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Design and Study of Efficient Solar Tracking for Optimum Power Output

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Abstract: ***The solar based power plants are very essential for our country and particularly for backward areas facing electricity shortage. To address the electricity shortage issues it's very important to deploy latest and emerging concepts of ICT (Information Communication Technology). As for analysis the power crises faced by the consumers are reduced to a great extent with modern solar power plants and its need to monitor and control the solar plants remotely using latest concepts for optimum power output. The paper presents a smart and very dynamic solar tracking approach.***

Keywords: PV, LDR, LED.

INTRODUCTION

Solar energy is that the energy extracted from the rays issued from the sun within the style of heat and electricity solar energy is one amongst the most sources of electricity utilized in our day to day life those who board some secluded areas don't have a correct access to the electricity attributable to the govt. negligence moreover as of the price conjointly it's become price big-ticket and could be a necessary issue of pollution, once it involves victimization fossil fuels, therefore there must be another to contend with this type of limitation. Hence, in such cases, alternative energy becomes the simplest possibility for the folks living there alternative energy on the contrary is clean, silent and reliable with low maintenance and most significantly, its eco-friendly alternative energy resolves the shortage of electricity to nice extent and covers most of the customer's happiness to backward class. In Jammu and geographical region, star electricity performs an excellent role specifically in geographical region division throughout the winter season the govt. of Asian country is functioning with a positive approach towards the event of star primarily based Power Plants to form provide swish to customers. Government of Asian country conjointly launched variety of schemes unitedly with totally different banks to form customers additional and more aware concerning solar energy and offers home primarily based solar energy Systems to them it's a style of energy controlled from the ability and warmth of the sun's rays it's a renewable, and thus a "green" supply of energy the foremost common approach of harnessing energy from the sun is thru electrical phenomenon (PV) panels – those massive, mirror-like panels you've got seemingly seen on rooftops, hand-held star devices, and even spacecraft's. These panels operate as conductors, taking within the sun's rays, heating up, and making energy (and electricity) star thermal power plants conjointly harness the ability of the sun to form energy on the idea of huge scale. These plants utilize the sun's heat to boil water and, in turn, power steam turbines. These plants will provide power to thousands of individuals. Today, most are privy to the solar energy however currently the demand is how to manage these Power Plants victimization the newest and rising technologies to form optimum power output because the conversion of the solar energy into the current is one amongst the foremost promising and difficult energetic technologies on harness the solar energy within the very best way and make this overall method additional economical in terms of usage, price and performance.

LITRATURE REVIEW

The analysis paper entitled "A Low value Closed-Loop solar chase System supported the Sun Position Algorithm" describes Sun position and also the optimum inclination of a solar battery to the sun vary over time throughout the day a straightforward however correct star position activity system is important for maximizing the output power from a solar battery so as to extend the panel potency whereas minimizing the system value star position may be measured either by a device (active/passive) or through the sun position observance formula. Sensor-based sun position measurement systems fail to live the sun position during a cloudy or intermittent day, and that they need precise installation and periodic calibration[1] the analysis paper entitled "Solar Energy activity exploitation Arduino" describes that this project aims to develop a measurement of alternative energy using Arduino Board technology during this analysis, four parameters that been measured are temperature, intensity level, voltage and current[2] the research paper entitled "Automated Solar Panel with Web Monitoring" describes the machine-driven solar panel turn out

