Research Journal of Recent Sciences _____ ISSN 2277-2502
Vol. **7(6),** 12-15, June **(2018)** *Res. J. Recent Sci.*

Standby automatic LED light on power failure

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Available online at: www.isca.in, www.isca.me
Received 23rd November 2017, revised 22nd May 2018, accepted 31th May 2018

Abstract

Light has become the essential part of people. Works can be seldom done in absence of light. The aim of this paper is to design a Standby automatic LED light. It switches on automatically on power shutdown. This device has high luminous value, extensive valuable life and small size. Besides, they consume less power and need no manual intervention. The rechargeable battery is used to power up the LED. The battery charges when the power exists. LDR is used to sense day and night. It helps the LED glow only during night when the power supply fails. The suggested method is not complex and inexpensive. Its core feature is the ease of implementation and reliability. The designed circuit of the Standby automatic LED light is verified and fabricated. The output obtained is satisfactory.

Keywords: Light emitting diode, light dependent resistor and relay circuit, single pole double throw (SPDT).

Introduction

Standby automatic led light can be deployed to light houses and workplaces during the power shutdown. If power fails during the day the effects are not nearly as bad as at night, because without light, you can't do the smallest of works. Without light, our effectiveness is limited to daylight hours only, and in this competitive world we can't afford to lose time just because of darkness.

The standby automatic LED light illuminates when the power is shut down[1]. This is made possible by deploying a battery which gets charged in the presence of main supply. During the power shutdown, the LED glows automatically powered by the charged battery. This paper takes care of three major processes such as the circuit activate LED automatically when the main power is down, it has the feature to sense the day/night and glow LED accordingly and finally the battery charges when the main power restarts[2]. This Standby automatic LED light can be used in the areaswhere there are frequent power fluctuations either due to harsh weather conditions or timely maintenance works. Several forms of standby light are available in market. All of them has a switch and require manual operation. The paper focuses on designing a smart device which can sense the existence of main power supply along with daylight to activate the standby LED light. The risk of hitting yourself in the dark is avoided since the light switches on/off automatically.

Circuit design: A single phase, 230 V, 50 Hz AC supply is given to the circuit in the Figure-2. It is converted to 12 V AC using TRAN-2P2S step-down Transformer[3]. Then a bridge circuit is deployed for converting 12 V AC to 12 V DC[4]. This 12 V DC supply is fed to the relay circuit. Relay and transistor BC557 work as a Switch[5]. There are mainly three terminals i.e. Normally Close (NC), Normally Open (NO) and Common[6]. Connect NC terminal to the LDR, NO to the main power supply and common to the rechargeable battery. Turning on the power supply, NO terminal is connected which charges the battery. Turning off the power supply, NC terminal is connected with the battery which turns on the LEDS. Low-self discharge 12 v Ni-MH battery is used to store the charge when the power supply is on and used to give power supply and turn on LEDs when the power supply is off.

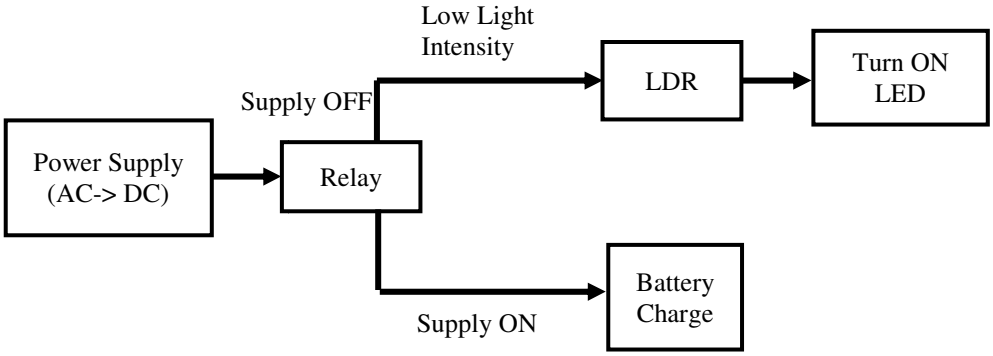

Figure-1: Concept block diagram of the automatic LED light.

6 LEDs are linked in series and parallel which is powered by rechargeable battery as and when the main power is shut down and switched on automaticall[7]. LDR's are light dependent devices whose resistance is decreased when light falls and vice versa[8]. During the night, there is low light intensity. Therefore, the resistance of LDR increases and the voltage drop across it also increases. The voltage increases high enough to turn on the LEDS. A red led indicates that the battery is charging.

