M.KUMARASAMY
COLLEGE OF ENGINEERING
NAAC Accredited Autonomous Institution
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A Minor Project Report on

MOBILE PHONE DETECTOR USING LM358

Under the guidance of

Mr.P.MANIRAJ (AP/EEE)

Submitted by

GOKUL V (20BEE4019)
MATHIMURUGAN V R (20BEE4046)
GURUCHARAN G (20BEE4305)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

M.KUMARASAMY COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to Anna University, Chennai)

KARUR-639113

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BONAFIDE CERTIFICATE

Certified that this report titled "**MOBILE PHONE DETECTOR USING LM358"** is the bonafide work of **GOKUL.V (20BEE4019), MATHIMURUGAN.V.R (20BEE4046), GURUCHARAN.G (20BEE4305)** out the work during the academic year (2021-2022) under my supervision. Certified further that to the best ofmy knowledge the work reported herein does not form part of any other project report.

HEAD OF THE DEPARTMENT

Dr.C.Kumar, M.E., Ph.D.,

Professor &Head,

Department of Electrical and Electronics Engineering,

M.Kumarasamy College of Engineering,

Karur-639113

SUPERVISOR

Mr.P.MANIRAJ,M.E.,

Assistant Professor,

Department of Electrical and Electronics Engineering,

M.Kumarasamy College of Engineering,

Karur-639113

Submitted for Minor project I (18EEP201L) Viva-Voice examination held at M.Kumarasamy College of Engineering,Karur-639113 on ……..

DECLARATION

We affirm that the Minor Project report titled **"MOBILE PHONE DETECTOR USING LM358"** being submitted in partial fulfillment for the award of **Bachelor of Engineering** in **Electrical and Electronics Engineering**, is the original work carried out by us.

Student Name	**Signature**
GOKUL V	_____
MATHIMURUGAN V R	_____
GURUCHARAN G	_____

VISION AND MISSION OF THE INSTITUTION

VISION

- To emerge as a leader among the top institutions in the field of technical education

MISSION

- Produce smart technocrats with empirical knowledge who can surmount the global challenges.
- Create a diverse, fully-engaged, learner-centric campus environment to providequality education to the students.
- Maintain mutually beneficial partnerships with our alumni, industry andprofessional associations.

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

VISION

- To produce smart and dynamic professionals with profound theoretical and practical knowledge comparable with the best in the field.

MISSION

- Produce hi-tech professionals in the field of Electrical and Electro Engineering by inculcating core knowledge.
- Produce highly competent professionals with thrust on research.
- Provide personalized training to the students for enriching their skills.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- **PEO1:** Graduates will have flourishing career in the core areas of Electrical Engineering and allied disciplines.
- **PEO2:** Graduates will pursue higher studies and succeed in academic/research careers.
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- **PEO4:** Graduates will practice ethics and have habit of continuous learning for their success in the chosen career.

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After the successful completion of the B.E. Electrical and Electronics Engineering degree program, the students will be able to:

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9: Individual and team work: Function effectively as an individual, and as a member or leaderin diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

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PSO2: Apply relevant models, resources and emerging tools and techniques to provide solutionsto power and energy related issues & challenges.

PSO3: Design, Develop and implement methods and concepts to facilitate solutions for electrical and electronics engineering related real-world problems.

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ABSTRACT

Cell phones are widely used in the world. While people have to be connected to one another, there are situations or places where their usage is to be prohibited either dueto security reasons or it may cause health hazards. Cell phone detection has been on investigation for a long time. There are techniques which have been formulated or proposed on how cell phones can be detected. Most of them use the features such as audiosystem, RF system and common materials of the phones and try to look into how they canbe used as basis to detect mobile phones. This project utilizes the RF system of the cell phone as the feature to be used to detect its presence. A circuit that detects signals of therange 0.9GHz to 3GHz is used to detect a cell phone when in use. When the signal is detected, an LED blinks to indicate the usage of a cell phone within a radius of 1.5 meters. This led to the development of cellphone jammers where signal reception is completely blocked when you enter the premises. This circuit consists of an op-amp with some active-passive components. A LED is used for an indication of the presence of a cellphone. This mobile phone detector can sense the presence of an activated mobile phonefrom a distance of four to five meters. So, it can come handy in an examination hall or meetings where mobile phones are not permitted.

