



EAST WEST UNIVERSITY

PROJECT

Department: Electronics & Communications Engineering

Course Name: Electronic Circuit –II

Course Code: ETE 214

Project Name: Battery Level Indicator Circuit

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Submitted to:

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Introduction:

Battery level indicator is a circuit that is used to check the battery life. We can easily recognize the battery level with the help of LED's. It uses a LM3914 driver IC use to drive 10 LEDs by passing through it sufficient amount of current. Brightness of LEDs is controlled by reference adjustable pin and reference out pin. A variable resistor is also deployed in the circuit to have variable input voltage at pin 5 of the driver IC. Since the driver IC has two modes of operation which is bar graph mode and dot mode, it enables us to have indication of the battery life either in bar form or in dot form. We can have colored lods to indicate state of the batteries like first three LEDs will indicate low battery. Green LEDs will indicate full battery. Thus by using various colored LEDs illustration of battery life will be made easy to understand. Cascading the driver ICs, we can increase the range of battery input in terms of voltage. In the below given block diagram we have 4 blocks. One is the power supply, other is the driver IC itself. We will have a led block and an input block. LEDs will glow according to the input given and the reference Input present. Power supply is ranging around 12 to 18V. Reference voltage is pre decided which 1.25mV. Any dc signal lying in the range of the power supply is judged and the level is indicated by the LEDs. The current through the LEDs is controlled by the internal adjustment.

Circuit Diagram:

In this circuit, the components are IC LM3914 and LED. In this circuit we use 10 green LEDs. We use 3 resistances according to 10K Ω , 3.9K Ω and 2.7K Ω . We use a potentiometer and a 12V battery.

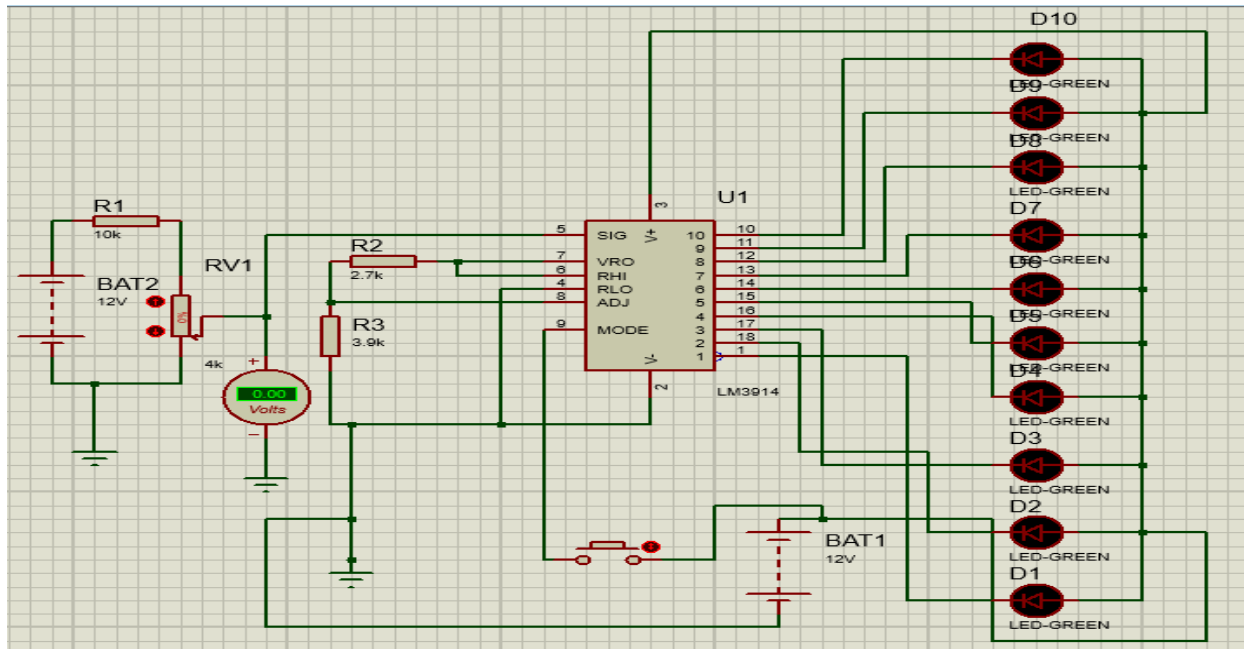


Figure 01: Battery Level Indicator Circuit.

