Design of lamp holder with Power saving system

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Abstract: **The need of electricity is being increasing day by day. It has now become a part of our daily life and one cannot think of world without electricity. Electricity is now an important part of homes and industries. Almost whole the devices at homes, businesses and industries are running because of electricity. Power failure (load shading) is common phenomenon in most of villages in India. The need for an alternative source of illumination in our homes, workshops, offices, etc. become a viable option.**

Now, here we come with the solutions over drawbacks of existing emergency light lamp by designing a holder for emergency light lamp that switches ON automatically or manually when main power fails. The holder consists of battery that supplies power to the lamp and keeps charging when main power is present, at that time lamp will get ON or OFF as per the intensity of sunlight in that particular area. When battery gets charged upto 90%, it automatically stops charging to avoid overcharging and when battery gets discharged upto 10%, lamp will get automatically turned OFF to avoid deep discharging. So, when main power comes back then peak up time of battery will be less.

One more feature is developed in this holder of lamp so that the lamp can be used as night lamp too.

***Keywords*: Holder, Battery, Microcontroller, LDR, Power saving, Emergency lamp, etc.**

1.INTRODUCTION

Motivation:

Power failure (load shading) is a common phenomenon in most of villages in India. The need for an alternative source of illumination in our homes, workshops, offices, etc. has become a vibal option. Worst of all they are not reliable as batteries easily go bad due to overcharging and these batteries cannot be replaced as they are not in market.

Background:

The existing system of emergency lighting consists of the lamp that switches on automatically and manually when main power fails. Power to lamp is supplied by battery that keeps charging when the main power is present and lamp remains ON. When main power cut OFF then lamp gets ON through battery and discharges upto 0% (deep discharging).

Organization of report:

We are going to design a holder for emergency light lamp with extra features in the existing system of emergency light that switches ON automatically or manually when main power fails. The holder consists of battery that supplies power to the lamp and keeps charging when main power is present, at that time lamp will get ON or OFF as per the intensity of sunlight in that particular area. When battery gets charged upto 90%, it automatically stops charging to avoid overcharging and when battery gets discharged upto 10%, lamp will get automatically turned OFF to avoid deep discharging. So, when main power comes back then peak up time of battery will be less.

One more feature is developed in this holder of lamp so that the lamp can be used as night lamp too.

2. BLOCK DIAGRAM

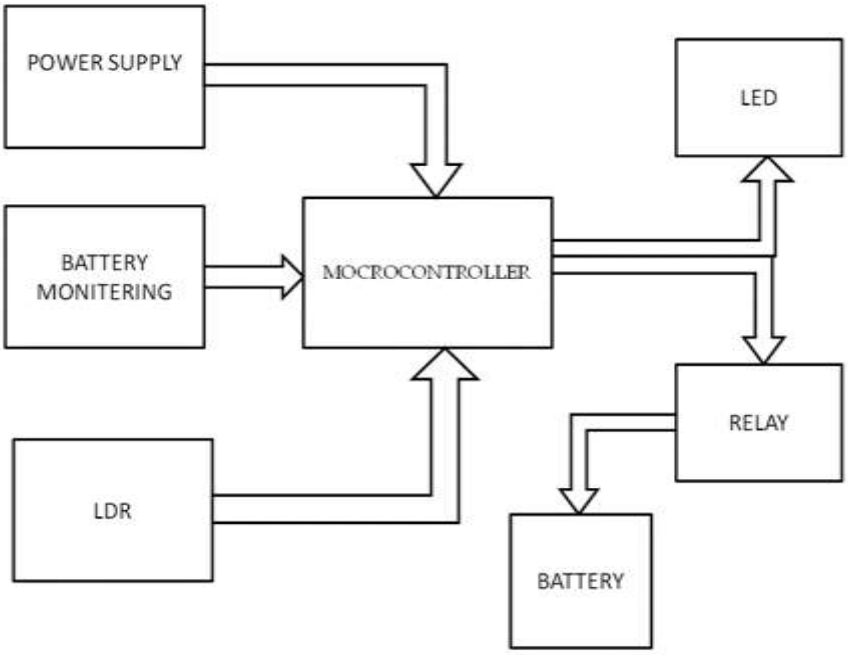

Fig.1 Block Diagram

Block Diagram Description:
Here, the 4 inputs are given to the microcontroller 1.Power supply 2.Battery monitoring 10% 3.Battery monitoring 90% 4.LDR (light dependent resistor).

