

# Automatic Brightness Control Using LDR Sensors

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**Abstract:** This paper describes automatic brightness light based embedded system using LDR sensors which can be used at rooms, companies, personal places, petrol pumps and banks etc. In this system brightness is controlled using LDR sensors and array of LED's which are interfaced with the microcontroller. According to the value of LDR sensors the brightness is controlled. At the daytime, when there is a need of less light, LDR sensors sense the light and accordingly the programmed LED's glows, but when there is a need of more light LDR sensors sense the light in nearby area and based on the amount of light required the LED's are turned on. This system is better than any other system as intensity of light is controlled according to the amount of light needed in the room. Based on the amount of light required the number of LED's turn on and off, during night time when highest amount of light is needed, all the LED's will glow, during the time when some of the light is required in the room, only some of the LED's glows based on the amount of light needed.

**Keywords:** Microcontroller, LED, LDR Sensors, LCD display

## 1. INTRODUCTION

The system of Automatic Brightness Control uses the concept of an LDR sensor that is primarily used to sense the light conditions around it. For our experiment these sensors sense the light conditions of the environment and can be used to glow LED's according to the requirement. If the light value is between 675-900 a single LED glows and for light value between 0-225 all 4 LEDs glow. This technique will be efficient in offices and houses when there is low voltage or in certain conditions when the light requirement suddenly falls below and could affect the working of the systems being used.

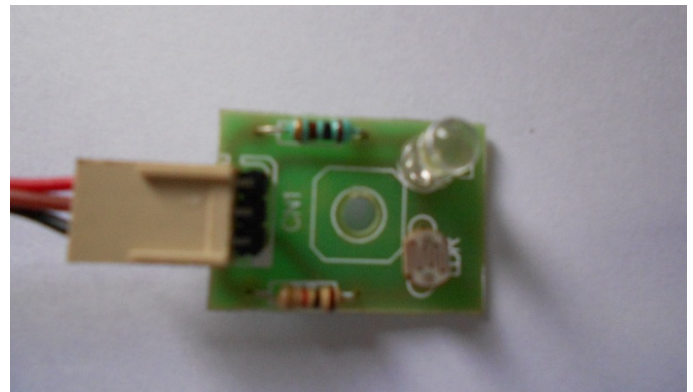
## 2. RELATED WORKS

In this section some related works are – (a) To increase the brightness in homes, offices automatically (b) This system is used in dark streets where automatic brightness of light is needed (c) To increase the intensity of light in closed room, offices (d) This system is used for airport closed rooms using automatic brightness control .

## 3. WORKING PRINCIPLE

The basic working principle for our system is based on the fact that the LDR sensors would sense the immediate level of light in the room. In our setup of using 4 LEDs if the level of light

in our room is very bright that is between 675-900 we glow only a single (1) LED. For light level between 450-675 there is a requirement for 2 LED to be switched on automatically. When the light level in the room falls below 450 and is in the range of 225-450 we need 3 LED's to be automatically switched on and for dull room condition that is for light level from 0-225 we need all 4 LED's to be glowing. Due to this principle of the sensor sensing the light condition automatically we can overcome this problem of switching the lights on manually.



**Figure 1: LDR sensor**

## 4. AUTOMATIC BRIGHTNESS CONTROL SYSTEM

The Automatic Brightness Control System is a system that has been made by using a combination of an LDR sensor. LDR sensors are a type of photo resistor components that have a relatively high resistance value. When light is made to fall on these materials it leads to the emission of electrons and when the light frequency exceeds this set value the emitted electrons acquire an energy that can make them to jump into the conduction band. The LDR sensors can be used in many devices like the alarm clocks, digital and analog watches, the radio sets and solar devices. Light Emitting Diodes or commonly called LED is nothing but actually a diode that is capable of functioning like a diode. It's working is based on the concept of Electroluminescence according to which light can be emitted when we pass an electric current through the material. The system being presented by us is composed of LED and the LDR sensors. The LDR sensors being used can pick the value of light present in the room or the environment

