# IOT BASED SOLAR STREET LIGHT INTENSITY CONTROL SYSTEM

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**Abstract -** *This paper proposes energy efficient of automatic street lighting system based on low cost Arduino. The main objective is to design energy efficient smart street light for energy conservation in existing streetlight. While, the controlling and managing of the system is based on the number of traffic and day/night time. The system was programmed to automatically turn off during the hours of daylight and only operate during the night and heavy raining or bad weather. Many times we see that street lights are remain switched ON even during day time, this is lot of wastes of electricity while India is facing lack of electricity.*

**KeyWord- Internet of thing (Iot), Street light,LED,Solar panel,embeded C software**

## 1. INTRODUCTION:

Street Lights have become an essential part of our lives as they are an important source of light at evening and night time. The main advantage of street lights is that they increase safety and prevents accidents and collisions. Auto Intensity Control of Street Lights is a simple project where the intensity of the street lights is automatically controlled based on the sunlight conditions. Generally, street lights are turned on during evening time and will continue to glow till morning.

### 1.1 Objective:

The main objective of this project is to implement a IoT based Automatic Street Lightning System. As the traffic decreases slowly during late-night hours, the intensity gets reduced progressively till morning to save energy and thus, the street lights switch on at the dusk and then switch off at the dawn, automatically. The process repeats every day.White Light Emitting Diodes (LED) replaces conventional HID lamps in street lighting system to include dimming feature. The intensity is not possible to be controlled by the high intensity discharge (HID) lamp which is generally used in urban street lights. LED lights are the future of lighting because of their low energy consumption and long life. LED lights are fast replacing conventional lights because intensity control is possible by the pulse width modulation.

This proposed system uses an Arduino board. Strings of LED are interfaced to the Arduino board. A programmed Arduino board is engaged to provide different intensities at different times of the night.This project is enhanced by integrating the LDR to follow the switching operation precisely and IOT to display the status of street on web browser and help in

controlling it. The main objectives are as follows:To avoid unnecessary Waste of light.To provide efficient, automatic and smart lightning system

### 1.2 Problem defination:

The idea of designing a new system for the streetlight that do not consume huge amount of electricity and illuminate large areas with the highest intensity of light is concerning each engineer working in this field. Inefficient lighting wastes significant financial resources every year, and poor lighting creates unsafe conditions. Energy efficient technologies and design mechanism can reduce cost of the street lighting drastically.

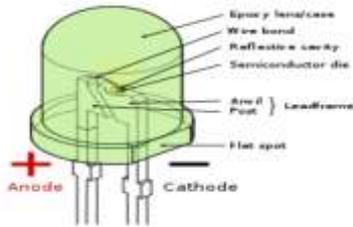## 2. HARDWARE:

### 2.1 Solar panel:

Solar panels are active solar devices that convert sunlight into electricity. They come in a variety of rectangular shapes and are usually installed in combination to produce electricity. A solar panel or module is a series of interconnected silicon cells joined together to form a circuit. In greater numbers the amount of power produced by these interconnected cells can be increased and used as an electricity production system At the present time about 80% of all solar panels are made from crystalline silicon (i.e. monocrystalline, polycrystalline, amorphous silicon or hybrids) solar cells. Typically the solar cells are laid out in a grid pattern – with perhaps as many as 72 different solar cells. The solar panels after being hermetically sealed to protect them, are covered in a non-reflective glass to protect the solar cells from environmental damage and placed into a rigid frame.. Typically, the frame is designed to prevent it from deforming due to freezing weather or strong winds. The frame will usually include a drainage hole to help prevent water buildup on the panels, which can reduce outputs.