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LIST OF ABBREVIATIONS

S.No	ABBREVIATION	EXPANSION
1.	LED	Light Emitting Diode
2.	IC	Integrated Circuit

CHAPTER 1

INTRODUCTION

1.1 Introduction

Cell phones have become an integral part of people's lives. They are not only used for communication via short messaging service (SMS), calls, emails and internet but advanced applications such as remote health monitoring systems and security systems have been integrated with mobile phones. The recent years have seen rapid advancementsin the value addition applications in mobile phones such as high definition cameras and high-speed internet connectivity. The country has also experienced developments in the infrastructures to support the rising need of faster internet connectivity. Safari com rolledout their 4G internet infrastructure which is now available in over thirteen towns in the country. Despite the advantages enjoyed by these advancements in mobile technology, there are threats that have been posed by their usage. This led to the development of cell phone jammers where signal reception is completely blocked when you enter the premises. This mobile phone detector can sense the presence of an activated mobile phonefrom a distance of four to five metres. So, it can come handy in an examination hall or meetings where mobile phones are not permitted.

1.2 Necessity

This mobile phone detector can sense the presence of an activated mobile phone from a distance of four to five meter. So it can come handy in an examination hall or meetings where mobile phones are not permitted. The circuit can detect incoming and outgoing calls, SMSes, Internet and video transmissions even if a mobile phone is kept in silent mode. When it detects an RF signal from an activated mobile phone, its LED starts blinking and continues to blink until the signal stops

1.3 Scope of the work

The monopole antenna detects the RF signals from the frequency ranges of mobile phonesand gives it to the 2.2 micro farad capacitor. This capacitor stores the signals and discharges to the op amp LM358. This op amp acts as a comparator. It compares the inputvoltage with the reference voltage of about 5v if the input voltage is greater than the reference voltage this is passed through the output pin of the IC.

CHAPTER 2

SYSTEM MODEL

2.1 Introduction

RFID systems consist of three components in two combinations: a transceiver (transmitter/receiver) and antenna are usually combined as an RFID reader. A transponder(transmitter) and antenna are combined to make an RFID. An RFID tag is read when thereader emits a radio signal that activates the transponder, which sends data back to the transceiver.

A basic RFID system consists of three components:

- An antenna or coil .
- A Transceiver (with decoder) .
- A transponder (RF tag) electronically programmed with unique information

This circuit consists of an 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. The circuit diagramis given below. The circuit can be either assembled in a breadboard or in a Vero Board. This circuit consists of an 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. The circuit diagramis given below. The circuit can be either assembled in a breadboard or in a Vero Board.