additional electricity rather than existing system. The goal of this paper is to style associate automatic sun light chase system, which may find position of the sun.[3] the analysis paper entitled "Design of most electric receptacle chase for sun Controller Drying System: associate Experimental Study" This research describes the performance of maximum power point tracking as a solar furnace of PV system integration for agriculture product drying system. The system includes of solar furnace, chase PV array, the battery bank, the small controller and also the DC convertor this method is style to boost the work of solar furnace in drying method.[6] the analysis paper entitled "A Study of IoT based mostly solar battery chase System" has given the IoT framework to the solar panel tracking systems the total paper is really the study of the sun chase systems supported the IoT and it's been complete that it may be manipulated anyplace like in households or at workplace [7].) the analysis article entitled "Dual-Axis star Tracker" have incontestable Non renewable energy sources like fossil fuels are before long being depleted and in close to future we'll face, with its extinction energy sources. Sun's insulation fits each the standards therefore there are rising technologies centered on gather alternative energy[10] the analysis paper entitled "An correct and economical chase System exploitation Image process and LDR Sensor" introduces the utilization of renewable energy resources is increasing for the aim of manufacturing electricity in present because of lack of non-renewable sources[14] the analysis paper entitled "Solar chase system", this paper deals with the potency of cell with and while not chase system. It additionally includes a planned arrange of easy twin axis chase device that is predicated on servo motors which are successively interfaced exploitation Arduino microcontroller kit. The directions to the servo motor comes from extremely economical lightweight dependent resistors that are liable for moment of PV panels towards most intensity level [15].

PROBLEM DEFINITION

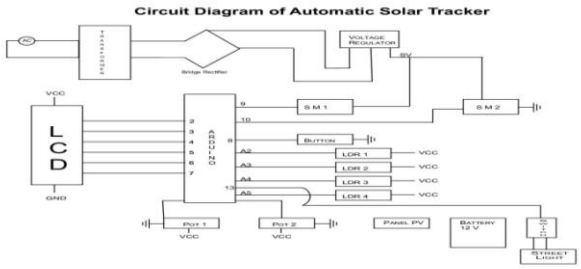
A lot of research has been done on solar panels using PV cells. But the research has been limited to certain facts therein. The solar power is considered the best alternative for power supply hence the plants need to be monitored properly. The deployment of technical aspects enhances the performance of solar plants like rotation of solar panels as per the intensity of light for optimum output. There are other options also available that can be achieved by solar plants. In this work I am going to test some other options also like use of solar panels for voltage status, alternative option for rotation of solar panels etc. means a very dynamic and automatic solar plant for optimum power supply.

METHODOLOGY

In this system LDR sensors are used to detect light from environment. This system has two modes, manual mode and automatic mode. In manual mode, when the user changes the values of tow potentiometers the position of servo motors will also changes depends on the input given by user using the potentiometer. In automatic mode, the LDR in which drop or fall of resistance is more upon increase in the intensity of light, the servomotor will change its angle to the position where it obtains max voltage and hence solar panel during day time when there is fall in resistance on any of the LDR the street lights will turn off and during night time, when there is no fall in resistance on LDR's the lights (LED) are turned On. The whole approach is based on Arduino Uno.

RESULTS

The results are very important for research and development work to prove the problem definition practically. The results obtained are mentioned below:



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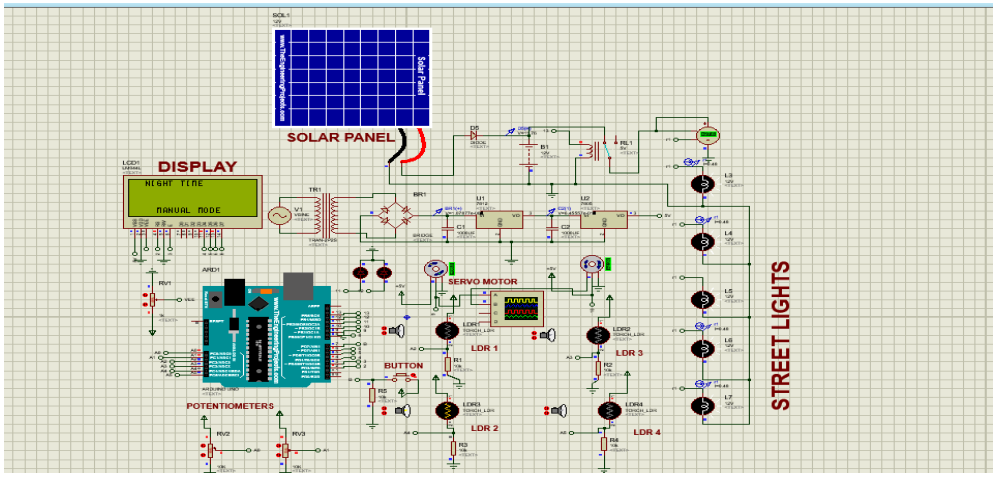