Circuit Components:

- ❖ LM3914 IC.
- ❖ LED's -10 (Green).
- ❖ SPST Switch.
- ❖ Resistors (10K Ω , 3.9K Ω , 2.7K Ω).
- ❖ Potentiometer - 4K Ω
- ❖ Battery (12V to test).
- ❖ Connecting wires.
- ❖ DC voltmeter.

Circuit Explanation:

In this project, the whole circuit is designed & simulated by proteus-8 software. The heart of this battery level indicator circuit is LM3914 IC. This IC takes input analog voltage and drives 10 LED's linearly according to the input analog voltage. In this circuit, there is no need of resistors in series with LEDs because the current is regulated by the IC. In this circuit LED's (D1-D10) displays the level of the battery in either dot mode or bar mode. This mode is selected by the external switch sw1 which is connected to 9th pin of IC. 6th and 7th pins of IC are connected to the ground through a resistor. This resistor controls the brightness of LED's. Here RV1 POT forms potential divider circuit. Here, pot RV1 is used for calibration. There is no need of any external power supply to this circuit. The circuit shown here is designed to monitor 10.5V to 15V DC source the input. Now, adjust to the 4K Ω to get LED 10 glow (in dot mode) or LEDs up to 10 glow (in bar mode). The circuit will work even if the battery voltage is 3V. The operating

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Figure 02: Battery Level Indicator Circuit for low charge.