1.1 Power Supply:
The power supply consists of SMPS (switch mode power supply) which is used to obtain 5V regulated DC output voltage from unregulated 230V AC input voltage. SMPS converts the input supply drawn from AC mains, firstly rectified, filtered, regulated.

1.2 Battery Monitoring:
All rechargeable batteries have their specific level of charging and discharging. They are likely to get damaged, if the battery voltage exceeds that level. Here is a simple monitor circuit used to indicate the state of battery by monitor them. The maximum limit for battery charging is 90% and for discharging is 10%.

1.3 LDR (Light Dependent Resistor):
LDR is an electronic component that has a variable resistance which is used to sense the absence and presence of light.These 4 inputs are given to the microcontroller ATTINY85. It is a high performance, low power based on advanced risk architecture. It has 8kb programmable flash. It is popular because of its compact size and features.The two outputs from microcontroller are given to relay and LED (lamp).

1.4 Relay:
Relay is used to connect or disconnect the battery from AC mains as per the requirement. Battery is connected to relay.

1.5 LED lamp:
It is a semiconductor device that emits the visible light when electric current passes through it. LED's of lamp turn ON or OFF as per the intensity of sunlight in that particular area.

3.Circuit Diagram:

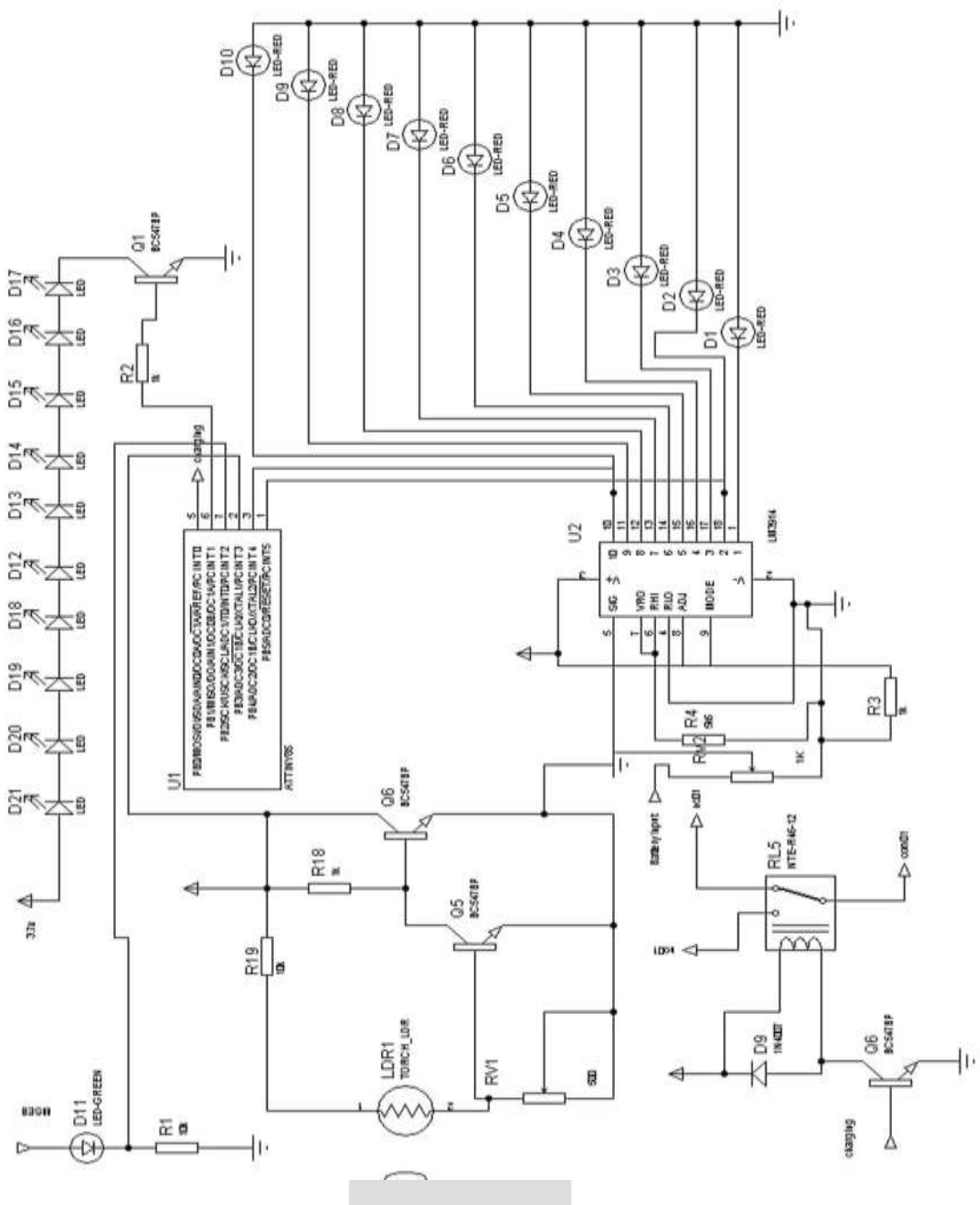

Fig.2 Circuit Diagram

Circuit Diagram Description:

The circuit of holder consists of microcontroller ATTINY85. It is 8 pin IC. One pin is Vcc and one pin is ground. Remaining six pins are used for input and output. Microcontroller has given 4 inputs and 2 outputs are taken from it. First input is taken from MSEB which is given to 7 no pin microcontroller through resistor.

