AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH

ESHOP PORJECT
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Submission type: Solo

Cell Phone Detector & Battery voltage monitor.

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Introduction:

The most common electronic equipment used now-a-days is Cell Phone or Mobile Phone. With advancement in communication technology, the requirement of cell phones has increased dramatically. A cell phone typically transmits and receives signals in the frequency range of 0.9 to 3GHz. This article provides a simple circuit to detect the presence of an activated cell phone by detecting these signals.

Cell Phone Detector Circuit Applications

- This circuit can be used at examination halls, meetings to detect presence of mobile phones and prevent the use of cell phones.
- It can be used for detecting mobile phones used for spying and unauthorized transmission of audio and video.
- It can be used to detect stolen mobile phones.

Components of Cell Phone Detector Circuit:

- Operational Amplifier
- NPN Transistor
- IC Jacket
- LED
- Capacitor
- Resistors
- Dc Battery

Working Principle:

✦ This circuit consists of op-amp with some active-passive components.

✦ A LED is used for an indication of the presence of a cellphone. Op-amp is configured as Frequency Detector and its output is connected to a LED using NPN Transistor.

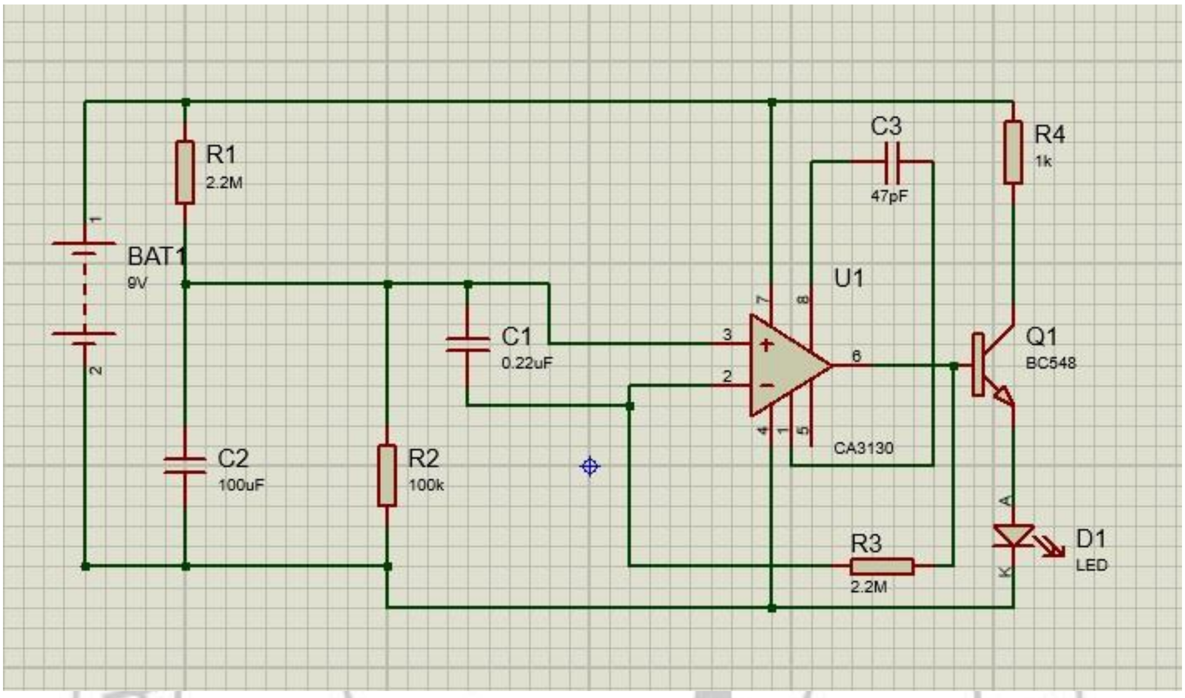
✦ A 0.22uF capacitor the RF signal from any transmitting device namely a phone. The capacitor leads act as a small GHZ loop to capture the transmitting RF signals from a mobile phone.

✦ CA3130 (op-amp) functions as a current to voltage converter with a 0.22uF capacitor connected between its inverting and non-inverting input channels.

