.00 PM	6.01V	0.166A	1W
4.00 PM	3.01V	0.289A	0.87W
5.00PM	2.25V	0.173A	0.31W

5.3 Output voltage & Current Day 1

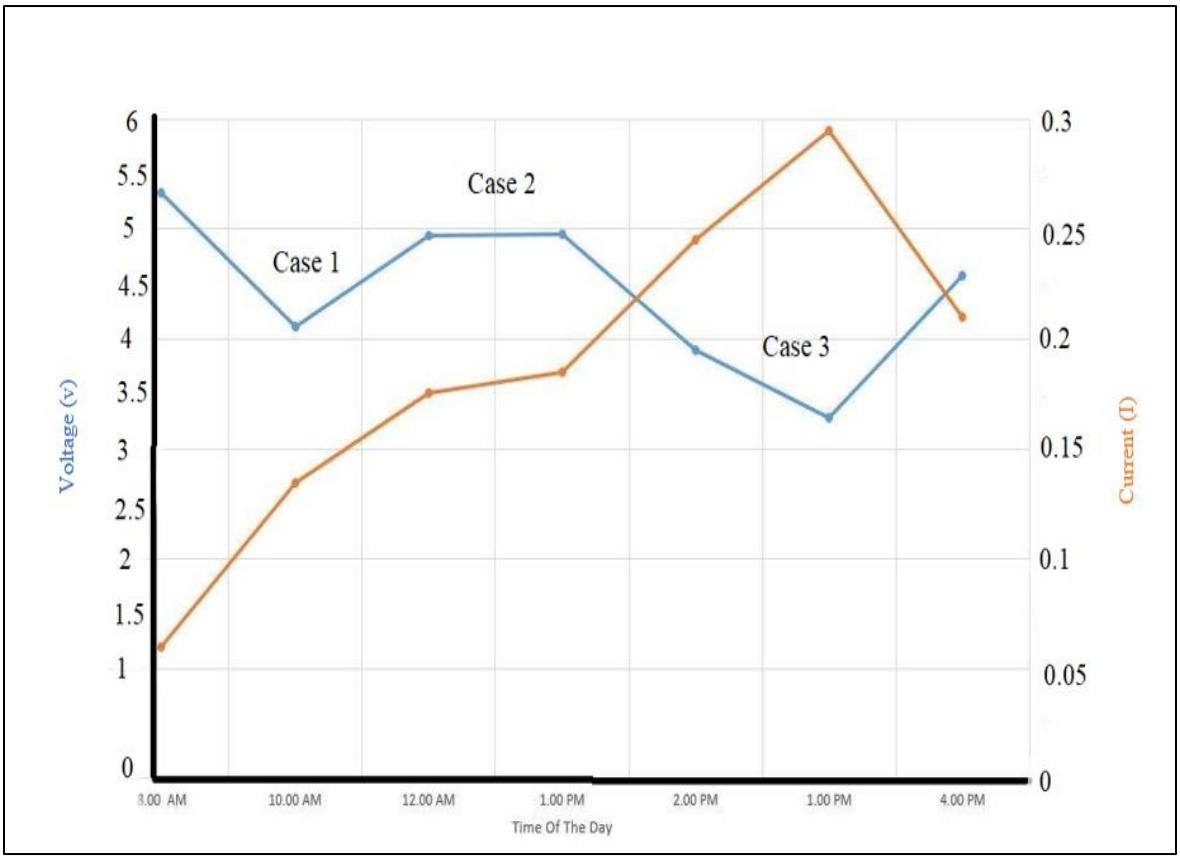


Figure 5.1: Output Voltage and Current Day1

5.3.1 Output Voltage and current Day Two

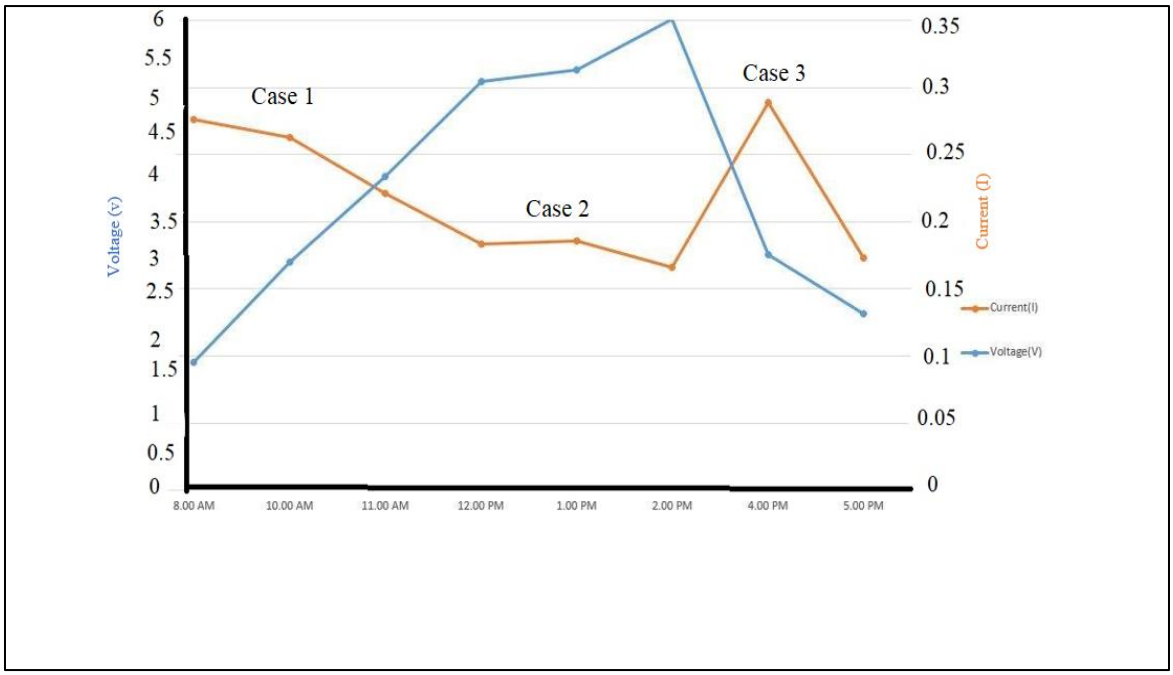


Figure 5.2 : Output voltage and Current Day2

5.4 Result

In this project we have get some voltage and current between day one and day two. That was show in this voltage output graph and it was separate from day one and day two. We also show some case in day one and day two output voltage and current .First figure we see there have two line and different between color .there have voltage case .

Case 1: First day sky was cloudy and thus voltage ratio went down a small amount, with the solar plate we used. We found at 10.00 am voltage level was 2.7v .and and supplied current to the load was 0.206 A and sensing suns position solar tracking system faced east side . In second day voltage was 2.92v and current .263A and power was 0.77watt, solar panel position was same as before.

Case 2: It was sunny day and voltage level of the solar plate we found at 12.00 pm to 1.00 pm was 3.7v-4.9v and and supplied current was 0.195 A-0.248A and our system was facing 90 degree to the horizontal plane. In following day voltage level went up and found 5.22v-5.95V showing on voltmeter and supplied current was 0.183A-0.289A and power supply was at peak 1 watt position was same as before.

Case3 : First day It was sunny day and voltage ratio of the solar plat we see at 2.00 pm to 4.00pm it was 5.9v-4.7v .and and current was 0.164 A-0.229 and our system motor was to go west side . In second day voltage was 3.01V-2.25v and current 0.289A-0.229A and power was 0.31watt. solar panel goes to same position.