2.2 Block diagram

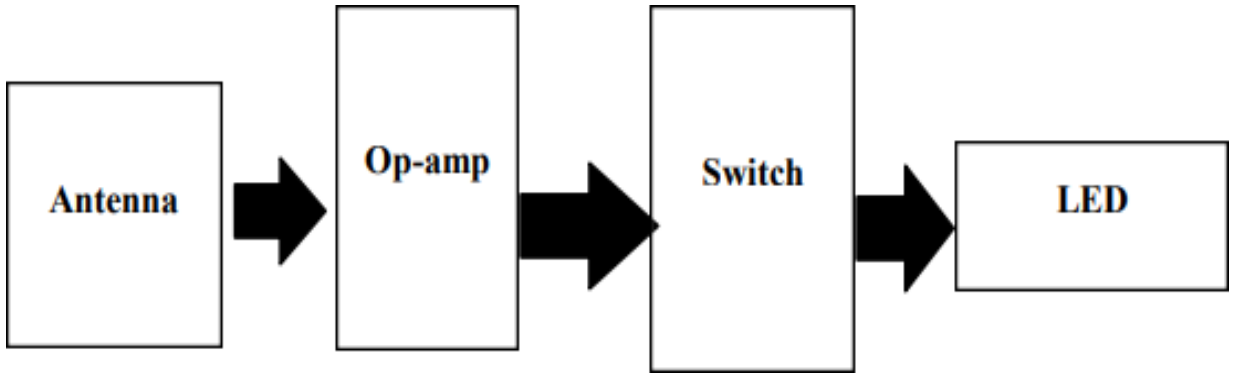

Figure 2.1Block Diagram

2.3 DESCRIPTION OF VARIOUS BLOCKS

Antenna

An antenna is a metallic structure that captures and/or transmits radio electromagnetic waves. Antennas come in all shapes and sizes from little ones that can be found on your roof to watch TV to really big ones that capture signals from satellites millions of miles away. An antenna is mainly used as a metallic device for radiating or receiving radio waves which is basically used for transmitting signals, transmitting antenna is used to transmit information and for receiving signal, receiving antenna is used at receiver end to receive signals.

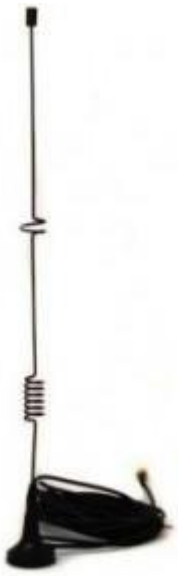

Figure 2.2 Antenna

You can connect most phones to an external antenna by using an installable hands free kit that comes with an external antenna adapter. You can also purchase an external antenna adapter that allows you to connect the antenna directly to your phone. Some phones have an external antenna port.

Operational amplifier (Op-amp)

An operational amplifier is an integrated circuit that can amplify weak electric signals. An operational amplifier has two input pins and one output pin. Its basic role is to amplifyand output the voltage difference between the two input pins. An operational amplifier isan integrated circuit that can amplify weak electric signals. An operational amplifier has two input pins and one output pin. Its basic role is to amplify andoutput the voltage difference between the two input pins.

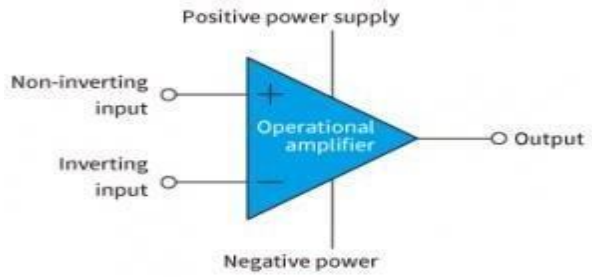

Figure 2.3 op-amp

An operational amplifier is not used alone but is designed to be connected to other circuitsto perform a great variety of operations. This article provides some typical examples of usage of circuits with operational amplifiers.

Switch

An electrical switch serves the purpose of controlling the flow of electrical current withina circuit. A switch performs the task of manually cutting or reconnecting power from an electrical supply by creating or closing an air insulation gap between two conduction points. .A switch is used in a wired network to connect to other devices using Ethernet cables. The switch allows each connected device to talk to the others. Wireless-only networks donot use switches because devices such as wireless routers and adapters communicate directly with one another. A switch is a device that is used for making and breaking electric current in a circuit. It isused to turn on and turn off daily used equipment like television, washing machine, fan, light, etc.

Figure 2.4 Switch

LED

LEDs (Light Emitting Diodes) in electronics, a semiconductor device that emits infraredor visible light when charged with an electric current. LEDs are the latest development in the lighting industry. Made popular by their efficiency, range of color, and long lifespan, LED lights are ideal for numerous applications including night lighting, art lighting, and outdoor lighting.

Figure 2.5 LED

An LED bulb produces light by passing the electric current through a semiconducting material the diode—which then emits photons (light) through the principle of electroluminescence. The first commercial visible-wavelength LEDs were commonly used as replacements for incandescent and neon indicator lamps, and in seven-segment displays, first in expensive equipment such as laboratory and electronics test equipment, then later in such appliances as calculators, TVs, radios, telephones, as well as watches (see list of signal uses). Until 1968, visible and infrared LEDs were extremely costly

CHAPTER 3

HARDWARE DESCRIPTION

3.1 Introduction

This mobile phone detector can sense the presence of an activated mobile phone from a distance of four to five meters. So, it can come handy in an examination hall or meetings where mobile phones are not permitted. The circuit can detect incoming and outgoing calls, Internet and video transmissions even if a mobile phone is kept in silent mode. When it detects an RF signal from an activated mobile phone, its LED starts blinking and continues to blink until the signal stops. I will show you a simple mobile phone detector project using a cheap LM358 op-amp. This mobile phone detector can detect the nearness of an active cell phone from a separated distance of four to five meters.