Simulation Results

Simulation of the circuit was done in Proteus 8 Professional Software. Proteus enables us to design, test and run any kinds of electrical and electronics circuits[9].

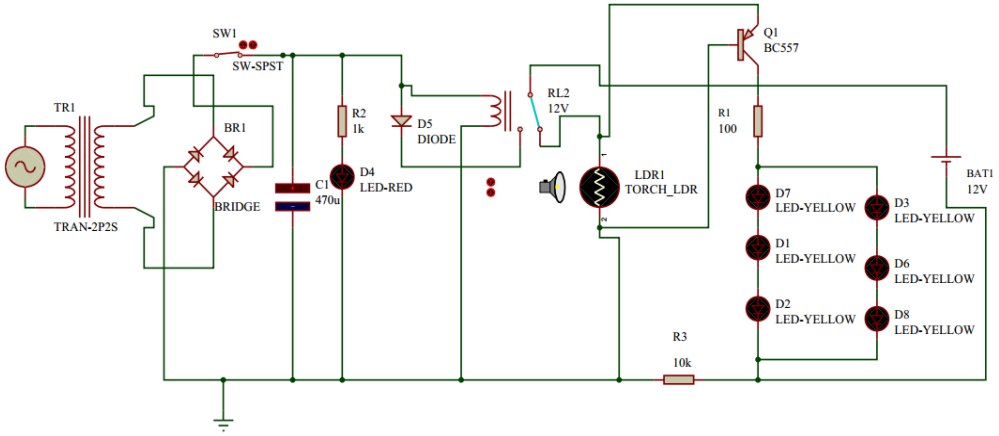

Figure-2: Designed circuit diagram of the automatic LED light.

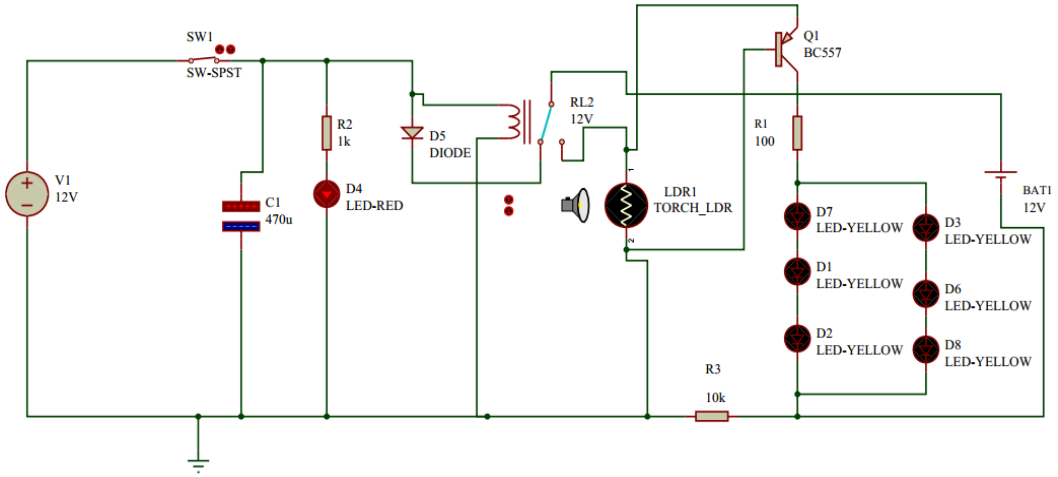

Figure-4: Simulation result on power existence.

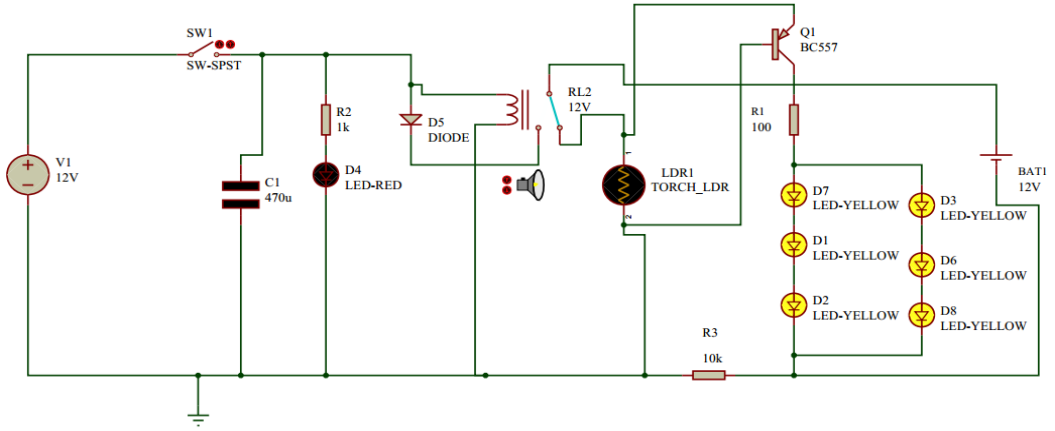

Figure-5: Simulation result on power shutdown during the night or dark condition.

