

# Environmental Based Light Intensity Control For Energy Saving & Optimal Illumination

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## ABSTRACT

In this paper we have study light intensity control depend on vehicle moment. For reduce the power consumption and wastage of power it is important to control intensity of light. It is the need to reduce power wastage for developing country. In this paper LDR, IR or ultrasonic sensors are used. Illumination of street light can control on the basis of traffic density, light intensity control is also based on pulse width modulation (PWM). street light control is very important factor in Nagar-perished, Municipal Corporation, rural areas. Only 20-30% sun energy fall on the earth surface so it is very necessary to use solar tracker, for tracking maximum sun light. This paper gives idea about smart lightning system, low installation cost, high efficiency, wireless communication gives smart lightning system.

**Keywords:-** Solar Trackers, Sensor (IR, LDR), Street light.

## 1. INTRIDUCTION

Energy conservation is need today; by controlling intensity of street light minimize wastage of energy. NASA proposed that temperature on sun is about 5800 Kelvin, distance between earth and sun is about 150 million kilometers total energy radiated by sun is not fall on surface of earth because of various layers present between earth and sun various types of LED's are used these are electronic component they directly convert electric energy into light energy. We always prefer LED's which have high efficiency, reliable operation and low power consumption lightening system consume 20% of total energy and 6% consume by green house emission. Smart lightening system used wireless sensor (LDR, IR or Ultrasonic) works in the system without affecting normal working operation for reducing the CO<sub>2</sub> emission efficient LED's are used. Because of technological development lightening system categorized on the basis of efficiency, working condition, performance and area where street light installed various types street lights that is incandescent lights,

mercury vapor light CFL low pressure and high pressure light, induction light LED's select for operation on the basis of high efficiency, compact size and robustness. Controlling overall system embedded system are used consist of software and hardware this control by using microcontrollers, used real time data real time control and reliable operation. Embedded system used in various operation industrial telecommunications, military, commercial sector operation. Developing country takes 86% of total energy national electricity consumption is about 5-15%.

## 2. EXISTING SYSTEM

Due to rapid growth in industries highly efficient street light are use. In present electrical and electronic system energy consumption, automation cost is highly effective to reduce this problem develops more economical system and control Complex Street light is necessary. Smart street light system is developing to reduce energy wastage, energy consumption and efficient energy at end user. Existing system are use metal halide lamp used in urban area is very high. Metal halide systems have high efficient and good color characteristics. It has higher efficiency and intensity than high pressure lamp. Because of some disadvantages metal halide lamp not used now days.

Disadvantages:

- 1) Short life.
- 2) Low efficiency for horizontal operation.
- 3) Restart capability is lower than other lamp.
- 4) Lamp use higher wattage.

## 3. PROPOSED SYSTEM

In proposed system work use of various switches, sensors for controlling street light automatically by using infrared detection sensor used for wireless communication. Light dependent resistor (LDR) sensor used for detecting night or day. For higher efficiency Ultrasonic sensors are used. It has property to detect object in degrees (45°) and it cover large area. In proposed system LED's used for street lamp, other

than metal halide, florescent lamp etc. LED's have efficiency, low maintenance cost, frequently starting and stopping operation are done and long life. In proposed system use of ultrasonic sensor or IR sensor for detection vehicle moment.

#### 4. BLOCK DIAGRAM

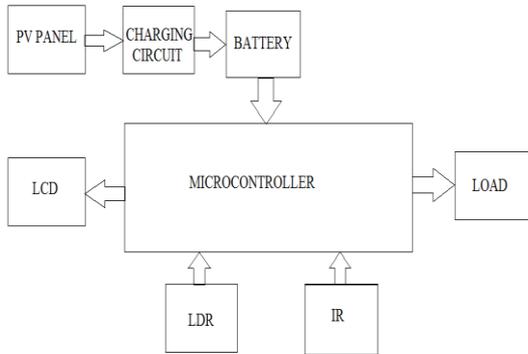


Fig.1 Block diagram

In above figure shows block diagram of street light system. Consist of pv panel, charging circuit, battery, microcontroller and sensors. PV panel used for detecting uv rays radiated by sun, then charging circuit is used for charging the battery, output of battery is gives to microcontroller. Output of battery is 5v. LCD used for display day or night, load connected that is street light. IR sensor used for detection of vehicle moment or object. Total system controlled by microcontroller (PIC 18).

#### 5. SENSOR

Smart street light system is developed for controlling light illumination and energy conservation. Detection of object or vehicle moment infrared detection sensor is used, IR sensor gives straight detection. For efficiently object detection ultrasonic sensor also use, ultrasonic sensor detect object in 45°. For smart lightning system various sensors like infrared detector, light dependent resistor, passive infrared sensor, ultrasonic sensor used.