3.2 Hardware components

- IC LM358
- ON/OFF Switch
- Resistor
- Capacitor
- Transistor
- LED

IC LM358

The LM358 IC is a great, low power and easy to use dual channel op-amp IC. It is designed and introduced by national semiconductor. It consists of two internally frequency compensated, high gain, independent op-amps. This IC is designed for specially to operate from a single power supply over a wide range of voltages. LM358 can be used as transducer amplifier, DC gain block etc. It has large dc voltage gain of 100dB. This IC can be operated on wide range of power supply from 3V to 32V for single power supply .

Figure 3.1Transistor

LM358 is a dual op-amp IC integrated with two op-amps powered by a common powersupply. The differential input voltage range can be equal to that of power supply voltage. The default input offset voltage is very low which is of magnitude 2mV. LM358 is a dual op-amp IC integrated with two op-amps powered by a common powersupply .

Resistor

A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses. High-power resistors that can dissipate many wattsof electrical power as heat, may be used as part of motor controls, in power distribution systems, or as test loads for generators. Fixed resistors have resistances that only changeslightly with temperature, time or operating voltage.

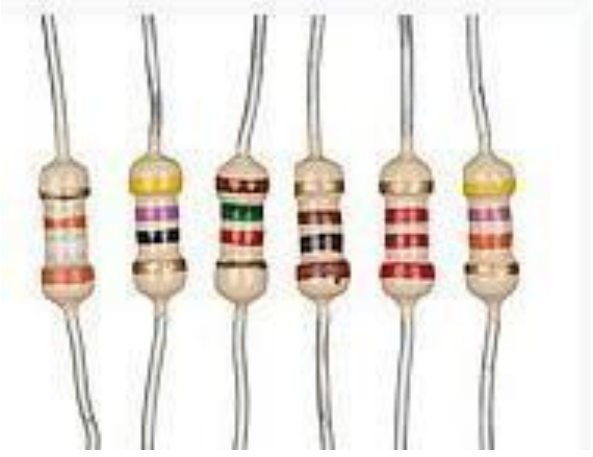

Figure 3.2 Resistor

Resistors are common elements of electrical networks and electronic circuits and are ubiquitous in electronic equipment. Practical resistors as discrete components can be composed of various compounds and forms. Resistors are also implemented within integrated circuits. The electrical function of a resistor is specified by its resistance: common commercial resistors are manufactured over a range of more than nine orders of magnitude. The nominal value of the resistance falls within the manufacturing tolerance, indicated on thecomponent.

Capacitor

Capacitor, device for storing electrical energy, consisting of two conductors in close proximity and insulated from each other. A simple example of such a storage device is the parallel-plate capacitor. If positive charges with total charge +Q are deposited on oneof the conductors and an equal amount of negative charge $-Q$ is deposited on the secondconductor, the capacitor is said to have a charge Q. Capacitors have many important applications. They are used, for example, in digital circuits so that information stored in large computer memories is not lost during a momentary electric power failure; the electric energy stored in such capacitors maintainsthe information during the temporary loss of power. Capacitors play an even more important role as filters to divert spurious electric signals and thereby prevent damage tosensitive components and circuits caused by electric surges. capacitor, device for storing electrical energy, consisting of two conductors in close proximity and insulated from each other.

Figure 3.3 Capacitor

Transistor

A transistor is a semiconductor device used to amplify or switch electrical signals and power. The transistor is one of the basic building blocks of modern electronics. It is composed of semiconductor material, usually with at least three terminals for connectionto an electronic circuit.

