

Ecofriendly Street Lightening System using Solar Panels

D. Swetha, S. Haripriya, G. Sahithi, N. Prabhanjan, G. Swamy Yadav



Abstract: The purpose of this project is to plan and develop a sunlight based tracker framework that pursues the sun course for creating most extreme out for sun based controlled applications. To get the maximum sunlight in a limited distance, two solar panels were placed in a bi-facial manner and reflectors. LDRs are used to detect the sun's direction. And the energy from the solar panels is stored in a battery. The stored energy is used for street lights. These street lights are automated. This automation process is done by the microcontroller with the help of LDR. The street lights switched ON at night and switched OFF in day times.

Keywords: PIC microcontroller, LCD display, LDR, DC motor with L293d DRIVER, solar panel.

I. INTRODUCTION

Electric energy is converted into mechanical energy or light energy based on the requirement. On streets at night times for the smooth traffic flow, for visibility of objects and vehicles on road, street lights are used. These lights generally may not consume more electric power but installation of the street lights along the highways may be a problem. This installation involves a lot of wiring. Especially when the areas are far from the cities repairs occurred may not be repaired easily.

Usage of natural sources to generate electricity is a very good eco friendly option in the present scenario. One of the well known power generation using natural resources is usage of solar panels. These are now a days used in all possible places to generate extra electric power. This is considered as a smart innovation in the generation of electricity. In the present work some LDR sensors are used to detect the changes in the environment and autonomous operation is made in the system to generate more electricity. Here the design and evaluation of street lights controlling system is done using sun trackers, with this some extra amount of electricity is expected to generate,

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II. LITERATURE REVIEW:

Wind energy and solar energy are new methods applied to generate electricity in the current world. Yadav and Swapneel[1], the mix of two vitality assets is happening for example wind and sunlight based vitality. Fundamentally this framework includes the incorporation of two vitality framework that gives consistent power yield. Sun oriented boards are utilized for changing over sunlight based vitality and wind turbines are utilized for changing over wind vitality into power. This paper manages the age of power by utilizing two sources consolidate which prompts produce power with moderate expense without harming the nature cycle. Solar street lights with different angles using different trackers and different power savers are discussed here, Manisha, et al.[2], discusses about the street lights which are powered using single axis solar tracker. This enhances in saving the energy when lights are not required at some places which automatically urn off.

In India we find many problems like poor road conditions, which may cause many accidents. For improving the life of roads many studies have been developed gradually including modern methods in construction of roads. And with such innovative methods many problems can be resolved [9-13].

Streamlining of a Small Scale Dual-Axis Solar Tracking System using Nano-watt Technology, Jay Robert, et al.[3].A solar module will be situated first in North, East, West or South. At that point, the PV exhibit will naturally look and stop at the most noteworthy current picked up by the sunlight based cell. This will happen like clockwork from 6 am to 6 pm. In these positions, the estimations of current, voltage and power were estimated. The structure centers around various applications in a little ranch setting with fan, hatchery, and aquarium siphon engine and lightning.

Some new innovations are made in the lightening system where the street lights are lightened even in worst environment conditions. Tracking the movement of sun and capturing more energy is the new way to improve the solar plant efficiency of generating the electricity (Sanju Saini et al).

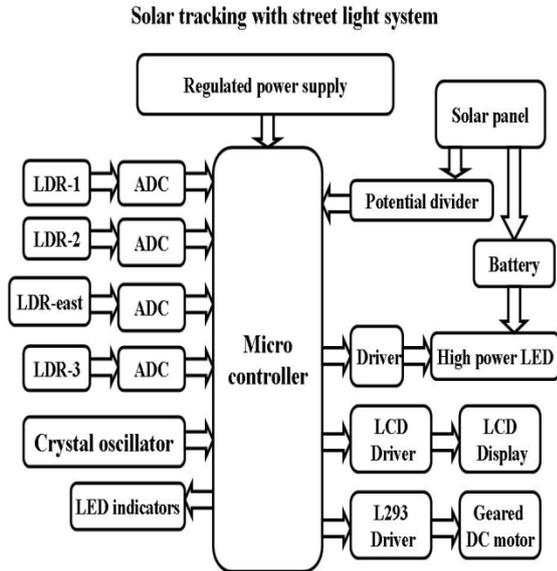
Four modules are involved in the systems. Each module is involved in one task. Solar tracking system is one of the module in which the solar energy is converted to electric power. Auto diming is the second module which is used in diming the LED in the dark and at day time this diming is low compared to the dark ones. This dimming process is done automatically detecting the light component.