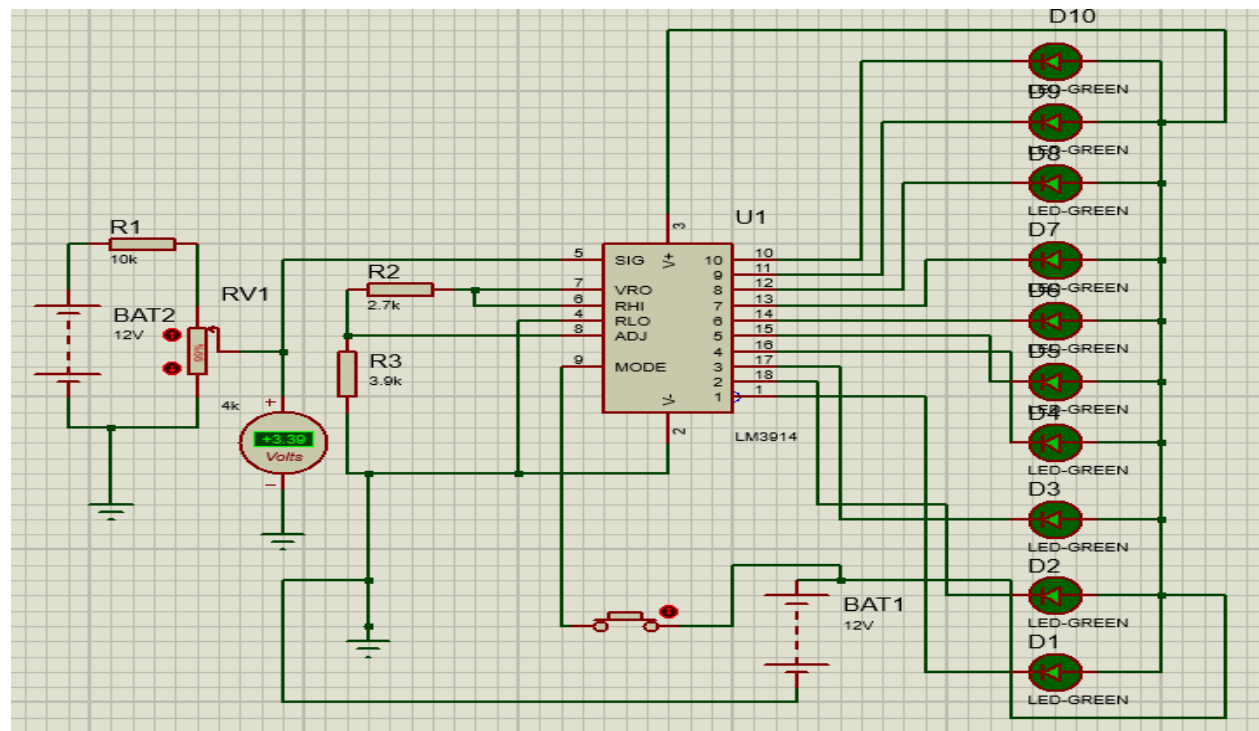


Figure 03: Battery Level Indicator Circuit for full charge.

Evaluation of Project:

Yes, I think my project will work & will perform than any alternatives. There is some reason behind that, the main criteria of our project are to prevent the use any electronics devices. This simple battery level indicator circuit is based on single IC LM3914 with few more discrete components. LM3914 is a monolithic integrated circuit which senses the analog voltage and derives 10 LED's providing a linear analog display.

Battery level	Percentage	Status of LEDs
1.2V	10	D1 - ON
2.4V	20	D1, D2 - ON
3.6V	30	D1, D2, D3 - ON
4.8V	40	D1, D2, D3, D4 - ON
6.0V	50	D1, D2, D3, D4, D5 - ON
7.2V	60	D1, D2, D3, D4, D5, D6 - ON
8.4V	70	D1, D2, D3, D4, D5, D6, D7 - ON
9.6V	80	D1, D2, D3, D4, D5, D6, D7, D8 - ON
10.8V	90	D1, D2, D3, D4, D5, D6, D7, D8, D9 - ON
12V	100	ALL LEDs - ON

a) Advantages:

1. A battery level indicator is with electronic appliances to arrange as to display, on an indicator, a real time voltage detected by voltage indicator.
2. Indicator indicates how much power the battery will be able to supply to electronic apparatus.
3. It is used to check the battery level with the help of LED's for example if three LED's, indicates battery capacity of 30 percent and if 10 LED's glow then it is 100 percent.
4. Easily indicate the battery level.
5. Enhanced version of this circuitry is the present mobile phone battery level indication system.

6. This circuit can be used in household applications like INVERTER. This circuit connected to inverter can help the users to know when to charge and when to leave the inverter idle.
7. Minimized version of this circuit can be also used for automobiles to indicate the battery level and low cost.

b) Disadvantages:

1. In case of voltage matching, correct level wouldn't be indicated.
2. If input voltage is higher than the calibrated voltage, for full scale input error will be shown.

c) Advantage of IC LM3914

1. In this user can easily select the dot or bar graph display just by changing a single pin.
2. This IC can drive LED's, LCD or vacuum fluorescent display.
3. You can cascade more IC's up to 100 steps.
4. This IC can also work on 3V power supply.
5. In this we do not require resistor with the LED's because current drive to LED's is regulated and programmed.
6. It will support wide temperature range from 0 degree to +70 degree Celsius.

Conclusion:

In this project our main theme is develop the battery level indicator circuit. We have succeeded in making the circuit and 12V battery which works fine. When the battery is fully charged all LEDs will light up. When the battery charge is gradually decrease then the LEDs light will turn off one by one. When there is no charge in the battery, the LED light will not work. So, we can use this circuit in electronics devices, vehicle's, medical environment and health devices etc.

Sources: <https://youtu.be/0xXlpp8UU0I>