Efficiency calculation:

Solar panel dimension that we used was 107*67mm

Surface area=$(107 * 67)/$ $1000\square^2$07*67)/1000m^2107*67)/1000m^2*67)/1000m^2107*67)/1000m^267)/1000m^2*67)/1000m^2)/1000m^2*67)/1000m^21000m^27)/1000m^27*67)/1000m^21000m^207*67)/1000m^207*67)/1000m^21000m^2

=7.169 $\square^2$

As we know for STC rated solar panel 1000$\square/\square^2$/m^2/m^2/m^2

Thus, efficiency=$(1/7.169)$.169)9))69))169)69))

=13.95%

Now this efficiency rating is for the stand-alone solar panel while that system produces average of 0.79W of power in a given day. While in our given period of cases we have gotten.

5.5 Proposed circuit assembly for the Automatic Solar Tracker:

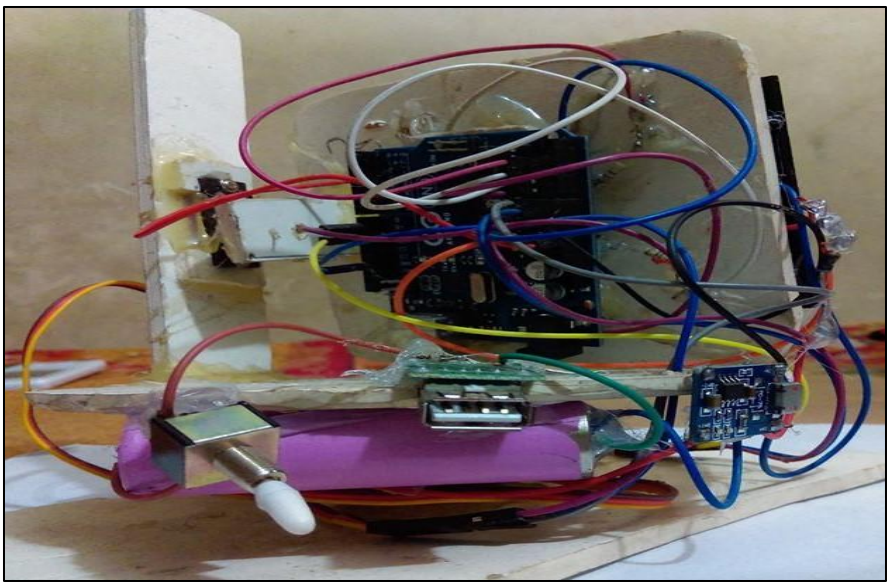


Figure 5.3: Proposed circuit assembly for the solar tracker

5.6 Proposed assembly for solar tracker:

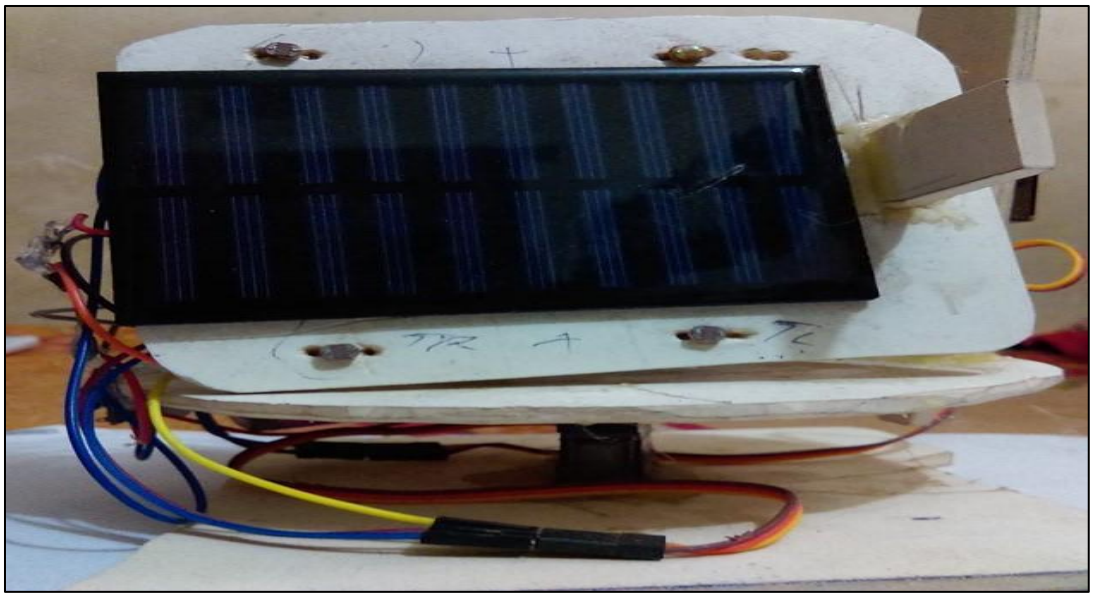


Figure 5.4: Proposed assembly for solar tracker.