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If any error or fault is observed by the system then GSM sends the message to the control room, this comes under the module auto detection. The last module here is the auto switching module where the power supply is switched automatically based on the need.

III. IMPLEMENTATION:



This task comprises not many LDR sensors and a mechanized system for turning the board toward the sun. Moving the sun-powered cell board toward the sun can build the sun oriented vitality produced from the sun based cell. Microcontroller based control framework deals with detecting daylight and controlling the mechanized component. This framework works persistently with no interference.

IV. DISCUSSIONS:

The brief introduction of different modules utilized in this project is discussed below:

PIC Microcontroller:



PIC represents Peripheral Interface Controller given by Microchip Technology to distinguish its single-chip microcontrollers. These gadgets have been exceptionally effective in 8-piece microcontrollers. The primary

explanation is that Microchip Technology has constantly redesigned the gadget design and added required peripherals to the microcontroller to suit clients' prerequisites. The improvement apparatuses, for example, constructing agents and test systems are openly accessible on the web at www.microchip.com.

Peripheral Interface controller (PIC16F72):

Featured of this interface

1	Features	Highlights 200ns guidance execution Self programming ICD 2 COMPARATORS 5 channels of 8-Piece Analog-to-Digital converter.
2	ROM	4KB ROM
3	RAM	128 bytes
4	Operating voltage	2v to 5.5v

Solar panel:

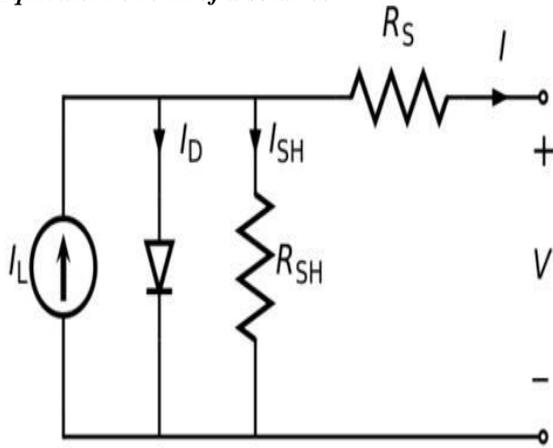
A sun based board is an enormous level square shape, commonly somewhere close to the size of a radiator and the size of an entryway, made up of numerous individual sun based vitality gatherers called sun-powered cells secured with a defensive sheet of glass. The cells, every one of which is about the size of a grown-up's palm, are normally octagonal and shaded pale blue dark. Much the same as the phones in a battery, the phones in a sun oriented board is intended to create power; yet where a battery's phones make power from synthetic substances, a sun-powered board's phones produce control by catching the daylight. They are in some cases called photovoltaic cells since they use daylight ("photograph" originates from the Greek word for light) to make power (voltaic" is a reference to power pioneer Alessandro Volta).

A sun based cell or photovoltaic cell is a gadget that changes over sun based vitality into power by the photovoltaic impact. Now and again the term sun based cell is saved for gadgets proposed explicitly to catch vitality from daylight, while the term photovoltaic cell is utilized when the source is unknown. Congregations of cells are utilized to make sunlight based on board, sun oriented modules, or photovoltaic exhibits. Photovoltaic is the field of innovation and research identified with the use of sun-powered cells for sun-powered energy. Solar cell efficiencies change from 6% for undefined silicon-based sun powered cells to 40.7% with different intersection inquires about lab cells and 42.8% with numerous bites the dust collected into a crossover bundle. Sun-powered cell vitality transformation efficiencies for monetarily accessible multicrystalline Si sunlight based cells are around 14-19%.

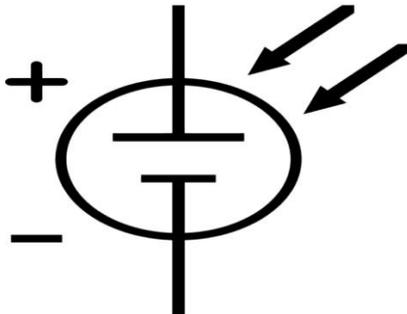
Sunlight based cells can likewise be applied to different gadgets to make it self-control feasible in the sun. There are sun-powered phone chargers, sun based bicycle light and sunlight based outdoors lamps that individuals can embrace for day by day use.