Second input from LDR is given to 2 no pin of microcontroller. LDR senses the intensity of sunlight and turn the ON or OFF as per the intensity when it is at automatic mode. It can be kept ON manual mode also. When light level decreases, the resistance of LDR increases. As this resistance increases in relation to the other resistor, which has a fixed resistance, it causes the voltage drop across the LDR also increases. When this voltage is large enough (0.7V for a typical NPN transistor), it will cause the transistor to turn ON.

Another 2 inputs are given from battery monitoring circuit, one is from 10% and other is from 90%. Battery monitoring circuit consists of LM3914 IC. LM3914 IC is monolithic integrated circuit that senses analog voltage levels and drives 10 LEDs. This monitoring circuit monitors the charging level of battery. In this circuit, LEDs (D1 to D10) displays the capacity of battery in either dot mode or display mode. This mode is selected by the external switch which is connected to 9 pin of IC. 6 pin and 7 pin are

connected to the ground through a resistor. This resistors control the brightness of LEDs. Here, resistors R3 and RV4 form potential divider circuit. Here, pot RV2 is used for calibration.

Relay circuit is connected to battery monitoring IC LM3914. Relay circuit connects or disconnects the battery to the mains supply as per the charging level of battery in order to avoid overcharging and deep discharging of battery.

Two outputs are taken from microcontroller, from pin5 and pin6. Output from 5 pin is given to the battery for charging. Output from 6 pin is given to the LEDs of lamp through resistor and transistor. The lamp consists of 16 LEDs connected in series and this number of LEDs can be increased or decreased.