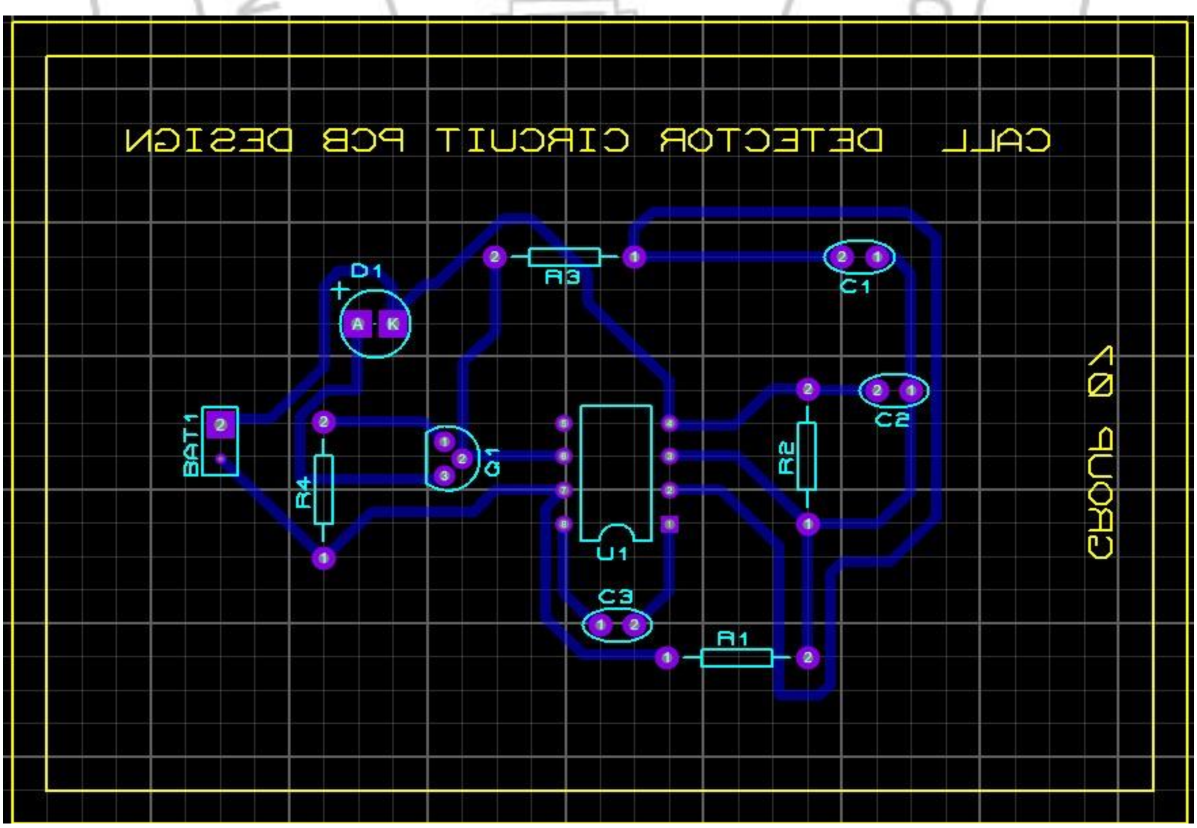
Schematic Diagram, PCB Layout and 3D View:

Schematic Circuit Diagram, PCB layout, 3D view for Phone Call Detector Circuit are given below:

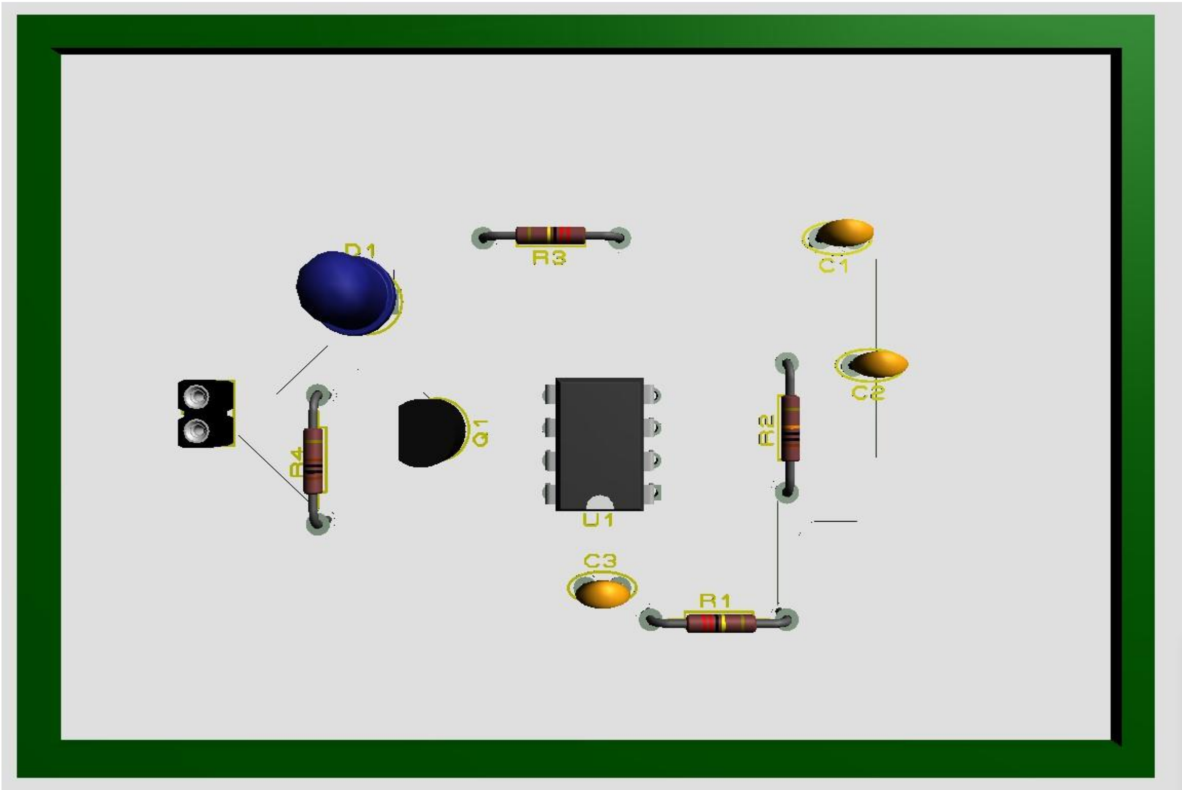
Schematic Diagram:

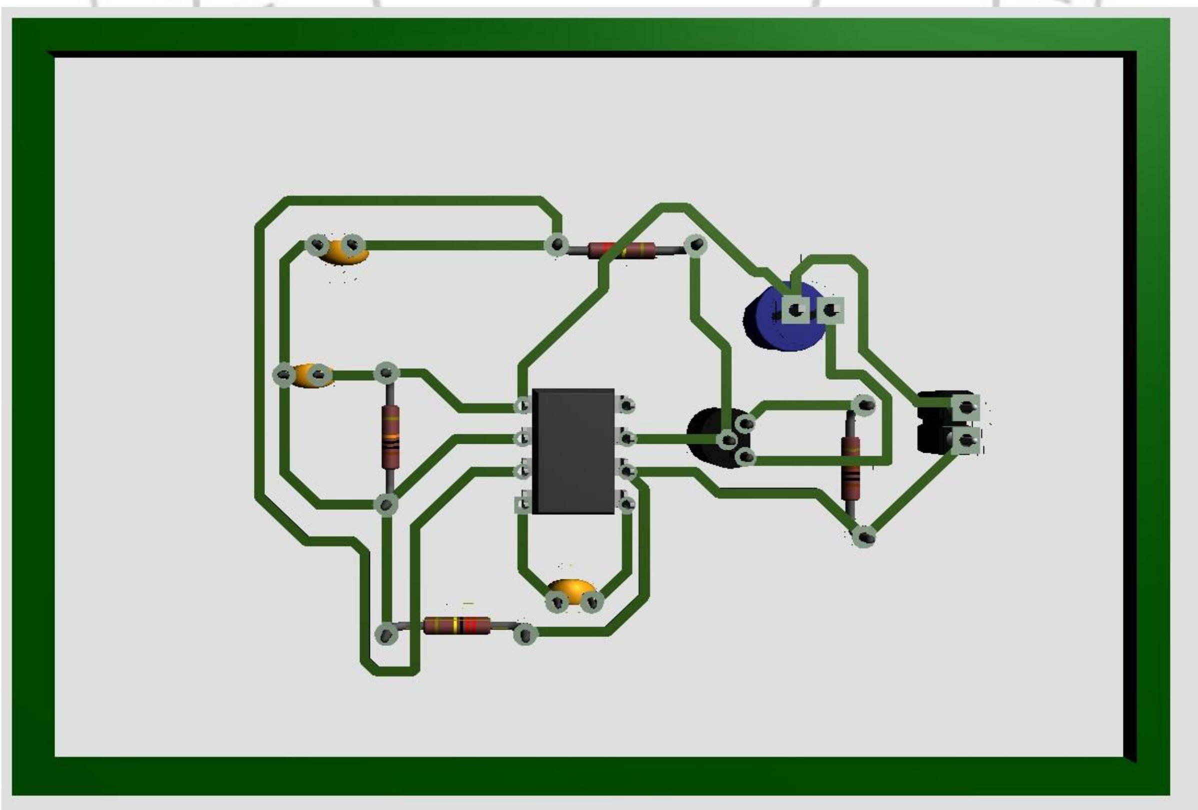


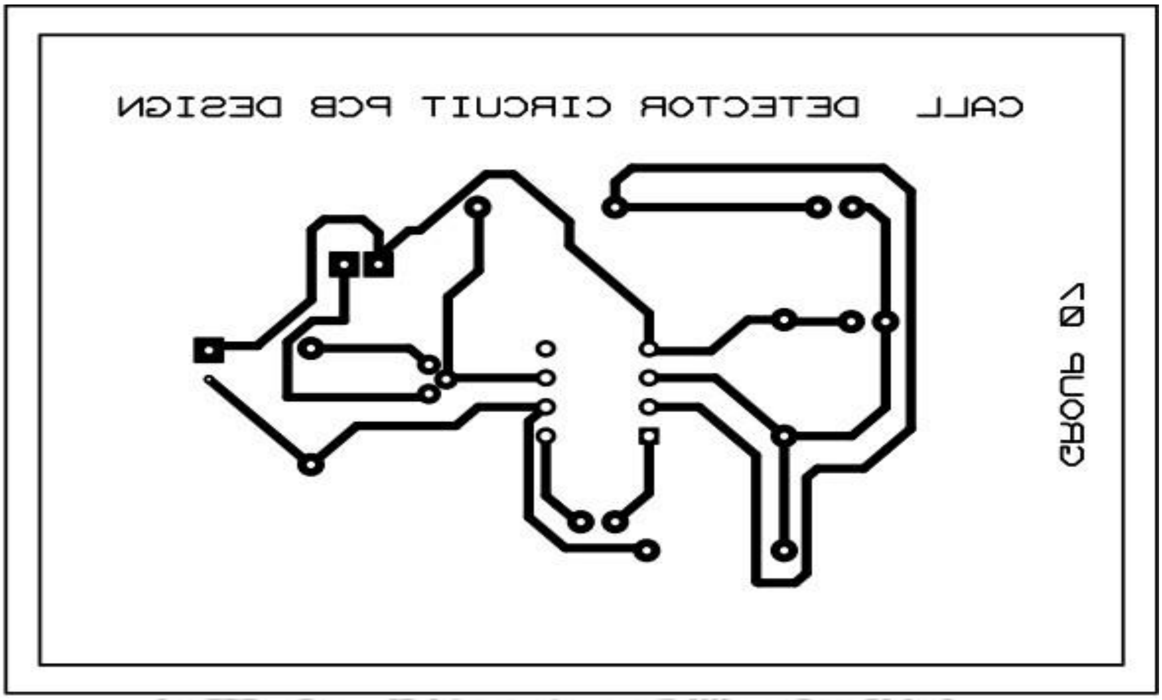
PCB Layout:



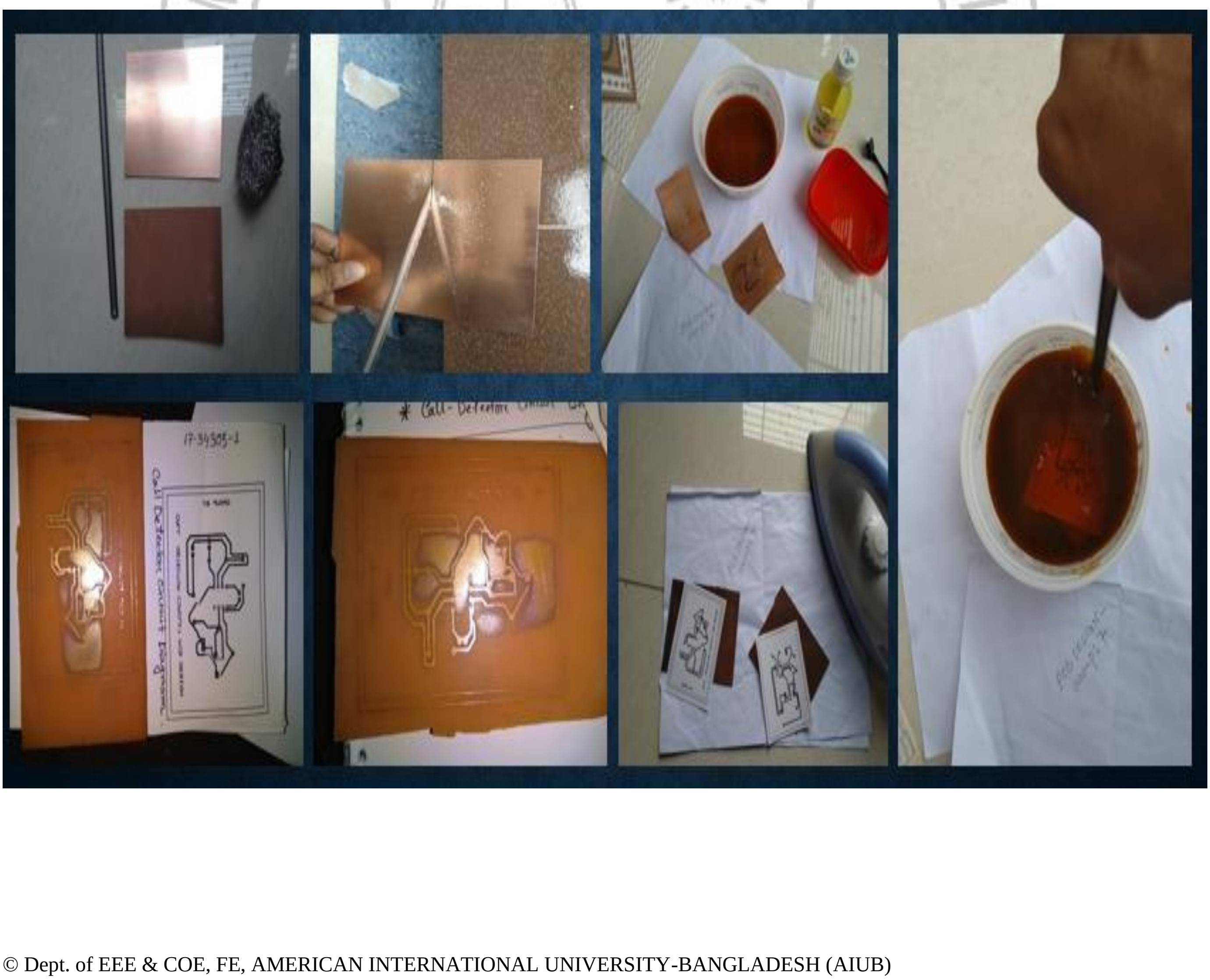
3D view (Top, Bottom, PDF layout)







Home Made (PCB) hardware design:



Cost analysis:

This pandemic situation, We could not buy all the components. But Some of the components we bought through online shopping website. Here is the list of the cost-

- PCB Copper Clad Board- “70*100*1.5mm” – Tk 345
- Ferric Chloride- Tk 290
- Print Paper- Tk 20
- Board Cutter- Tk 35
- Hand Gloves- Tk 30
- Others- Tk 170

Here is a list of the components that we could not buy in this pandemic situation.