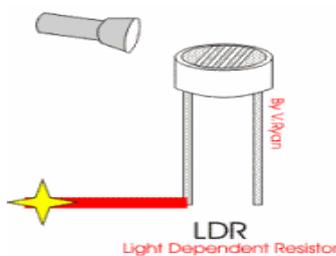


Fig.2. LDR Sensor

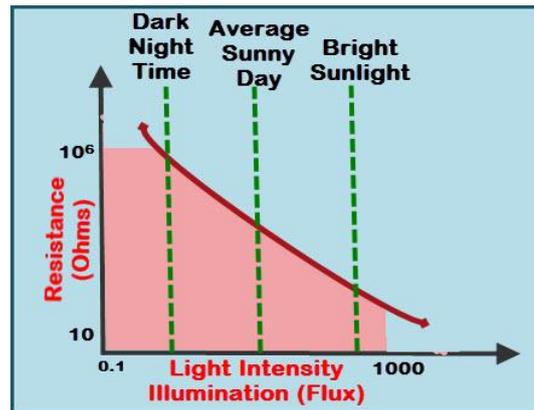


Fig.3. Characteristic of LDR sensor

LDR covert light energy into electrical energy, this is passive electronic devices. Light intensity and resistance of LDR both are inversely proportional, that increase in light intensity low the resistance of LDR. This sensors have many application which detect amount of light energy is present.

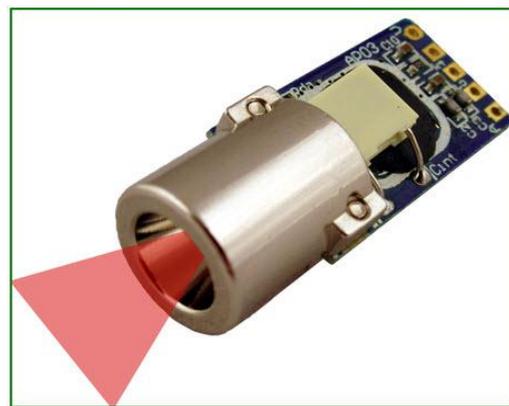


Fig.4. IR sensor

IR sensor used for detection of obstacle present in its range. IR sensor gives real time data. In IR sensor transmitter and receiver used for transmit and detection of object. In IR sensor IC used, if IR sensor does not detect any signal input goes to inverting terminal and no any operation performed by sensor. When non-inverting terminal goes high operation performed by sensor.

#### 6. MICOCONTROLLER (PIC 18f458)

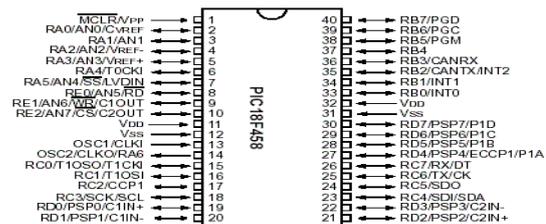


Fig.5. PIC18 Microcontroller

Embedded system used for controlling overall system that include software, hardware. Microcontroller used for controlling embedded system. We have use pic18f458 because it have low cost and various features such as it have 1536 bytes linear data memory, 32 byte linear program memory, 40 MHZ clock input, peripheral features, timers (8 bit or 16 bit), 8 byte message length. Special microcontroller features are power on reset, power up timer, Oscillator start up timer enhanced flash program memory and advanced error management features. This type of features provides accurate control of system and we have real time data.

## **7. CONCLUSION**

In this paper we have study advanced street light control system, by installing proposed system lot of energy conservation can possible. In proposed system highly efficient LED's are used by replacing metal halide lamp for energy saving, by using sensors with wireless communication and microcontroller smart street light system installed. As per user need this proposed system is totally adjustable, all round, extended. In proposed system overall output of system is improved by using solar tracker. Charging circuit not only used for charging battery but also used for preventing battery from overheating discharge and saves higher energy.

## **8. REFERENCES**

- [1] Design and construction of an automatic solar tracking system Md. Tanvir Arafat Khan, S.M. Shahrear Tanzil, Rifat Rahman, Member, IEEE
- [2] A.K. Sexena and V. Dutta, "A versatile microprocessor based controller for solar tracking," photovoltaic specialist conference, vol 2, pp.1105-1109, 1990.
- [3] Wireless street light control system, Deepak Kapgate, G.H. Raison college of engg. Nagpur university, International journal of computer applications (0975-8887), volume 41-No.2, March 2012.
- [4] Electrical safety of street light systems, Giuseppe Parise, Fellow, IEEE, Luigi Martirano, Senior member, IEEE, and Massimo Mitolo, Senior member, IEEE, vol.26, No.3, July 2011.
- [5] "Intelligent street light system using GSM" International journal of engg. Science invention ISSN (online): 2319-6734. ISSN (print): 2319-6726 vol 2, issue 3 March 2013.
- [6] "Analysis of solar energy based street light with auto tracking system", International journal, 2012.