1) Equivalent circuit of a solar cell



The equivalent circuit of a solar cell



The schematic symbol of a solar cell

LDR:



This can also be called as photoconductor whose opposing diminishes when expanded we find the occurrence of light.

Two cadmium sulfide (cds) photoconductive cells with ghastly reactions like that of the human eye The cell opposition falls with expanding light power. Applications incorporate smoke discovery, programmed lighting control, and cluster checking and criminal caution frameworks.

Rechargeable battery:

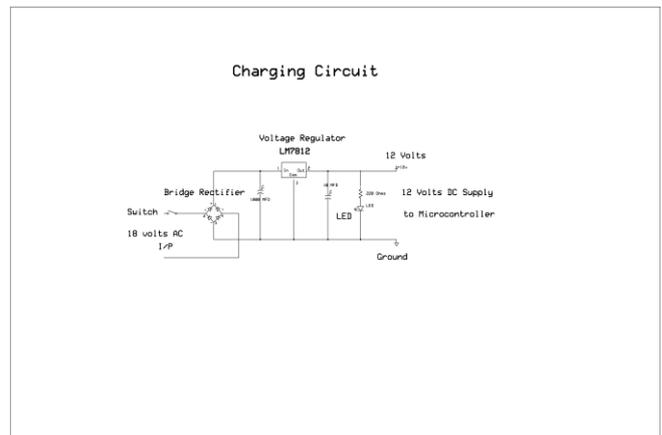
A battery-powered battery, amassing battery, or aggregator is a sort of electrical battery. It includes in any event one electrochemical cell and is a sort of imperativeness authority. From the above circuit diagram, we can see that the 18v AC is being converted to 18V pulsating DC which is in

turn converted to smooth DC with the assistance of the Capacitor



It is known as a discretionary cell since its electrochemical reactions are electrically reversible. Battery-powered batteries come in different shapes and sizes, running from getting cells to megawatt systems related with balance out an electrical scattering network. Several unmistakable mixes of synthetic concoctions are commonly used, including lead-destructive, nickel-cadmium (NiCd), nickel-metal hydride (NiMH), lithium molecule (Li-molecule), and lithium molecule polymer (Li-molecule polymer).

Charging circuit:



. This 18V Smooth DC is converted to 12V DC by the Voltage Regulator 7812. At the output of the regulator, we get some spikes that are not desirable. These spikes are removed with the assistance of another capacitor used. We can get 12V Steady DC at the output terminal which can be shown if the LED glows.

DC motor:



A DC motor is an electric motor that works on Direct Current (DC).

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- Motor supply: 9-15V DC.
- DC motor can be made to run in both directions by changing the supply polarities.
- The microcontroller cannot run the motor in both directions and is not capable of driving the motor at the point when it is directly connected to it.
- So, the motor driver (H-bridge IC) is used as an interface between motor and Microcontroller.
- The motor driver used in the project is L293D (2 H-bridges).
- A motor driver is a small Current Amplifier whose function is to take a low-current control signal and then turn it into a higher-current signal that can drive a motor. The L293D is a typical Motor driver which can drive 2 DC motors simultaneously. Motor Driver ICs are primarily used in autonomous robotics only.
- L293D IC is a run of the mill Motor Driver IC which permits the DC engine to drive on any course. This IC comprises 16-pins which are utilized to control a lot of two DC engines momentarily toward any path. That is to say, by utilizing an L293D IC we can control two DC engines.

▪ **LCD display:**



1	charecteristics	16 x 2 character display LCD WH1602W
2	Voltage size	80.0 x 36.0 66.0 x 16.0
3	Maximum thickness	13.2mm
4	Voltage options	+5.0 v or + 3.0v
5	Driven pins	Pin 1, pin 2, or pin 15, pin 16 or A/K
6	Operating temperatures	-20°C to +80°C

V. RESULTS ANALYSIS:

The main criteria here is to increase the power generation capacity of the solar panels and it is observed that this is done using the solar trackers. And then this energy is used to lighten the street lights and then other devices are used to automatically guide the power consumption.

SL.NO	Type	Power saved
1	SOLAR PANNEL (GENERAL)	6 KW
2	ROTATING	7.25KW

VI. CONCLUSIONS:

Using these new devices more energy can be saved. The solar panels will save 20 percent more power than the normal ones. Using this power in lightening the streets is very economical. The devices used here are more of extensions to the actual solar panel so the initial cost of this setup is very low. Use of these solar systems enhances new power saving methods.

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