

AUTOMATION BASED ON LIGHT INTENSITY SENSOR USING SOLAR ENERGY

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Abstract : The recent decades have seen the increase in solar power demand for reliable and clean sources electricity. The generation of solar power is based on the sun rays intensity on the solar panel and the wavelength. The challenge in solar power plant to maximize the wavelength of the rays from the sun and minimize the temperature effect on the Panel. This paper analysis the solar panel based on different wavelength based Light intensity.

KEYWORDS- efficiency,solar power,tracking,sunrays,solar panels,intensity

I. INTRODUCTION

Light is defined as Electromagnetic radiation with wavelength between 380 and 750 nm which is visible to human eye. Electromagnetic radiation such as light is generated by change in movement (variation) of electrically charged particles, such as parts of 'heated' molecules, or Electronism atoms intensity is the power transferred per unit area, where the area is measured on the plane perpendicular to the direction of propagation of the energy. In the SI system, it has unit watts per square meter (W/m^2). It is used most frequently with waves (e.g., sound or light), in which case the average power transfer over one period of the wave is used. Intensity can be applied to other circumstances where energy is transferred. The conversion of solar light into electrical energy represents one of the most promising and challenging energetic technologies, being clean, silent in continuous development and reliable, with very low maintenance cost and minimal ecological impact according to this project. The photovoltaic solar panel used in this project. Photovoltaic simply means the convert sunlight into electricity. Many cells link together make up a solar panel. This energy will be stored in battery by using battery charger. Rechargeable battery is one kind of electrical battery and it has electro mechanical reactions to adjust so it is also called as secondary cell. Generally, there are two kinds of batteries, namely gel cell deep cycle and lead acid battery. A rechargeable battery is used in IR drive, this battery is used to store electricity generated from the solar panel during the sunrise to afford energy in sunset. The lifetime and capacity of the rechargeable battery are essential as they affect the backup power days of the light. The main part of this project is light dependent resistor (LDR). A LDR is a device to measure the intensity or brightness of light. One of the most common and least expensive detectors that can be used when building a light sensor is a photoresistor. Photoresistor, also called light dependent resistor (LDR) are made from cadmium sulfide (CdS) cells that are sensitive to visible and near infrared light. The light sensor measures the brightness of light, if the obstacles (e.g., Rain, clouds, at night) will coming in front of sunrays then the LDR will be on working mode. A controller is a very significant device in solar panel, used to decide the status of charging and lighting by switch on or switch off. Some recent controllers are preprogrammed and it consist of battery charger, a LED lamp driver, a driver, a secondary power supply, an MCU and a protection circuit. The battery can be controlled by the controller from the under and over charging condition. The battery can be charged by power received from the solar panels in the sunrise and while in the sunset it charges the battery. Due to the controller the switching mechanism will be in active mode. The amount of electrical energy requirement is increasing rapidly with the population growth and technology development. There are ways for generating electrical energy using renewable and non-renewable energy sources. Multiple advantages of solar energy are the key factors behind the usage of solar energy for various purposes. It can be used for generating electrical power with the help of solar panels and for storing the electrical energy by charging the batteries. Maximum power point tracking technology (MPPT) is a most efficient method among the various solar charge controllers such as simple 1 or 2 stage controls, PWM control and MPPT charge controller.

II. OBJECTIVES OF THE PROJECT:

1. Design a Charger based on solar rays.
2. To Store The Energy In Battery Via Solar Charger.
3. To achieve Automatic Switching Mechanism using Light Intensity Sensor.

III. SIGNIFICANCE AND SCOPE:

The proposed system "AUTOMATION OF FOOD DRYING SYSTEM BASED ON LIGHT INTENSITY" is significantly using accuracy of LIGHT SENSOR. The system can fully Automatic which can be operated by Light Sensor. And also utilize maximum of the technology and to do everything smartly and efficiently in order to reduce both energy and time consumption. It has vast scope in various industries because it saves time & Manpower.