- LED- Tk 10
- Capacitor (3 pc)- Tk 10
- Resistor (4pc)- Tk 10
- Op-Amp (CA3130)- Tk 80
- NPN Transistor (BC548)- Tk 30
- Battery (9V)- Tk150

The components that we bought and the components that we found out the price through analysis on the some website being priced.

Total cost : = 1,180 Taka

Conclusion:

Mobile phone technology is gaining new data capabilities very rapidly. This portable mobile transmission detector that senses the presence of an activated mobile cell phone from a distance of 1m to 1.5m can be used to prevent instances mentioned above and also the use of mobile phones in examination halls, confidential rooms etc.
So, Eventually we were able to successfully perform this experiment.

Introduction:

The circuit of battery voltage monitor is fabricated and designed around an op-amp IC LM709 configured as comparator. Where bi-color LED is used as indicator and indicates three voltage level state of a 12V battery. Resistor R1 with potentiometer VR1 is used as potential driver of voltage monitor circuit. When voltage level rise above 13.5 volts, the output from IC1 goes low as a result LED begins to emit RED light. Similarly, when the voltage fall below a preset level (10Volts) the output goes high and the LED start to emit GREEN light. Resistors R3 and R4 is used as current limiter of LED.

COMPONENTS :

- **PCB**
- **LED Light**
- **Resistors**
- **Battery 12v**
- **Operational amplifier**
- **Diode**

Working Principle:

- The circuit of battery voltage monitor is fabricated and designed around an op-amp IC LM709 configured as comparator.

- LED is use for Indicator.

- The LED indicates three voltage level state of a 12V battery.

- Resistor R1 with potentiometer VR1 is used as potential driver of voltage monitor circuit.

- When voltage level rise above 13.5 volts, the output from IC1 goes low as a result LED begins to emit RED light.

- when the voltage fall below a preset level (10Volts) the output goes high and the LED start to emit GREEN light. Resistors R3 and R4 is used as current limiter of LED.

Need of Battery voltage monitor:

- It increase battery life – By tracking the level of battery voltage we can understand when the discharge a battery from charging if the voltage is very high. It will help increasing the battery life.

- We can monitor battery health – With the help of battery voltage monitor we can monitor the voltage which is getting into battery and certainly we can monitor battery health.
- It can increase charging capacity – By monitoring the charging voltage we can improve battery life and keep monitoring the battery health, it also increasing the charging capacity.
- Reduce battery draining – If the proper voltage of charge the battery get then the battery draining issue will be solved.
- Fix over heating issue – If we want to preserve a good by the help of battery then keep tracing of voltage the battery get is very important. High voltage can make a battery give much power that it can over heat.
- Increase overall device performance – If a battery can always get proper voltage, then the life cycle of a device which is run with battery will be improved.

Application:

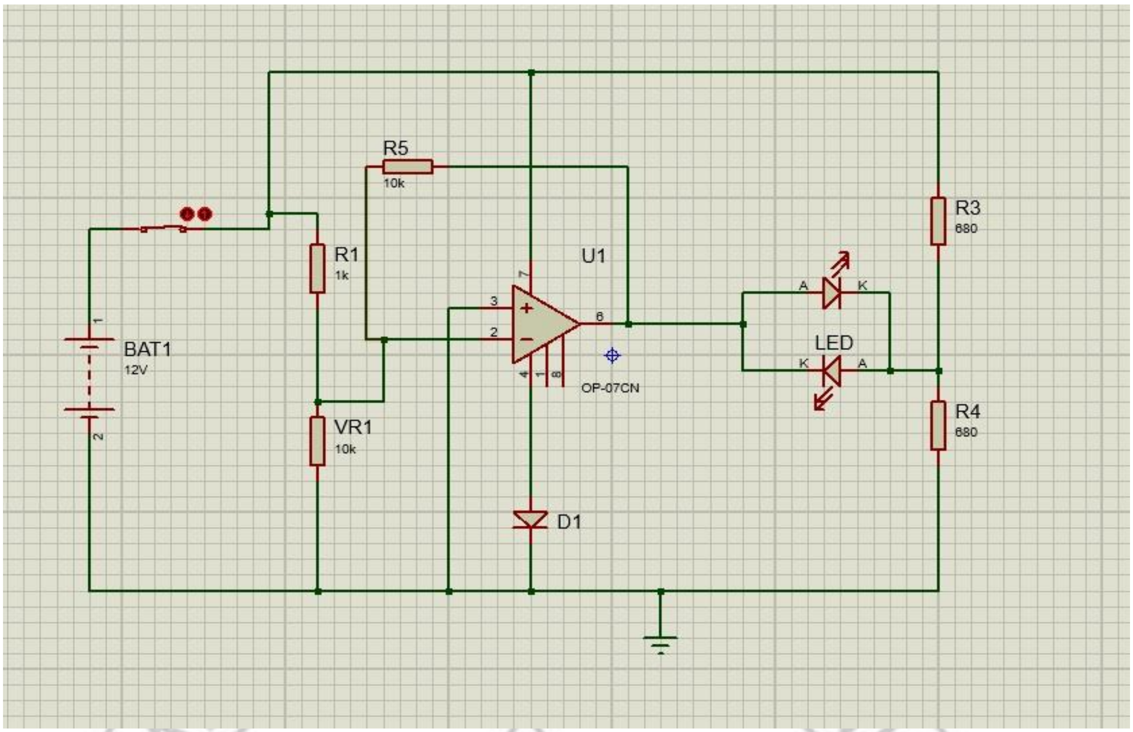
We use an LM339 Quad Comparator 14pin IC as the base of this circuit and a few parts include two resistors, LEDs, 10K-potentiometer without capacitors. When connects the probe input into the source, 9-volt battery. The current get in the circuit. Two pins are important to see right now.