2.1 solar panel

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## 2.2 LED ( light emitting diode)

light emitting diode (LED) is a two lead semiconductor light source. It is a pn junction diode, which emits light when activated. When a suitable voltage is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons. This effect is called electroluminescence, and the colour of the light (corresponding to the energy of the photon) is to determined by the energy band gap of the semiconductor



2.2 LED(light emitting diode)

## 2.3 Arduino Atmega-328 Microcontroller:

Arduino is a single-board microcontroller, intended to make the application of interactive objects or environments more accessible. The hardware consists of an open-source hardware board designed around an 8-bit Atmel AVR microcontroller, or a 32-bit Atmel ARM. Current models feature a USB interface, 6 analog input pins, as well as 14 digital I/O pins which allows the user to attach various extension boards. I various extension boards. It is open source source project software /hardware is extremely accessible and very flexible to be customized and extended it is flexible offer variety of analog and digital input The Arduino integrated development environment (IDE) is a cross-platform application written in Java, and is derived from the IDE for the Processing programming language and the wiring projects. It is designed to introduce programming to artists and other newcomers unfamiliar with software development. It includes a code editor with features such as syntax highlighting, brace matching and automatic indentation, and is also capable of compiling and uploading programs to matching and automatic indentation, and is also of compiling and uploading programboard with a single click. A program or code written for Arduino is called a "sketch". Arduino programs are written in C or C++. The Arduino IDE comes with a software library called "Wiring" from the original wiring project, which makes many common input/output operations much easier ATMEGA 328 microcontroller, which acts as a processor for the arduino board. Nearly it consists of 28 pins. From these 28 pins, the inputs can be controlled by transmitting and receiving the inputs to the external device. It also consists of pulse width modulation (PWM). These PWM are used to transmit the entire signal in a pulse modulation. Input power supply such as Vcc and Gnd are used. These IC mainly consists of analog and digital inputs. These analog and digital inputs are used for the process of certain applications
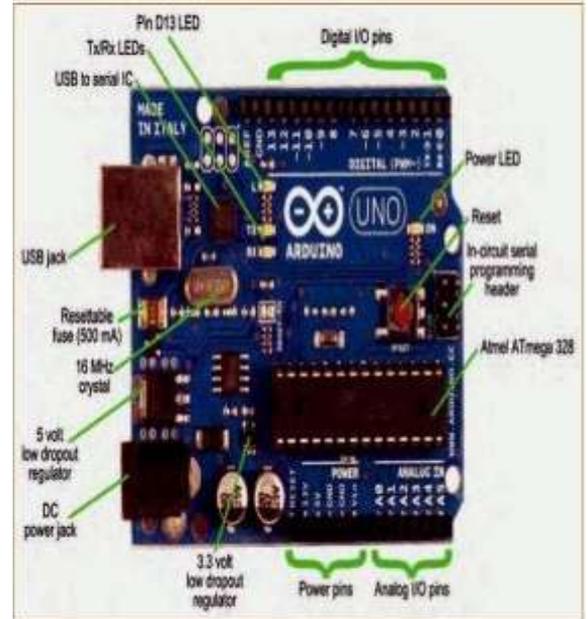


2.3 Arduino UNO

## 2.4 Voltage regulator:

A voltage regulator is an electrical ((regulator designed to automatically maintain a constant voltage level. It may use an electromechanical mechanism, or passive or active electronic components. Depending on the design, it may be used to regulate one or more AC or DC voltages. With the exception of shunt regulators, all voltage regulators operate by comparing the actual output voltage to some internal fixed reference voltage. Any difference is amplified and used to control the regulation element. This forms a negative feedback
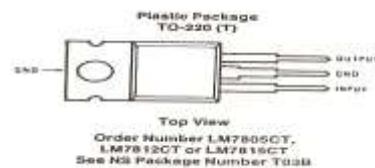


2.4 Voltage regulator

servo control loop. If the output voltage is too low, the regulation element is commanded to produce a higher voltage. If the output voltage is too high, the regulation element is commanded to produce a lower voltage. In this way, the output voltage is held roughly constant

## 3. SOFTWARE:

### 3.1 Embedded c:

The C standard doesn't care about embedded, but vendors of embedded systems usually provide standalone implementations with whatever amount

of libraries they're willing to provide. C is a widely used general purpose high level programming language mainly intended for system programming.