4.SIMULATION AND RESULT:

INPUT BATTERY MONITORING 10%	INPUT BATTERY MONITORING 90%	INPUT MSEB	INPUT LDR	OUTPUT CHARGING	OUTPUT LED
0	0	0	0	0	0
0	0	0	1	0	0
0	0	1	0	1	0
0	0	1	1	1	1
1	0	0	1	1	1
1	0	1	0	1	0
1	0	1	1	1	1
1	1	0	0	0	0
1	1	0	1	0	1
1	1	1	0	0	0
1	1	1	1	0	1

Fig.3 Table Of Logical Operation

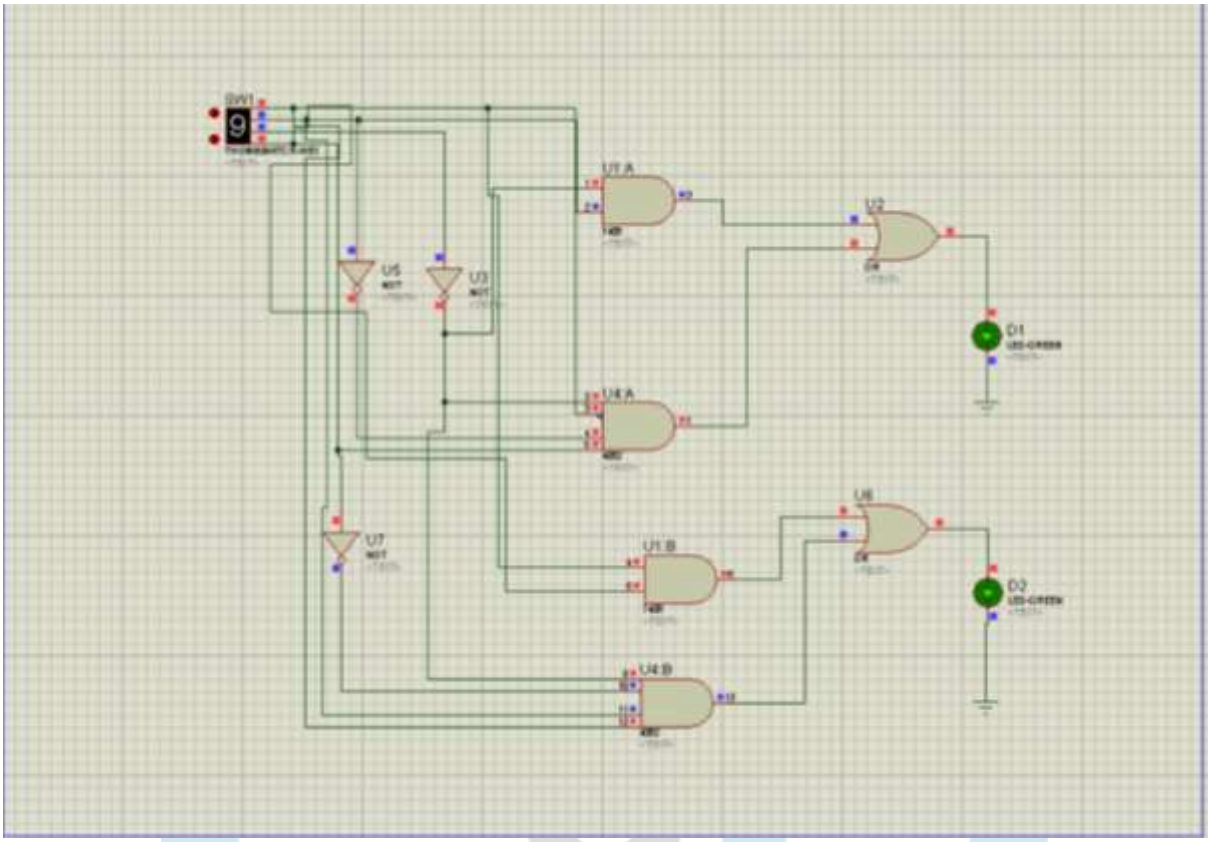

Fig.4 Simulation result for emergency mode when lamp is slamp is ON and battery is charging.