Fig Overview of Solar Tracker

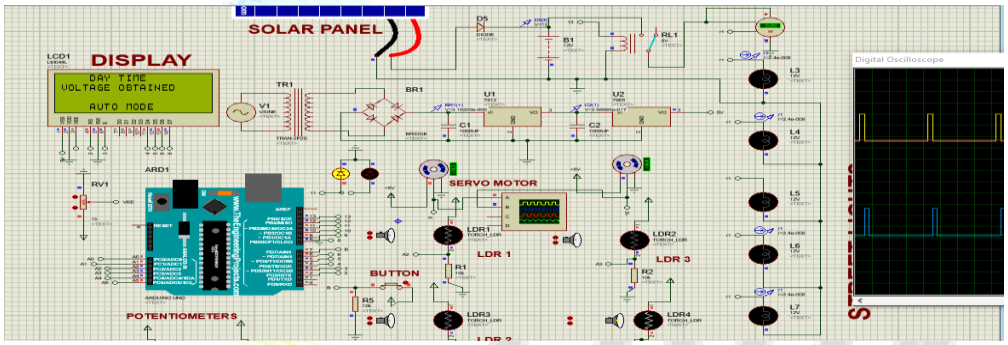

Figure Leds off during day time auto mode.

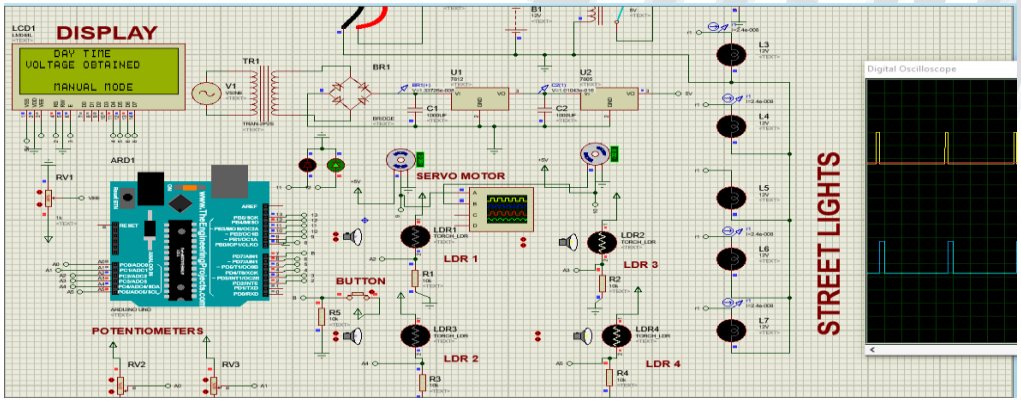

Figure Leds off in manual mode during day time and voltage is being obtained.

