SYMBIOSIS
INSTITUTE OF TECHNOLOGY

MOBILE SIGNAL DETECTOR

Mini Project in Electronic Circuits

Group members:

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3. Introduction to the Project:

Mobile phones are the most common electronic equipment now-a-days used in one's day-to-day life. With advancement in communication technology, the requirement of cell phones has increased dramatically. The typical range of frequency a mobile phone emits during transmission and receiving of signal is between 0.9 to 3GHz. With these advancements of technology and wide usage of it among many people worldwide the rate of misuse of this technology also increases. To monitor these, circuits like Mobile detectors are designed.

These circuits detect the mobiles in the vicinity by identifying RF (Radio Frequency) Signals. When an inductor is placed near the RF signal source, it receives the signal through mutual induction. This low power signal can be amplified and used to power any indicator like an LED in this case. In normal conditions, when there is no RF signal, the voltage across the diode will be negligible. Even though this voltage is amplified by the transistor amplifier, the output voltage is less than the reference voltage, which is applied to the inverting terminal of the comparator. Since the voltage at the non-inverting terminal of the OPAMP is less than the voltage at the inverting terminal, the output of the OPAMP is a low logic signal.

Now when a mobile phone is present near the signal, a voltage is induced in the choke and the signal is demodulated by the diode. This input voltage is amplified by the common emitter transistor. The output voltage is such that it is more than the reference output voltage. The output of the OPAMP is thus a logic high signal and the LED starts glowing, to indicate the presence of a mobile phone. The circuit has to be placed centimeters away from the object to be detected.

In this way a Mobile Detector is used to detect the presence of mobile phones. The application of these mobile detector circuits are listed below.

4. Applications:

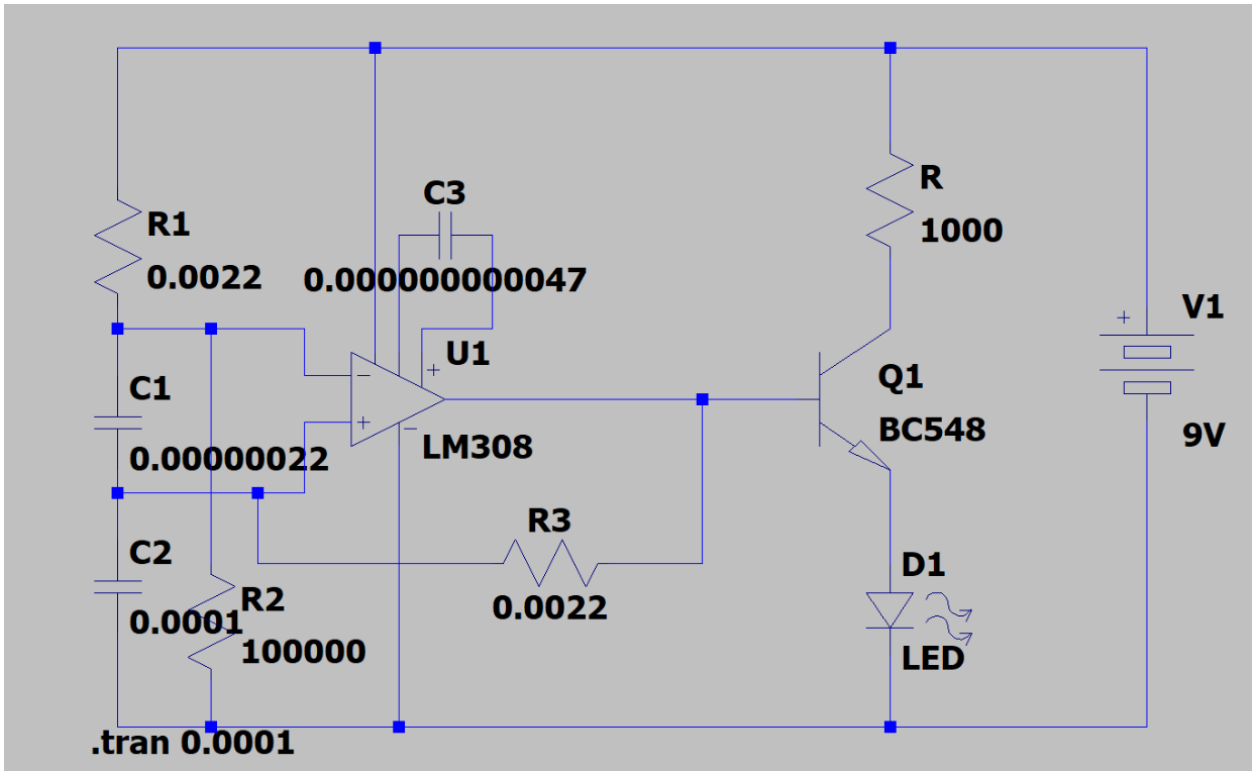
Mobile phone detectors have a wide range of applications in various sectors. The most used among them are in the fields of defense as well can be used in daily life. Some of these are listed below;