- The positive supply pin is pin 3
- Negative supply pin is pin 12

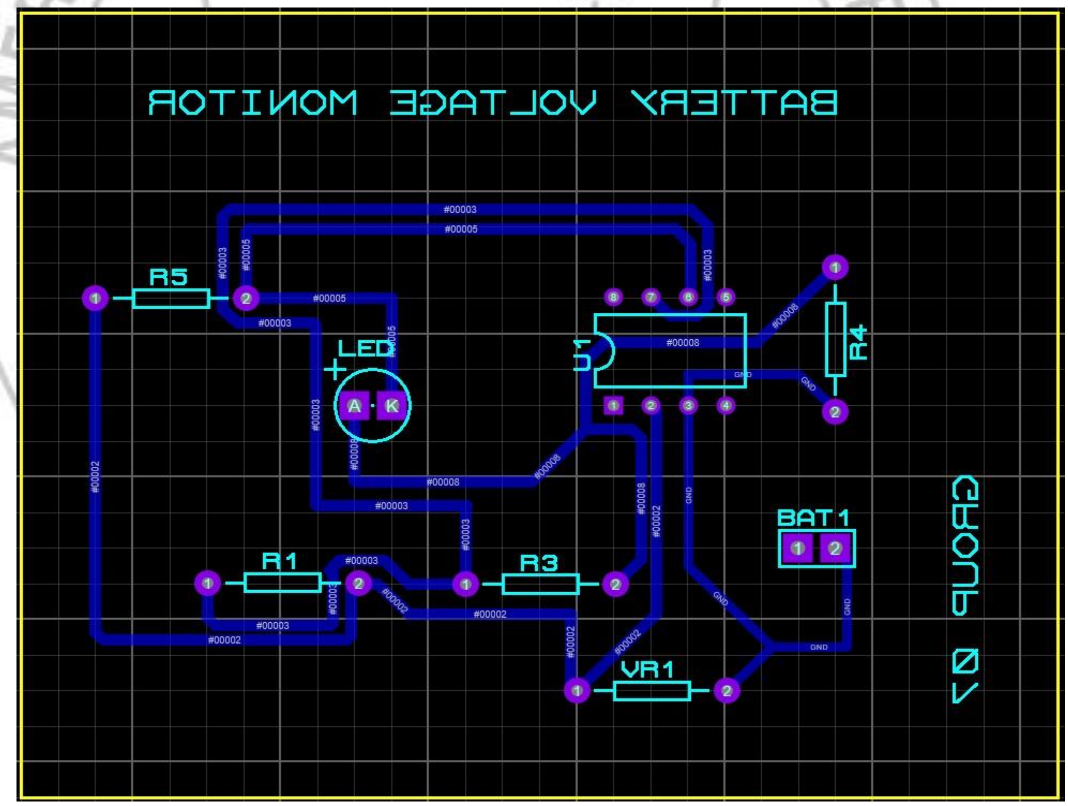
At the same time, the battery current will flow through to a VR1 to the input pin 5 of IC1. Then, another way, R1 passes the current to limit in save level for the 6V Zener diode at pin 4. It has the reference voltage. Both ways are compared the voltage inside IC1. The LED1 is an indicator of the circuit. R2 controls the proper current through them. When the input voltage is higher than 6-volts. It will have a high voltage state at output. But LED1 will still not works. Because it’s legs are connected to the positive supply and output pin. But when the input voltage is lower than 6-volts. Then, it makes LED1 glow brightly. Which we can set the level voltage input with adjusted sensitivity of the circuit by control VR1.

Schematic Circuit Diagram, PCB Layout, 3D view for Battery Voltage Monitor are given below:

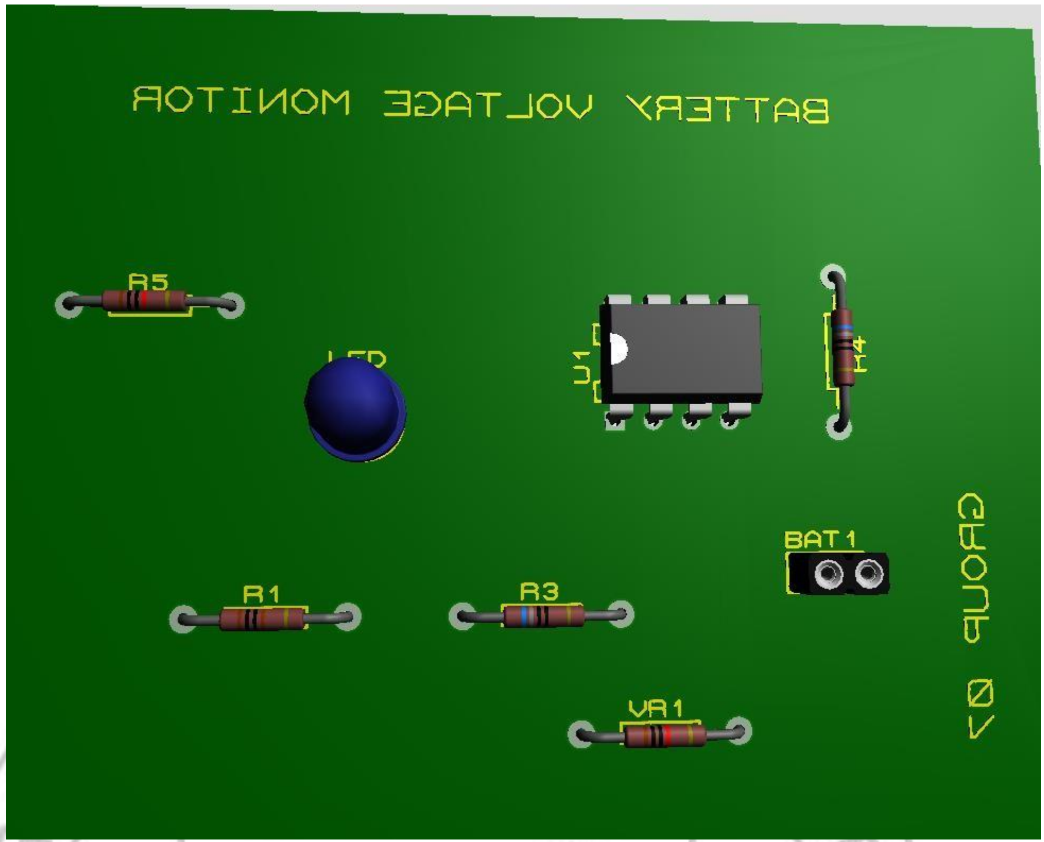
Schematic Circuit Diagram:

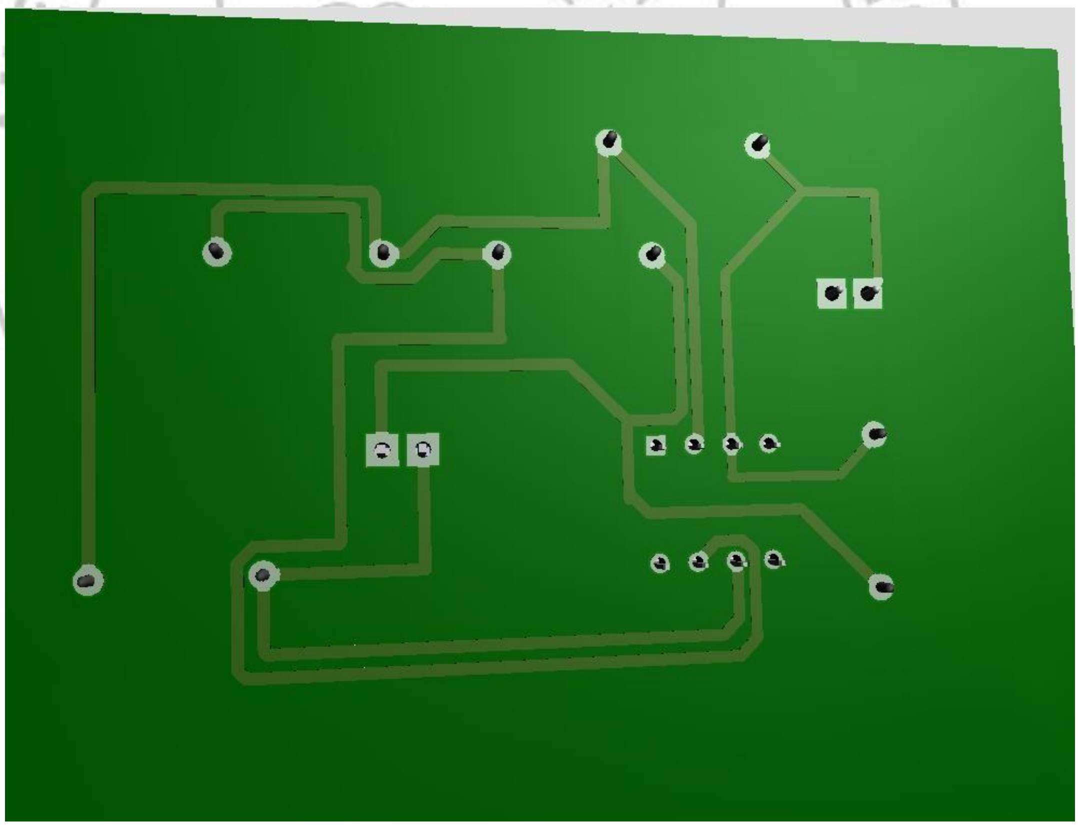


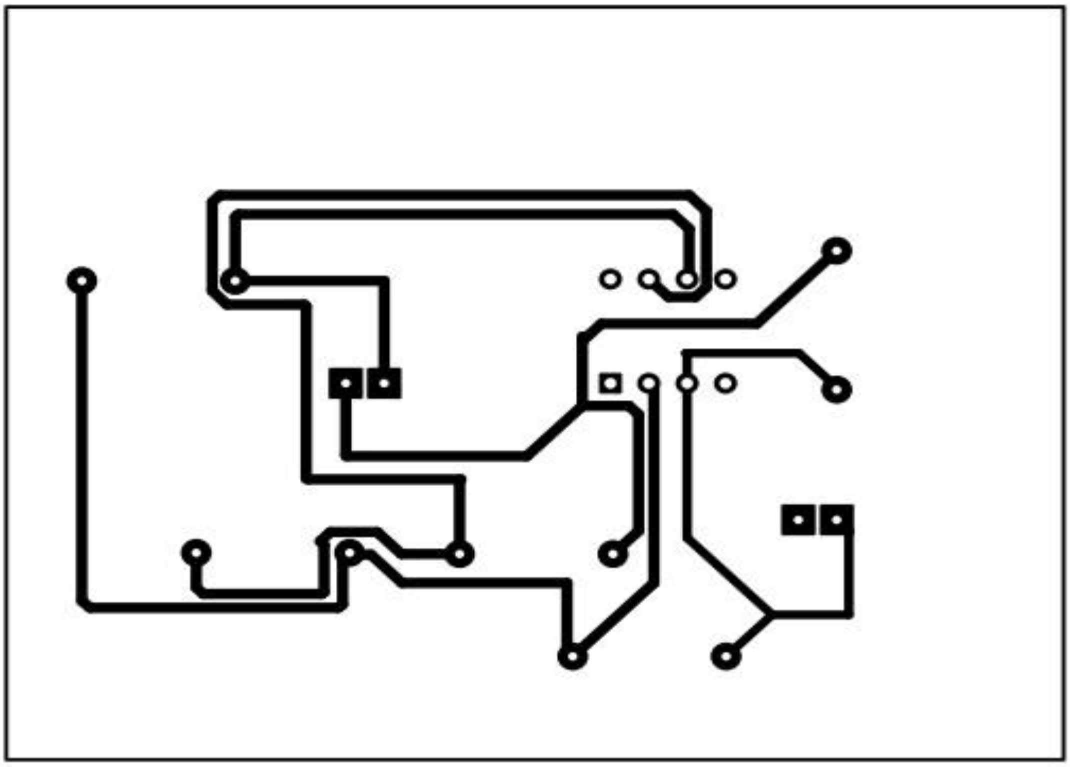
PCB Layout:



3D View (Top, Bottom, PDF layout):


BATTERY VOLTAGE MONITOR
R5
U1
R4
BAT1
R1
R3
VR1





Scope:

The BVM is an ultralow power ten LED battery voltmeter circuit that is optimized for monitoring charged 12V battery systems. So it is like an analog voltmeter which continuously measures or monitors the status of the battery and display the result by glowing the LEDs of different colors. So the user must know the meaning the LED colors i.e. he should know which color represents how much voltage drop. So if we can make the display digital, then the user interface will definitely increases. But eventually the cost will also increase. Again, since the design was constructed to monitor the car battery, it will be very handy if we can attach the circuit on the car dash. So further research and planning also would be placed on the location of the BMS with respect to where the ON/OFF switch and indicator light would be installed on the car dash. Similarly during testing we noticed that the inverter output power changes with component specifications. That’s why there is a possibility of increasing the output power level of the inverter if we can devote more time on testing the components.

Limitations:

This battery level indicator works only for small voltages. This circuit is theoretical and may require some changes to work in practical.

- It is a rather crude and basic method of approximating the voltage of the battery and it can further be modified it to read a range of the voltage to our choice with adding an additional resistor in series with the potential divider connected across the 5.1V Zener diode, in this way, we can get more accuracy on a smaller range so that we can identify more voltage levels across a smaller range for real-world applications like for a lead-acid battery.
- We can also interface different colored LEDs for different voltage levels and if we want a bar graph. We have only used a single LM324 in this circuit to keep it simple, we can use n number of Comparator ICs and with n resistors, in series with the reference voltage Zener diode, we can have as many reference voltages to compare against as we want which will further increase the accuracy of your indicator.

<u>Gant Chart for the time distribution:</u>

Date / Task	Jul 14	Jul 16	Jul 28	Jul 30-Aug 07	Jul 31 – Aug 05	Aug 08-Aug 12	Aug 13	Aug 14	Aug 14
Topic selection									
Preparing proposal reports & submission									
Schematic design									
PCB Materials Order									
PCB layout & 3D view design									
Real life PCB implementation									
Final Check									
Presentation									
Project submission									

Conclusion:

We hereby conclude that, in our project the main aim was to develop “Battery Voltage Monitor”. We have succeeded in making it and tested in a 12V battery which works fine. Further we have tried to add some additional circuitry to our project, so that besides monitoring it also provides some sort of management and utilization of the battery. There is only one dedicated lead-acid battery monitoring IC that we have found so far. Battery monitoring could also be implemented using a microcontroller, which we will also be looking into, but to get a reasonable accuracy then a better resolution ADC would be required rather than the 10-bit ADC incorporated within most microprocessors.
This project is a stepping stone to a cheaper and efficient battery monitoring system. We have learned a lot’s of new things while doing the project to make a battery voltage monitor.