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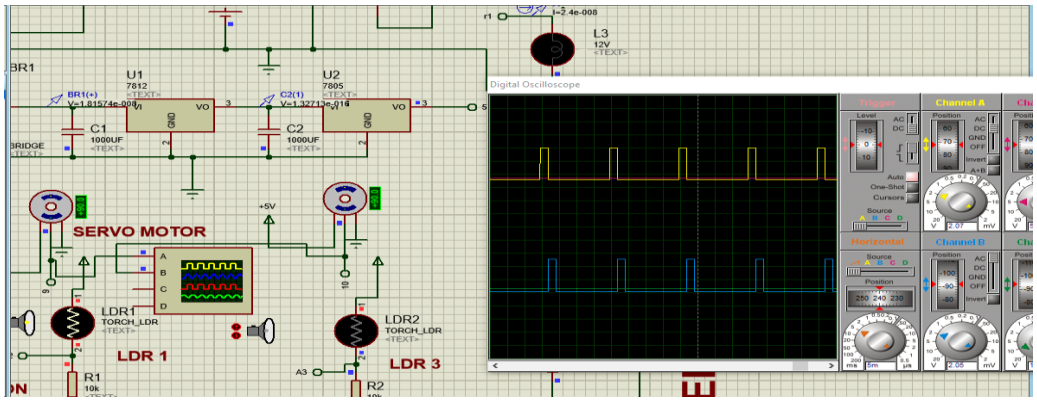
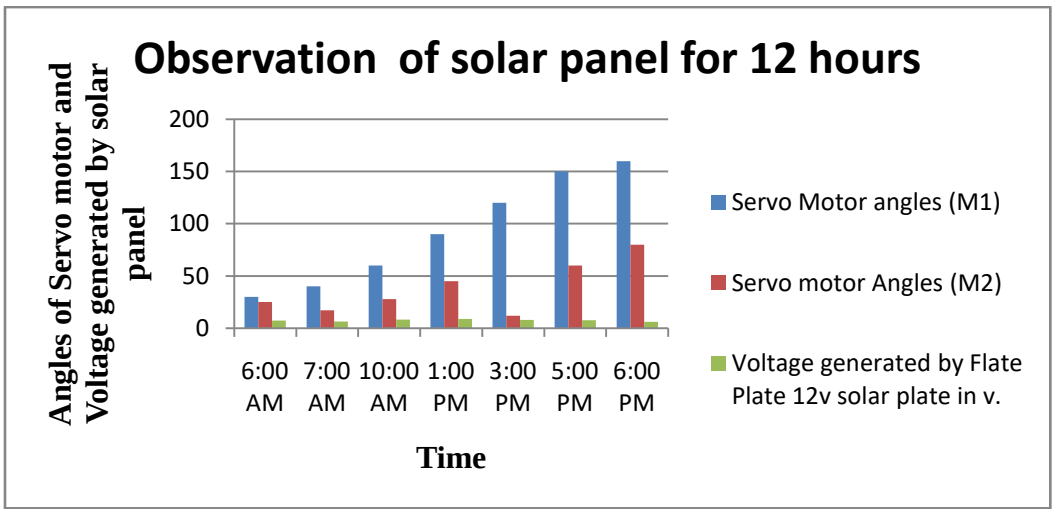


Fig Variations of servo motor angles in auto mode

LDR	Light intensity	Street lights
Light Falls	Daytime or Sunlight	OFF
Darkness	Night Time	ON