- Detecting mobile phones which are used for spying or unauthorized transmission of audio and video.
- Detecting stolen or lost phones in the vicinity of the circuit.
- This circuit can be used at examination halls, meetings, etc to identify the usage of mobile phones and to restrict them.

5. Components Used:

1. IC CA3130
2. Transistor BC548
3. Resistor 2.2M Ω
4. Resistor 100K Ω
5. Resistor 1K Ω
6. Capacitor 100 μF (50V)
7. Capacitor 0.22 μF
8. Capacitor 47pF
9. LED (Light Emitting Diode)
10. Battery 9V
11. Battery Clip 9V
12. Breadboard
13. PCB Board

6. Circuit Schematic diagram

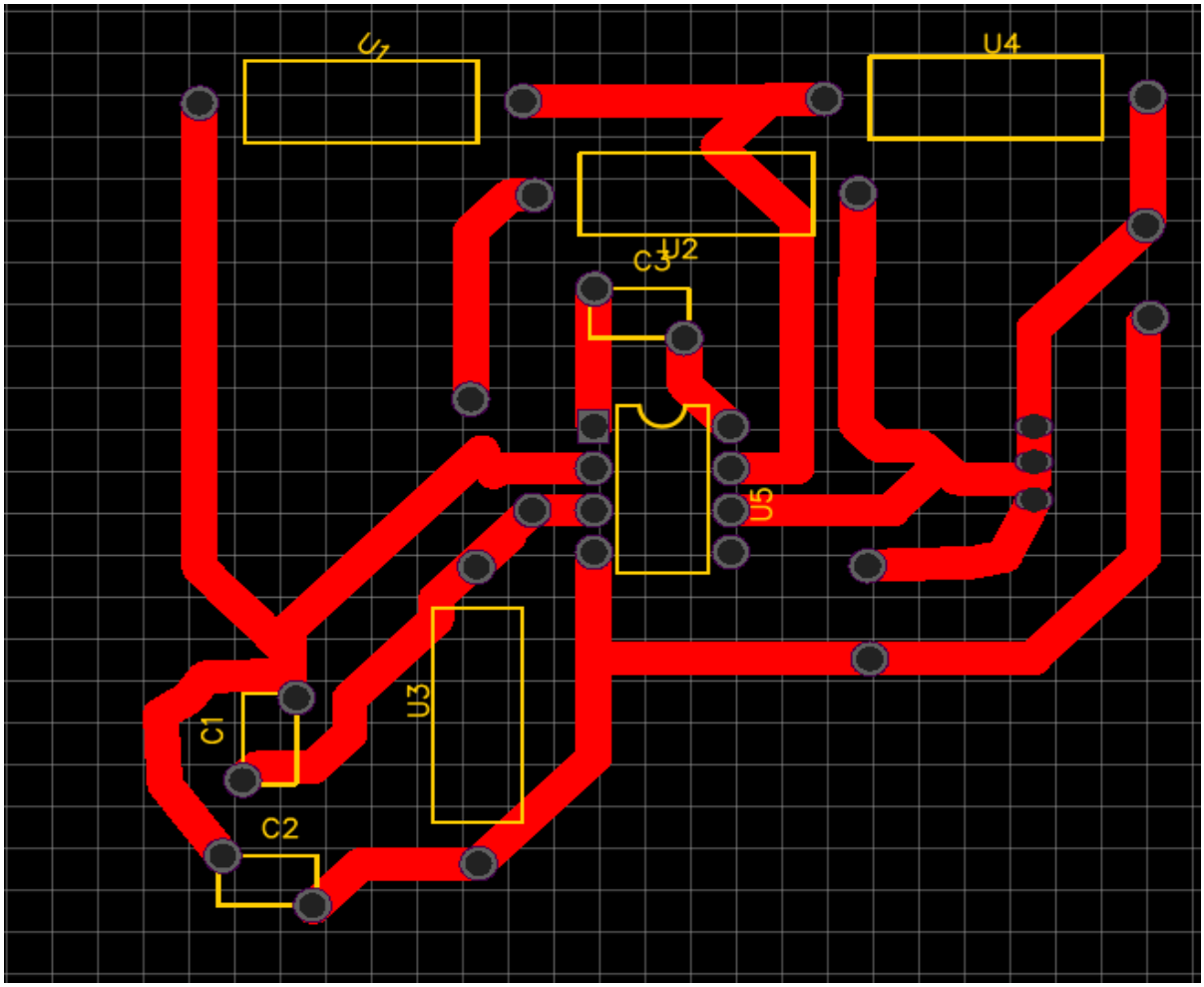


Circuit as simulated on LTSpice

7. Working Principle:

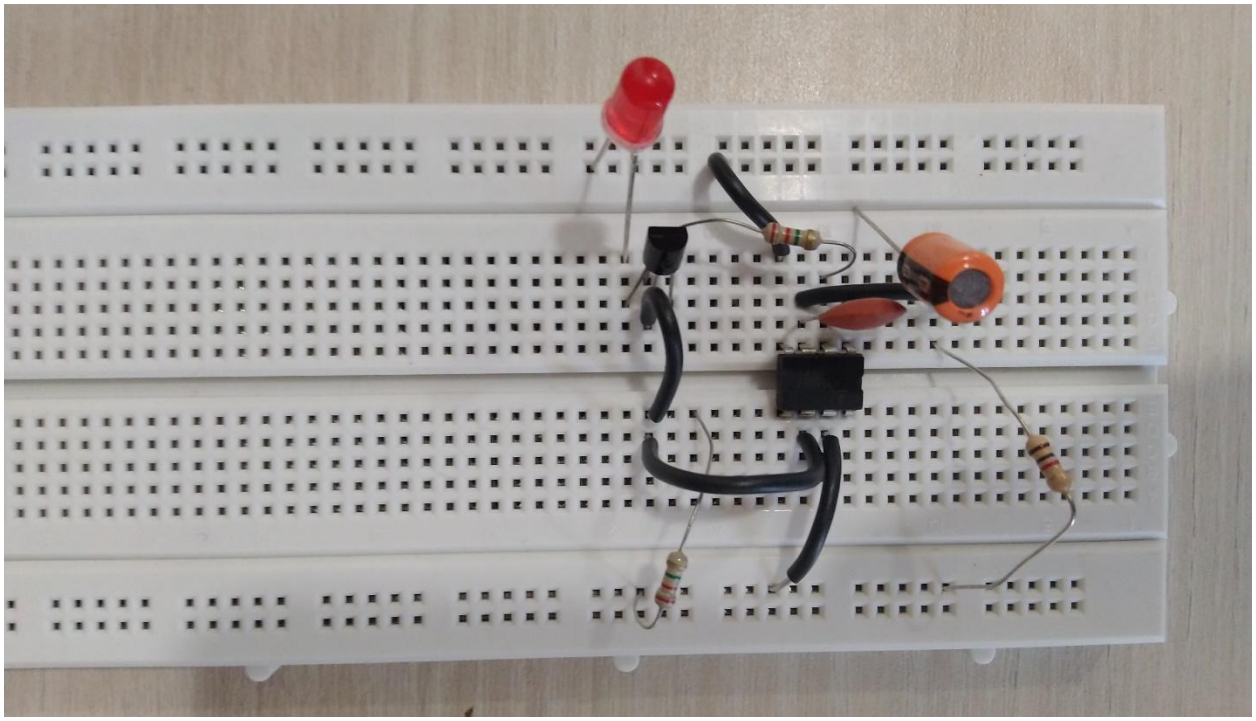
Cell Phone signal detector is a device that is used to detect if a cellphone in a given range is using radio frequency communication. For high technology security reasons a lot of institutions require this type of a system so that confidential information cannot be given out at any cost. A cell phone detection system like this uses an integrated circuit which has bugs fitted in it which recognizes radiofrequency in conversation mode of a cell phone within a certain range and alerts the system that establishes it in a network by either a beep or an LED glow in this case. An active mobile phone transmits this frequency in the form of sine waves passing through space which is picked up by this detection system.