## 3.2 Blynk app:

Blynk is a Platform with iOS and Android apps to control Arduino, Raspberry Pi and the likes over the Internet.It's a digital dashboard where you can build a graphic interface for your project by simply dragging and dropping widgets.It's really simple to set everything up and you'll start tinkering in less than 5 mins. Blynk is not tied to some specific board or shield. Instead, it's supporting hardware of your choice. Whether your Arduino or Raspberry Pi is linked to the Internet over Wi-Fi, Ethernet or this new ESP8266 chip, Blynk will get you online and ready for the Internet Of Things.



3.2 Blynk app

## 4. BLOCK DIAGRAM & WORKING

During day time solar panel produces electricity and it stored in the battery. ▢ In dusk to dawn time light sensor gives command to arduino controller. As per program it executes command and turns LED ON to 30% of max intensity when there is no motion below streetlight. If any person or vehicle passes nearby streetlight, motion sensor activates and gives command to arduino to increase brightness to 100%. After preset time and if there is no movement detected, intensity reduces gradually to 30%. At the time of morning LDR will send command to arduino and hence street light will turn OFF. Normally streetlight will operate from electricity stored in the battery. If battery is not charged sufficiently due to cloudy weather condition then streetlight will automatically switch to utility supply.
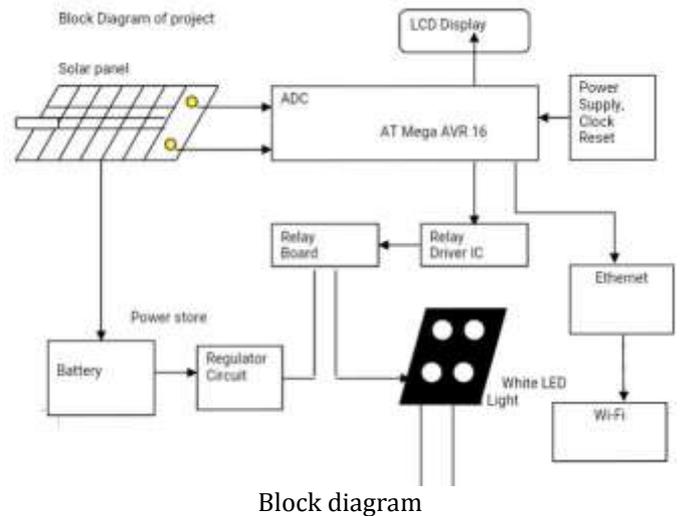


Block diagram

## CONCLUSION

The system solves the energy efficiency problem of conventional solar-powered street lamp system, ensure the traffic safety and prevent crime against night-time walking. It will also help in making our city a Smart City

## REFERENCES

[1] M. A. D. Costa, G. H. Costa, A. S. dos Santos, L. Schulch, and J.R.Pinheiro, "A high efficiency autonomous street lighting system based on solar energy and LEDs," in Proc. Power Electron. Conf., Brazil, Oct. 1, 2009, pp. 265–273.

[2] P.-Y.Chen,Y.-H.Liu,Y.-T.Yau, and H. C.Lee, "Development of an energy efficient street light driving system," in Proc. IEEE Int. Conf. Sustain. Energy Technology., Nov. 24–27, 2008, pp. 761–764.

[3] W. Yue, S. Changhong, Z. Xianghong, and Y. Wei, "Design of new intelligent street light control system," in Proc. 8th IEEE Int. Conf. Control Autom., Jun. 9–11, 2010, pp. 1423–1427.

[4] L. Jianyi, J. Xiulong, and M. Qianjie, "Wireless monitoring system of street lamps based on zigbee," in Proc. 5th Int. Conf. Wireless Commun., Netw.Mobile Comput., Sep. 24–26, 2009, pp. 1–3