Working of Lights

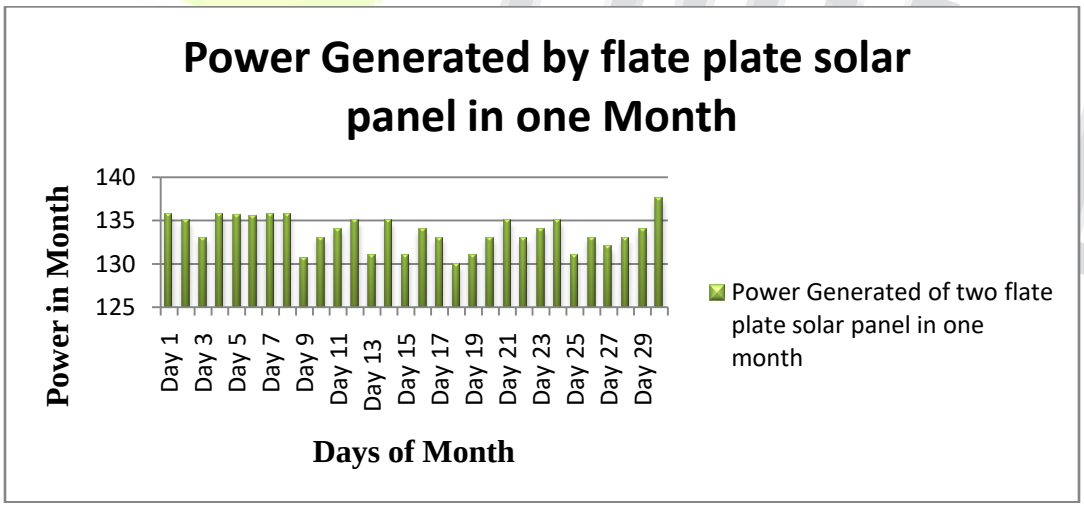
Intensity Of Light On Ldr's (Automatic Mode)	Angle Of Servo Motors	Voltage On Analog Pin Due To Ldr's	Status Of Street Lights According To Variation In Lights
Ldr1 > Ldr2	Servo Motor 1 Angle Is Above 90 Degree	If All Ldr's Receive No Light	Street Lights Are On
Ldr2>Ldr1	Servo Motor 1 Angle Is Below 90 Degree	If Any Of The Ldr Is Revieving Light	Street Lights Are On
Ldr3>Ldr4	Servo Motor 2 Angle Is Above 90 Degree		
Ldr4>Ldr3	Servo Motor 2 Angle Is Below 90 Degree		



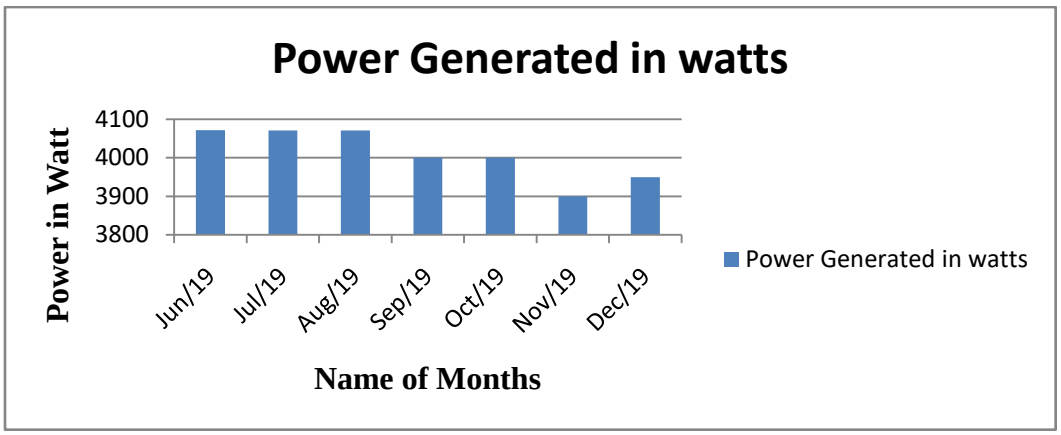
Assumed Average Voltage Generated by solar panel in a day on auto mode.

Total voltage in day = 52.8
Average of total voltage in one hour=52.8/7=7.54v
Pre specified value of current =1.50amp
Average power of one hour=7.54*1.50=11.31 w

Total Power Generated in one day=11.31*12= 135.72 w
Total Power generated in one month=135.72*30= 4071.6 w
Total power generated in 7 months = 4071.6*7= 28501.2w



Total power generated in one month



Total average power generated in 7 month =28501.2 watts =28.5 kw

CONCLUSION

Implementing renewable energy sources is one of the recommended way of reducing the electricity shortage and environmental impacts. For finest supply it is mandatory to utilize energy generated from renewable sources and monitoring it. Monitoring helps the users in analysis of renewable energy usage and makes system very cost effective the overall research work presents a modern and intelligent solar tracking approach supporting both manual rotation using potentiometer and automatic rotation using embedded code.

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