8. PCB Layout:



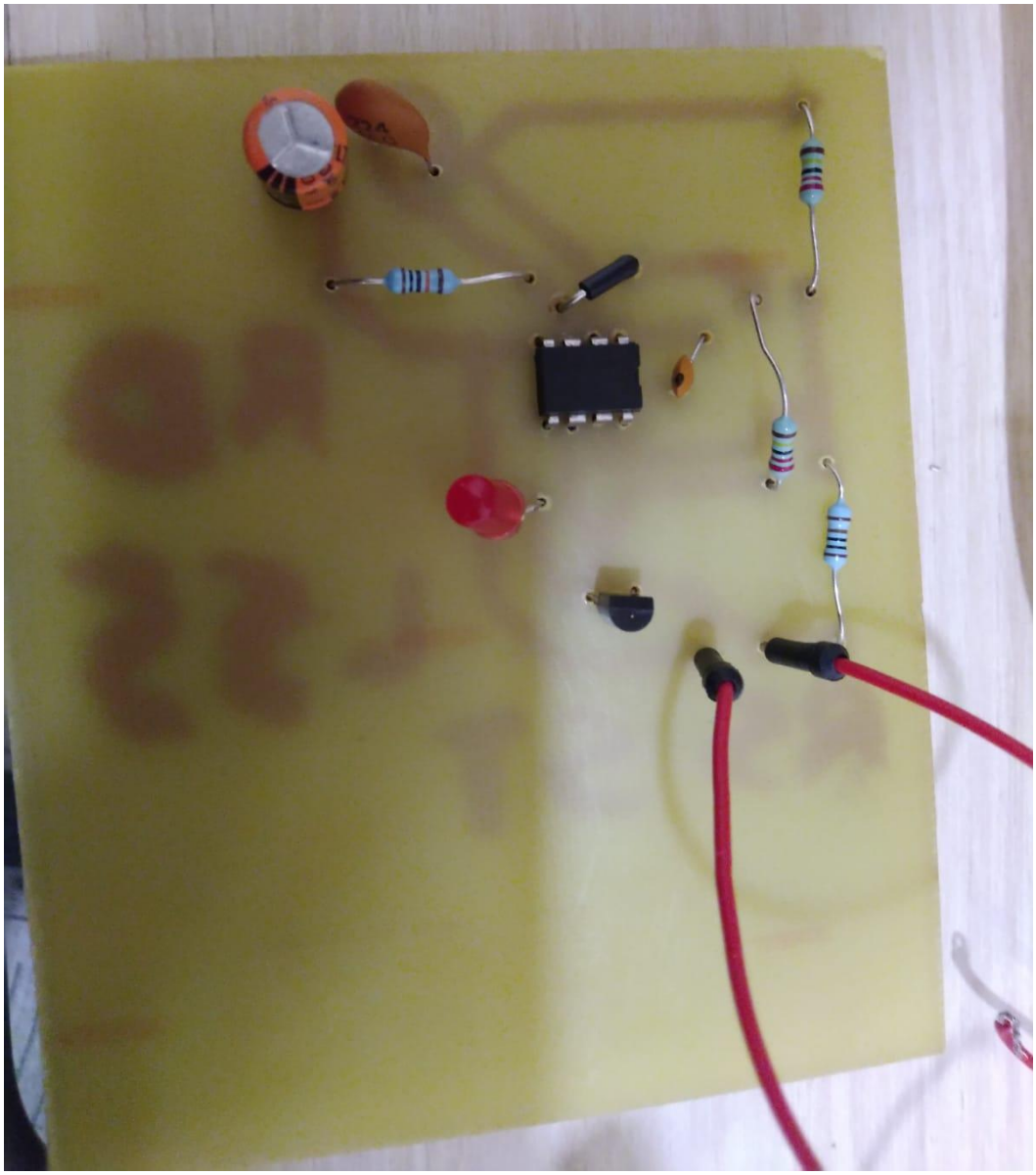
PCB design on EasyEDA

9. Testing and Validation:



Breadboard mounted circuit

PCB:



PCB after soldering

YouTube URL of working project video:

https://youtu.be/h3rB9Q7v0Mg

10. Conclusion & Inference:

We have learnt how to create and design a Printed Circuit Board, simulation of a circuit and understood the usage and working of operational amplifiers and how vast the field of ICs is.

Acknowledgement:

We extend our sincere gratitude for our faculty-in-charge Professor Parag Narkhede for giving us the opportunity to learn about the circuitry behind complex electronic projects. Without his guidance we would not have been able to make our mini project work.