Transistors are a three terminal semiconductor device used to regulate current, or to amplify an input signal into a greater output signal. Transistors are also used to switch electronic signals. The circulation of electrical current through all types of transistors is adjusted by electron addition.

NPN transistor

The NPN transistor is designed to pass electrons from the emitter to the collector (so conventional current flows from collector to emitter.

Figure 3.4 Transistor

3.3 Circuit diagram

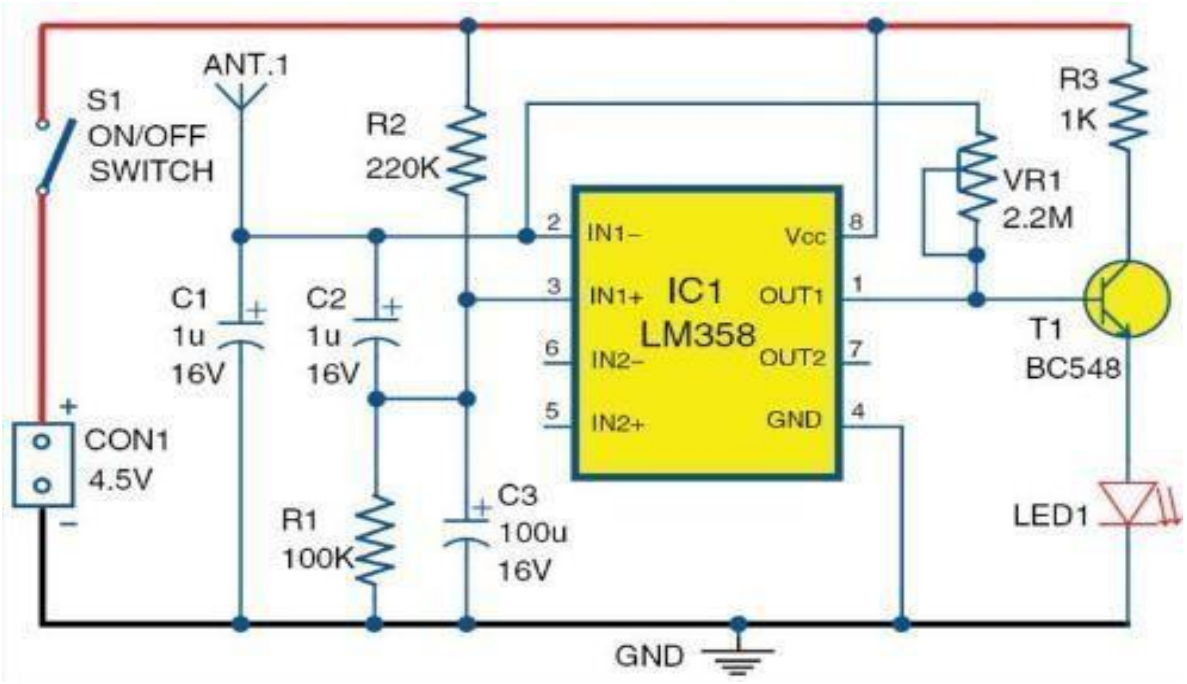

Figure 3.5 Circuit Diagram

Mobile phone detector, at first pin 8 and pin 4 of the LM358 op-amp are directly connectedto the Vcc and ground respectively. Pin 3 is connected to the ground through a 100 uF electrolytic capacitor and also connected to the Vcc through a 220 KΩ resistor. Pin 3 is also connected with pin 2 through a 1 uF electrolytic capacitor. A 100 KΩ potentiometeris taken and its right terminal is connected with pin 1 and the left terminal is connected with pin 2 and the middle terminal is connected to pin 1 of the op-amp IC. An NPN transistor of its base terminal is connected with pin 1 of the IC. Another collector and emitter terminal are connected with Vcc through a 1 KΩ resistor and cathode of the LED respectively. The anode terminal of the LED is directly connected to the ground. Pin 2 isconnected through two capacitors parallelly and also with a 100 KΩ resistor to the ground.An antenna is connected also from pin 2 of the IC. A 5V power supply is attached to thecircuit to distribute the required power. When a mobile phone is active, it radiates RF signal that passes through nearby space. The signal contains electromagnetic RF radiation from the phone. Capacitor C1 is used in the circuit to detect the RF signal from the mobile phone. When the mobile phone radiates energy in the form of RF signal, C1 absorbs it and passes on to the inputs of IC1. Transistor T1 is used to amplify the signal obtained at pin 1 of IC1. The circuit is applicablefor 2G networks, GPRS and network search (manual/automatic). It does not detect 3G, WCDMA and HSDPA network signals so well.