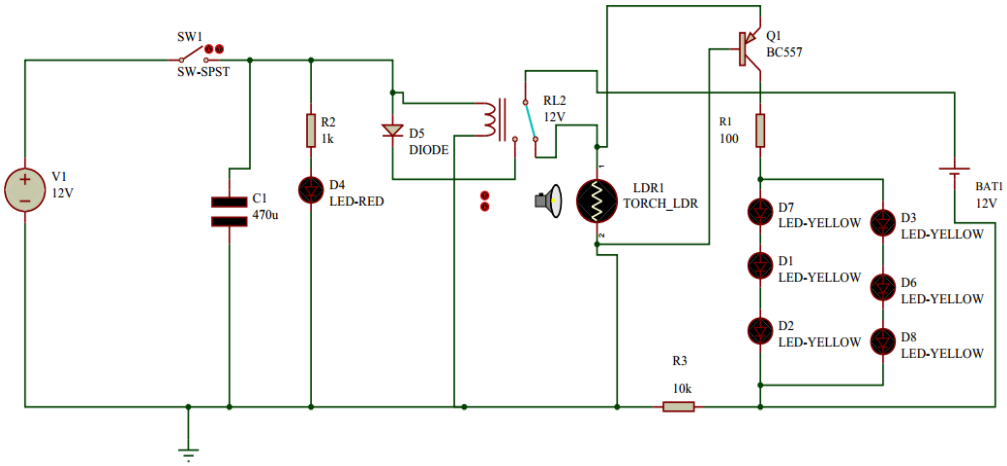

Figure-6: Simulation result on power shutdown during the day or bright condition.

Testing

Future Scope: Since, this circuit uses the rechargeable battery that gets charged when there is a main power supply; the overcharging of battery is a concern. Therefore, feature like battery level indicator such as buzzer or LED can be used[10]. The above circuit can be further improvised by finding alternate source to avoid sudden discharge of the battery. It can be done by using piezoelectric sensor to harvest energy or solar panel to extract solar energy to charge the battery.

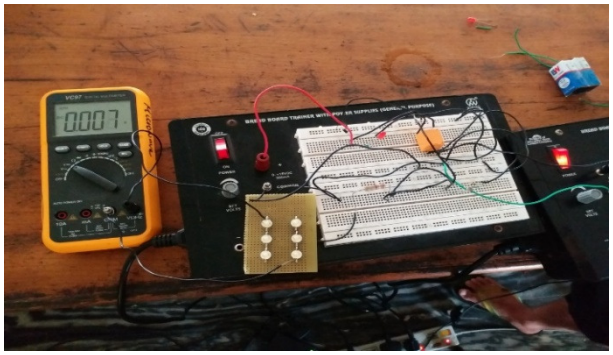

Figure-7: First test of the automatic LED light on the breadboard.

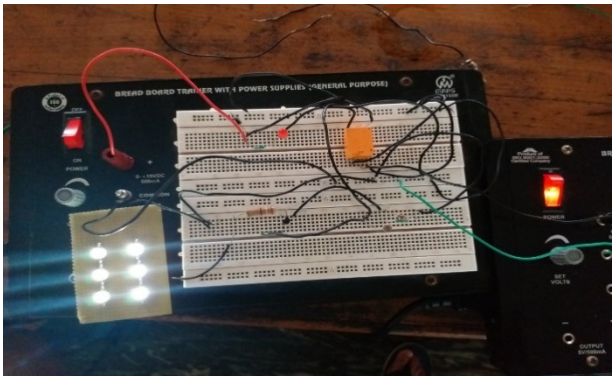

Figure-8: Second test of the automatic LED light on the breadboard.

Conclusion

This paper presented a standby automatic LED light on power failure. The deployment of LED ensures better valuable lifespan and productivity. The core variance between the suggested systems matched to others standby lighting systems based on LEDs is that the suggested circuit permits the usage of the standby lighting system automatically in the everyday works provided by main power supply, better than the switch oriented lamp. Moreover, the circuit require few constituents which are effortlessly obtainable. The suggested circuit is not complex, it is small and inexpensive.

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