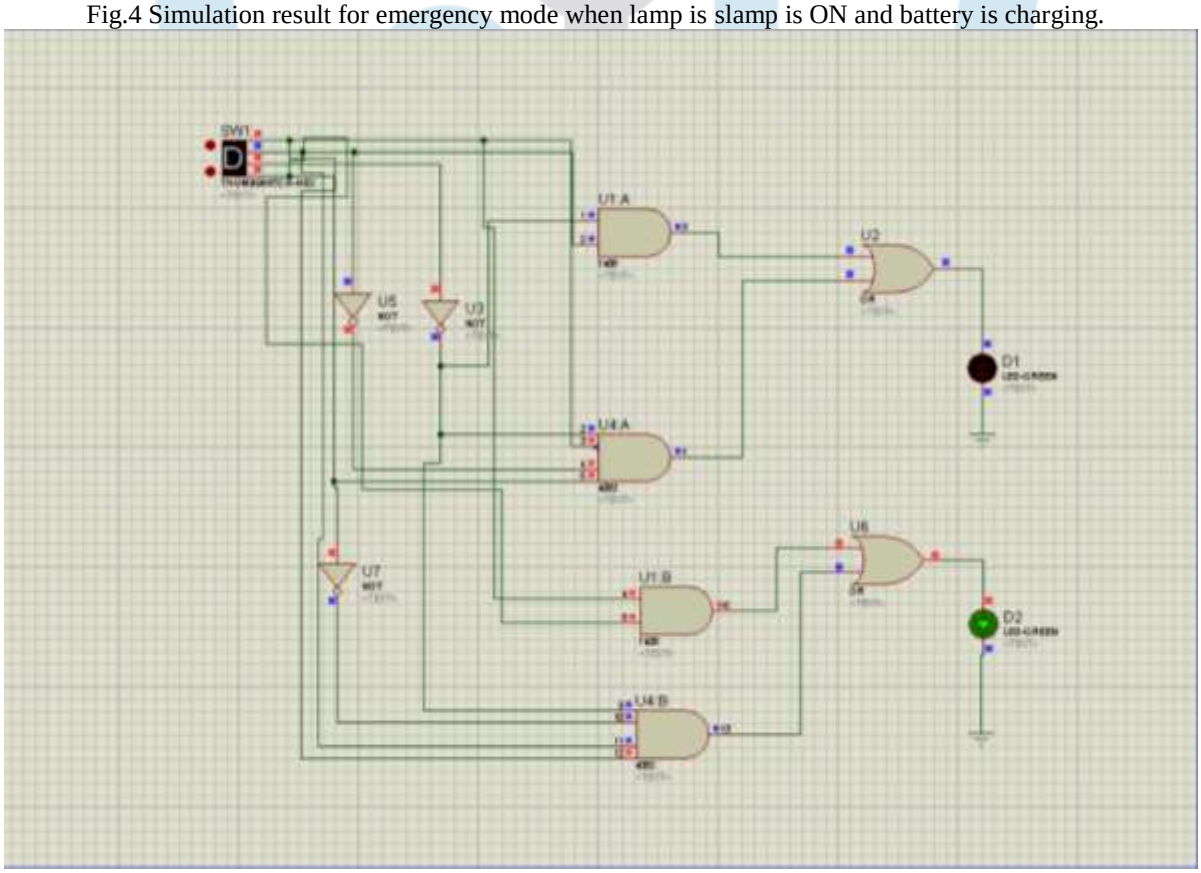

Fig.5 Simulation result for power saving mode when battery is charging and lamp is OFF.

5.FUTURE WORK:

Further development in this project can be done by enhancing the design of holder, so that the lamp can also be used as night lamp (zero watt bulb).

6.ACKNOWLEDGEMENT:
We would like to thank our guide Prof.S.G.Gholap of Electrical department for the valuable guidance and constructive suggestions,this helps us in making our project.

7.CONCLUSION :
This project can be concluded to be innovative for improvements in day to day life. The cost of circuit implementation is very less and it gives improvements in existing illumination system. The holder removes many drawbacks of existing emergency lighting system.

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