3.4 Cost of the components

Table 3.1 Cost of the components

S.no	**Components**	**Quantity**	**Amount**
1.	IC LM358	1	₹280
2.	Resistor	2	₹60
3.	Capacitor	2	₹40
4.	Transistor	1	₹25
5.	On/off switch	1	₹20
6.	LED	1	₹25
7.	Buzzer	1	₹50
		TOTAL	₹500

CHAPTER 4

RESULT AND DISCUSSION

4.1 Hardware implementation

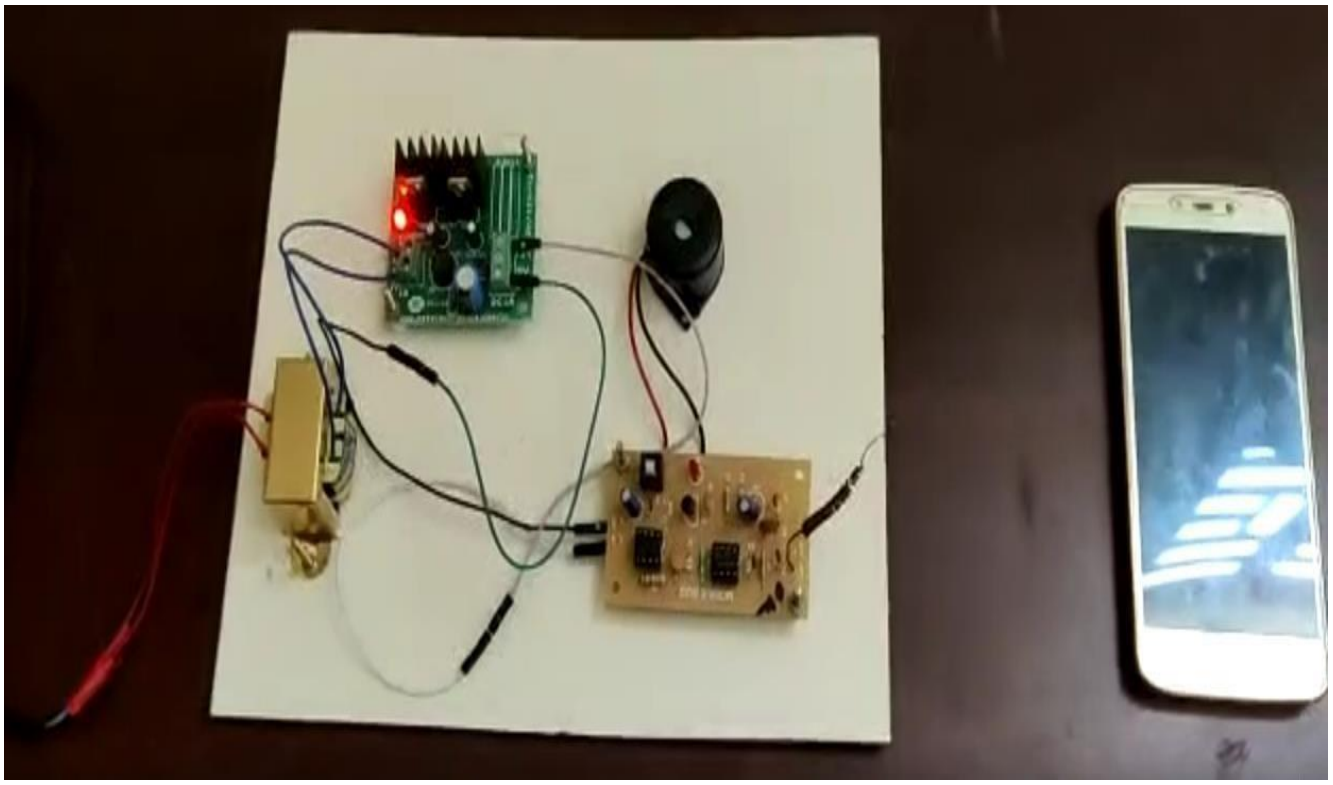

Figure 4.1 Experimental setup

The monopole antenna detects the RF signals from the frequency ranges of mobile phonesand gives it to the 2.2 micro farad capacitor. This capacitor stores the signals and discharges to the op amp LM358. This op amp acts as a comparator. It compares the inputvoltage with the reference voltage of about 5v if the input voltage is greater than the reference voltage this is passed through the output pin of the IC. This value is then passedout to the transistor BC548 where the transistor acts as switch and allows the voltage to pass through towards the led and the led glows.

4.2 Working of the project model

At the point when a mobile phone is activated, it radiates anRF signal that goes through close by space. The signal contains electromagnetic RF radiation from the cell phone. Capacitor C1 is utilized in the circuit to distinguish the RF signal from the cell phone. At the point when the cell phone radiates an RF signal, C1 retains it and gives it to the contributions of IC. This is shown by the flickering of the LED. Potentiometer VR1 is utilized to change the scope of the circuit. Transistor T1 is utilized to intensify the signal got at pin 1 of the IC. This mobile phone detector circuit isappropriate for 2G systems, GPRS, and network search. It doesn't identify 3G and HSDPA networks so well. In this project, we are demonstrating the Long-Range CellPhone Detector using LM358. This is a project of an exceptionally sensitive long-range cell phone detector circuit utilizing an LM358 IC. The circuit can identify a mobile phonefrom 10 to 12 meters away however it relies upon the output signal quality of the cell phone. In the testing, the circuit gave me different ranges of detecting cell phone with different mobile phones, it has detected some cell phones from 4 to 5 meters span and some from 10 to 12meter range. The circuit is additionally a good battery saver, it will draw just 400µA in standby condition because of which a 9V battery will last more. At the point when a mobile phone