IV. BASIC COMPONENT

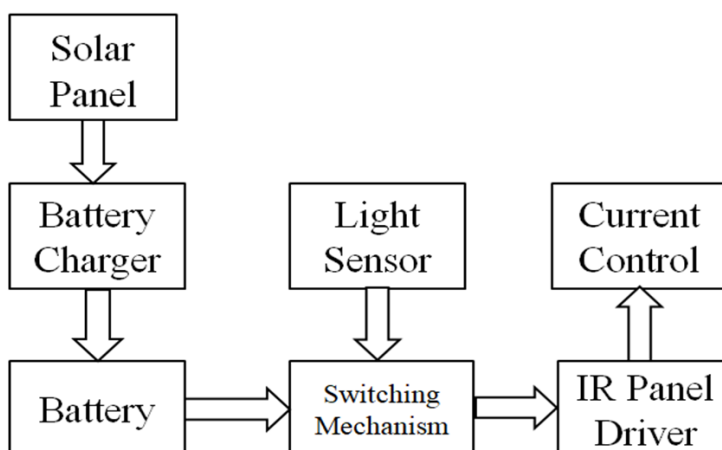


Fig1., Block Diagram

- Solar panel:** Photovoltaic solar panels absorb sunlight as a source of energy to generate electricity. A photovoltaic (PV) module is a packaged, connected assembly of typically 9x4 and 6x6 photovoltaic solar cells. Photovoltaic modules constitute the photovoltaic array of a photovoltaic system that generates and supplies solar electricity in commercial and residential applications. In our project we use maximum voltage of solar panel ids 32V for this we use two use solar panel in series connection.

- Battery:** An electric battery is a device consisting of one or more electrochemical cells with external connections provided to power electrical devices such as flashlights, smart phones, and electric cars. In our project the battery will be charge through the solar charger will be V for continuous next process. We use UPS 12V 8AH Battery for storing the energy from solar. This battery having 14.5V cut off voltage, while below 14.3V the charging process will be ON.

- MPPT Battery Charger :**An MPPT, or maximum power point tracker is an electronic DC to DC converter that optimizes the match between the solar array (PV panels), and the battery bank or utility grid. To put it simply, they convert a higher voltage DC output from solar panels (and a few wind generators) down to the lower voltage needed to charge batteries. Most modern MPPT's are around 93-97% efficient in the conversion. You typically get a 20 to 45% power gain in winter and 10-15% in summer. Actual gain can vary widely depending weather, temperature, battery state of charge, and other factors. Battery can fully charged by using of MPPT charger circuit.in Charger circuit we use MOSFET 3205 for switching mechanism Done through Opto-coupler. Opto-coupler work as gate pulse isolation. In this circuit we use two voltage divider with 100KOhm Resistance as input from solar panel and battery.

- Microcontroller:** We use ATMEGA328p. The Microcontroller will be getting as Brain of our project which will handle all input & output devices. By using this devise we can interface the LCD Display with microcontroller and input keypad. In built ADC to covert digital whatever analog voltage we approach to ADC port that will covert to digital and display on LCD.

- LDR:** A light dependent resistor, LDR is used in circuit where it is necessary to detect the presence or the level of light. In the dark there resistance is very high, sometimes up to 1MOhm but when LDR sensor is exposed to light, the resistance drops dramatically, even down to few Ohms, depending on light intensity. LDR have sensitivity that varies with wavelength of light applied.

LDR may typically have following resistances:

- Day Light: 5KOhm
- Dark: 20MOhms

Resistance(Ohm)	Light Intensity(Lux)
1MOhm-2MOhm	Darkness
10-20KOhm	10 Lux
2-5KOhm	100Lux