CHAPTER 6

CONCLUSION

6.1 Conclusion

Taking everything into account, the execution of the double hub sun oriented following framework was prosperously examined. Predicated on the information amassed, it very well may be inferred that the double pivot sun based following framework is superior to the static sun powered board as far as yield voltage, current and puissance. Therefore, the framework has been demonstrated strong for catching most extreme daylight hotspot for sun based collecting applications. The monetarily and naturally neighborly double pivot sun oriented following framework moreover can be an extraordinary procedure in using the preponderation of sun powered vitality in this manner illuminating the augmenting ordinant transcription of power scrape. For further research in future, some improvement to the framework can be made with the end goal to revise the result. It is prescribed that the investigation to be finished with a higher power sun powered board that induces higher yield voltage and current. By doing this, the yield power will be all the more monstrously gigantic contrasted with using microscopic sun powered board. It is furthermore suggested that the measurement is enhanced by using an information tracker. Every one of the readings will be naturally recorded in the information tracker.

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[14] https://www.adafruit.com/product/2195

APPENDIX A

```
#include <Servo.h>

//defining Servos

Servo servohori;

int servoh = 0;

int servohLimitHigh = 160;

int servohLimitLow = 20;


Servo servoverti;

int servov = 0;

int servovLimitHigh = 160;

int servovLimitLow = 20;

//Assigning LDRs

int ldrtopl = A1; //top left LDR green

int ldrtopr = A2; //top right LDR yellow

int ldrbotl = A3; // bottom left LDR blue

int ldrbotr = A4; // bottom right LDR orange


 void setup ()

 {
```

```
 Serial.begin(9600);
 servohori.attach(10);
 servohori.write(0);
 servoverti.attach(9);
 servoverti.write(0);
 delay(500);
 }

void loop()
{
 servoh = servohori.read();
 servov = servoverti.read();
 //capturing analog values of each LDR
 int topl = analogRead(ldrtopl);
 Serial.println (topl);
 delay(200);
 int topr = analogRead(ldrtopr);
 Serial.println (topr);
 delay(200);

 int botl = analogRead(ldrbotl);
```

```
Serial.print (botl);

delay(300);

int botr = analogRead(ldrbotr);

Serial.print (botr);

delay(300);

// calculating average

int avgtop = (topl + topr) / 2; //average of top LDRs

int avgbot = (botl + botr) / 2; //average of bottom LDRs

int avgleft = (topl + botl) / 2; //average of left LDRs

int avgright = (topr + botr) / 2; //average of right LDRs


if (avgtop < avgbot)

{

 servoverti.write(servov +7);

 if (servov > servovLimitHigh)

  {

   servov = servovLimitHigh;

  }

 delay(10);

}

else if (avgbot < avgtop)
```

```
{
  servoverti.write(servov -6);
  if (servov < servovLimitLow)
{
  servov = servovLimitLow;
}
  delay(10);
}
else
{
  servoverti.write(servov);
}

if (avgleft > avgright)
{
  servohori.write(servoh +8);
  if (servoh > servohLimitHigh)
  {
  servoh = servohLimitHigh;
  }
  delay(10);
```

```
 }
 else if (avgright > avgleft)
 {
  servohori.write(servoh -7);
  if (servoh < servohLimitLow)
   {
   servoh = servohLimitLow;
   }
  delay(10);
 }
 else
 {
  servohori.write(servoh);
 }
 delay(50);
}
```