is activated, it radiates an RF signal that goes through close by space. The signal contains electromagnetic RF radiation from the cell phone. Capacitor C1 is utilized in the circuit to distinguish the RF signal from the cell phone. At the point when the cell phone radiates an RF signal, C1 retains it and gives it to the contributions of IC. This is shown by the flickering of the LED. Potentiometer VR1is utilized to change the scope of the circuit. Transistor T1 is utilized to intensify the signal got at pin 1 of the IC. This mobile phone detector circuit is appropriate for 2G systems, GPRS, and network search.

CHAPTER 5

CONCLUSION AND FUTURE SCOPE

5.1 Conclusion

The results as obtained show that the cell phone detector worked sufficiently.The detector could detect the signal in the frequency range of 0.9GHz to 3.0 GHz thus a cell phone that is in use. This phone usage was indicated by the blinking of the LED. When a cell phone is on standby mode, it keeps a radio silence therefore cannot be detected using this cell phone detector. It can be concluded that the project was successful.This detector can therefore be used to track the usage of a cell phone where a buzzer usagewill be too loud and disturbed.

5.2 Future scope

Trying to increase the detecting range of mobile bug to few more meters for observing wide ranges of area. In the future time this detector will be improved in all ways. In futurewe could be able to detect any range of frequency over a meter of range and this will be very useful to detect the cell phones where the cell phones are prohibited.This pocket-size mobile transmission detector or sniffer can sense the presence of an activated mobile cell phone from a distance of one and-a-half meters. So, it can be used to prevent use of mobile phones in examination halls, confidential rooms, etc.

5.3 Application

It is also useful for detecting the use of mobile phone for spying and unauthorized video transmission. In this project we made an attempt to design a mobile detector which can detect both the incoming and outgoing calls as well as video transmission even if the mobile is kept at the silent mode. Our circuit has detected the presence of an active mobilephone even at a distance of about one and half a meter. It gave the indication of an activemobile phone by glowing the LED,

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