and then glow the amount of LED's which have been embedded in the systems. For the light conditions of 0-225 we need all the 4 LED's to be glowing while for light condition of the range of 225-450 there is a need for 2 LED's to be glowing. This requirement of LED's is further reduced if more of the light rays can enter our room i.e. when light rays of 450-675 Hz enters only 2 led's glow while for 675-900 we have a single glowing LED. For conditions above 900 the light of the room is sufficient for our usage. The LED's are embedded to the ATMEGA 16 microcontroller. This microcontroller belongs to the ATMEL family and is a 8 bit microcontroller. The LED and LDR can be embedded using the codes. This concept of automatic brightness control will be really useful in many industrial applications where if due to a sudden power failure enough light can be provided in order to keep light for the workers to keep working on the mechanical devices. Even in houses when there is low voltage we can ensure that using this system there would be light present in many such situations.

## 5. BLOCK DIAGRAM

The block diagram of automatic brightness control using LDR sensors is shown in the figure 1. It consist of power supply section, LED1, LED2, LED3, LED4, LDR sensor 1, LDR sensor 2, ATMEGA 16 microcontroller.

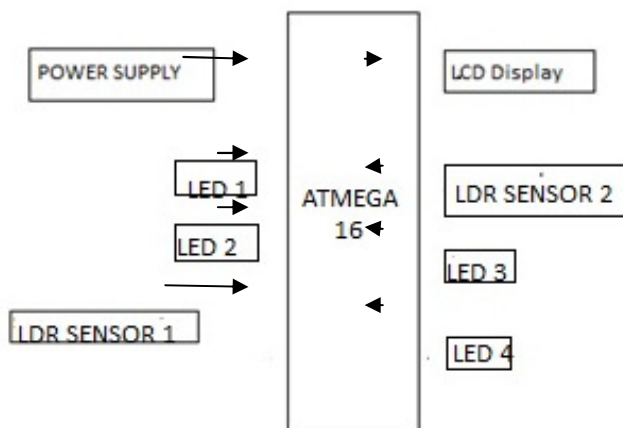


Figure 2: Block diagram of automatic brightness control

## 6. CONCLUSION

Automatic brightness control using LDR sensors has been implemented. It is cost effective system. LED's to be automatically switched on and for dull room condition that is for light level from 0-225 we need all 4 LED's to be glowing. Due to this principle of the sensor sensing the light condition automatically we can overcome this problem of switching the lights on manually.

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## REFERENCES

- [1] Alzubaidi, S.; Soori, P.K., "Study on energy efficient street lighting system design, " Power Engineering and Optimization Conference (PEDCO) Melaka, Malaysia, 2012 Ieee International, vol., no., pp.291, 295, 6-7 June 2012, doi: 10.1109/PEOCO.2012.6230877
- [2] Denardin, G.W.; Barriuello, C.H.; Campos, A.; Pinto, R.A.;Dalla Costa, M.A.; do Prado, R.N., "Control network for modern street lighting systems, " Industrial Electronics (ISIE), 2011 IEEE International Symposium on, vol., no., pp.1282-1289, 27-30 June 2011 doi:10.1109/ISIE.2011.5984343
- [3] Chunguo Jing; Liangchao Ren; Deying Gu, "Geographical routing for WSN of street lighting monitoring and control system, " Computer Design and Applications (ICCD), 2010 International Conference on, vol.3, no., pp.V3-235-V3-238, 25-27 June 2010 doi: 10.1109/ICCD.2010.5540771
- [4] Long, X.; Liao, R.; Zhou, J., "Development of street lighting system-based novel high-brightness LED modules, " Optoelectronics, IET, vol.3, no.1, pp.40-46, February 2009 doi: 10.1049/ietopt: 20070076
- [5] Xingming Long; Jing Zhou, "An intelligent driver for Light Emitting Diode Street Lighting, " Automation Congress, 2008. WAC 2008. World, vol., no., pp.1-5, Sept. 28 2008-Oct. 2 2008
- [6] Po-Yen Chen; Yi-Hua Liu; Yeu-Torng Yau; Hung-Chun Lee, "Development of an energy efficient street light driving system, " Sustainable Energy Technologies, 2008. ICSET 2008. IEEE International Conference on, vol., no., pp.761-764, 24-27 Nov. 2008 doi:10.1109/ICSET.2008.4747108.