Table1., Specification of LDR

V. Circuit Diagram

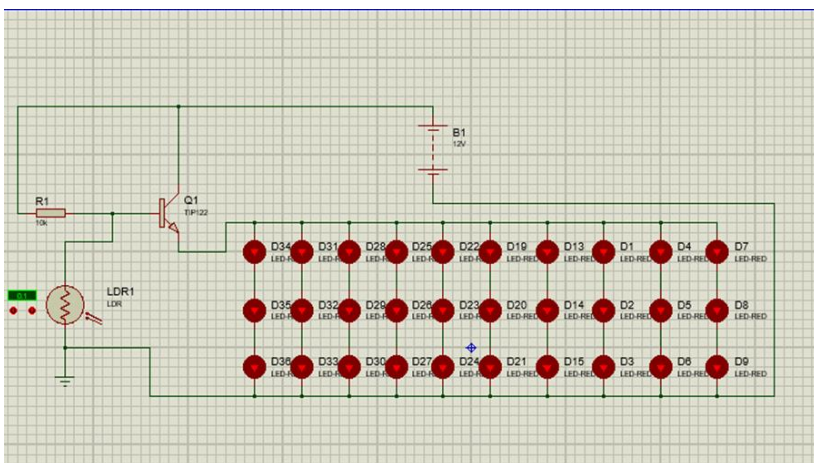


Fig2., LDR Switching Mechanism Circuit

VI. Practical Framework



Fig3., Battery Charging on Solar Panel

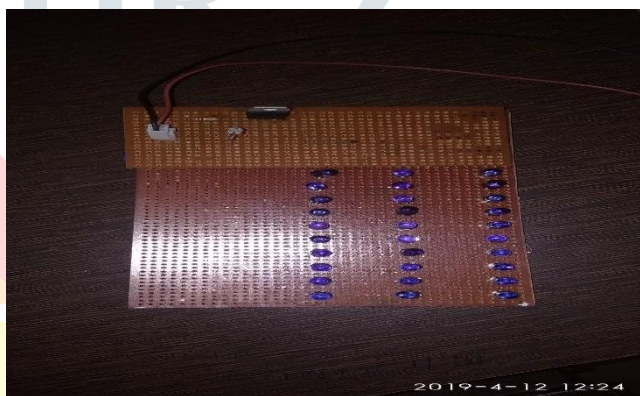


Fig4., LDR Switching Mechanism

VII. Result

In Solar based charger by helping of maximum power point tracking the battery was chargeable and displaying on the LCD. The MPPT (Maximum Power Point Tracking) charge controller technology may significantly increase the efficiency of battery charging state. The solar charge controller is a stand-alone off-the-grid photovoltaic (PV) system that utilizes maximum power point tracking (MPPT) to obtain the most efficiency. Due to the inherent losses that occur in photovoltaic systems, it is essential that the maximum power should be extracted. The intent is to create an extremely efficient charge controller that would be able to monitor the power generated by the photovoltaic array and deliver the maximum amount to the battery bank during varying atmospheric conditions. LDR senses the light intensity from surroundings and find whether its day or night. And it automatically turns ON when the surrounding is dark and it turns OFF when it receives light from surroundings. A sensor called LDR is used to detect the light intensity. When darkness over on LDR then resistance of LDR is High, when light fall on LDR then Resistance of LDR is Low then IR panel will drive.



Fig5., Charging Of battery display on LCD

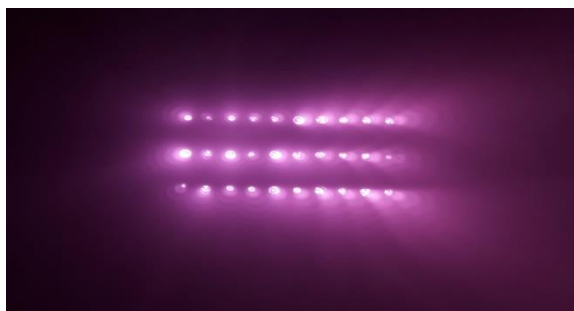


Fig6., Switching Mechanism IR Panel Drive

VIII. Advantages:

- A solar battery charger is device used for charging to avoid the electricity
- This system is automatically used by the light sensor.
- The main advantages of system, it gives nutritional food.
- Some fruits are a seasonal crop and gets spoiled fast, therefore all the fruits of a season must be utilized within a short span.
- The system uses MPPT algorithm hence the efficiency of the system is higher.
- Reduce the man power.

IX. Disadvantages:

- In rainy Season, When sun rays will not fall on solar panel then working of solar panel will be stop.
- The system is costly

X. Conclusion:

The MPPT based charge controllers are best suitable for wind and solar systems as they track the maximum power in case of power fluctuations at the input side due to environmental condition variation. Hence it is recommended to use the MPPT based charge controllers. Use of microcontroller based systems provides huge computational capability and reduction in the hardware. Microcontroller is a mini computer and brings much more accuracy in the control of MOSFET and IGBT. The MPPT charge controller operates with high efficiency (90% or even higher) as compared to existing charge controllers. The LDR resistance decreases with increase in intensity of light and hence there is an increase in the flow of current hence dependent on Light intensity the LDR should work and drives the IR panel. This project provides a light sensor to control the switching mechanism to continuous process of drying system, it can covers short period for dries the food.

XI. References:

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