

LINEAR INTEGRATED CIRCUITS

PROJECT REPORT

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Battery-Level Indicator using op-amp

Introduction

My name is Gaurav, roll number 194020 and I am a student of Bachelor of Technology (B.Tech) in Electronics and Communication Engineering at National Institute of Technology Hamirpur, Himachal Pradesh.

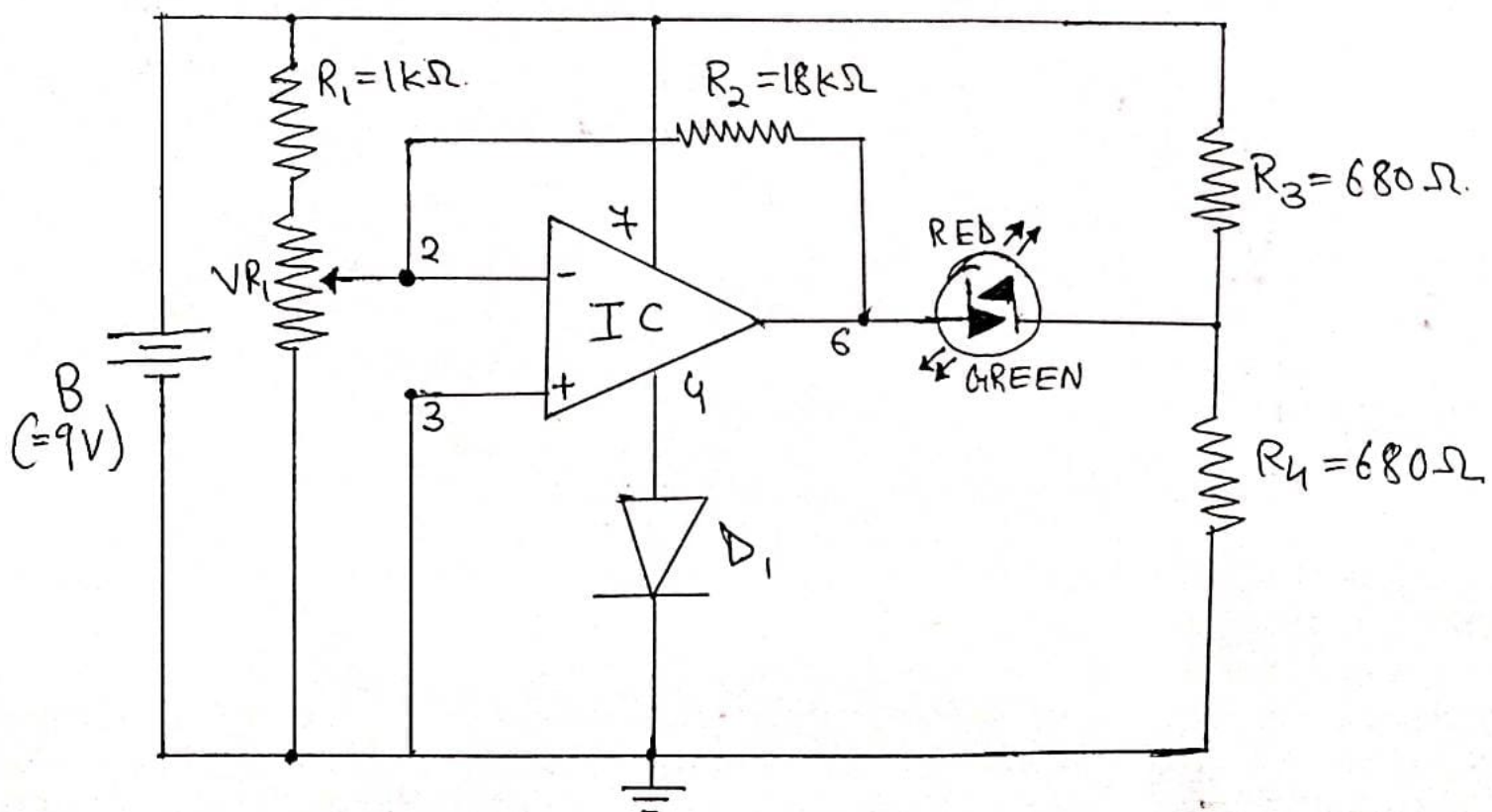
In the modern world we use the batteries in almost all the electronics gadget from our handheld mobile phones, digital thermometer, smart watch to electric vehicles, airplane, satellites and even in the robots. It is right to say that without the inventions of these electrochemical storage devices i.e Batteries, the life we are living full of gadget and electronic devices wouldn't exist. There are many different types of batteries like Li-ion, Lead-Acid etc and with the rising technology the new types of batteries are invented which have higher energy storage capacity and high operational temperature ranges. But this also leading to the more e-waste because there are batteries which are rechargeable and other not and all rechargeable battery has their specific level of charging and discharging, they are likely to get damage if the battery voltage exceeds that level.

In this project I had made a **Battery-Level Indicator** using operational amplifier LM741 to indicate the state of battery by monitor them. Rechargeable batteries should not be discharged below a certain voltage level. This lower voltage limit depends upon the type of the battery. This simple circuit can be used for 9V batteries to give an indication of the battery voltage falling below the preset value. The indication is in the form of a flickering LED.



Working of Project and circuit

Circuit Diagram:



Components Used in the circuit :

Name of the Component	Specification	Quantity
Op- Amp	LM741C	1
Resistors: (all 1/4-watt, ± 5% Carbon) (R1)	1 KΩ	1
(R2)	18 KΩ	1
(R3 & R4)	680 Ω	1
Potentiometer (VR1)	10k	1
Diode	1N4007	1
Bi-Color (Red-Green) LED	—	1
Battery	9 Volt	1
Breadboard		1

Working of the circuit :

The circuit of battery voltage monitor is fabricated and designed around op-amp IC LM741 configured as comparator. Where bi-color LED is used as indicator and indicates voltage level state of a 9V battery. Resistor R1 with potentiometer VR1 is used as potential driver of voltage monitor circuit. Adjust VR1 such that LED begins to emit GREEN light when 6.5V DC is connected.


When voltage level rise above 9 volts, the output from IC goes low as a result LED begins to emit RED light. Similarly, when the voltage fall below a preset level (6.5 Volt) the output goes high and the LED start to emit GREEN light. Resistors R3 and R4 is used as current limiter of LED.

The Link of the project video is given below:

https://drive.google.com/drive/folders/1xixW9ETzzz1Bwxdwxi6_QYnhEC3X3jtK?usp=sharing

Possible Application of the project

The possible application of this project can be:

1. With more modification of the circuit , it can be used in car to check the battery level.
 2. To indicate the state of battery by monitor them.
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Budget of the project

Components	Price	Quantity	Cost
Op amp IC LM741	25	1	25
1 kOhm Resisitor	2	1	2
18 kOhm Resisitor	2	1	2
680 Ohm Resistor	2	2	4
Potentiometer - 10k	35	1	35
Diode	5	1	5
9v Battery	30	1	30
Bi-Color LED	25	1	25
Breadboard and Connecting Wires	260	1	260
		Total Cost	388

