ABSTRACT

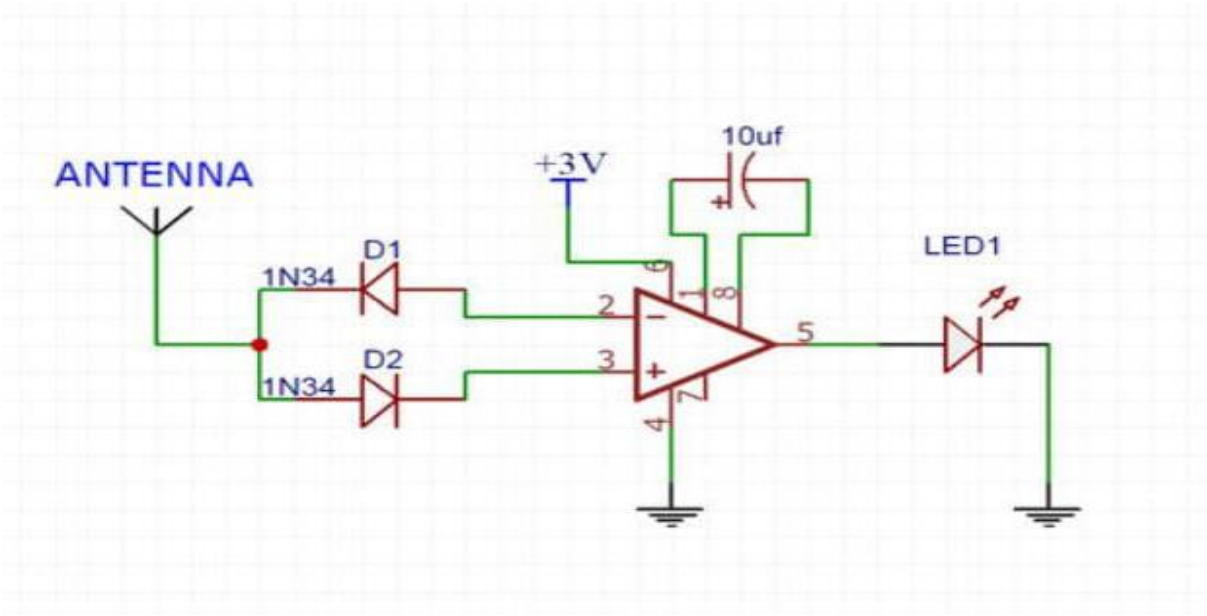
This handy, pocket-size mobile transmission detector or sniffer can sense the presence of an activated mobile cell phone from a distance of one and-a-half meters. So it can be used to prevent use of mobile phones in examination halls, confidential rooms, etc. It is also useful for detecting the use of mobile phone for Spying and unauthorized video transmission. The circuit can detect the incoming and outgoing calls, even if the mobile phone is kept in the silent mode. The moment the Op-Amp detects RF transmission signal from an activated mobile phone, it starts sounding a beep alarm and the LED blinks. The alarm continues until the signal transmission ceases. Assemble the circuit on a general purpose PCB as compact as possible and enclose in a small box like junk mobile case. As mentioned earlier, capacitor C3 should have a lead length of 18 mm with lead spacing of 8 mm. Carefully solder the capacitor in standing position with equal spacing of the leads. The response can be optimized by trimming the lead length of C3 for the desired frequency. You may use a short telescopic type antenna.

Use the miniature 12V battery of a remote control and a small buzzer to make the gadget pocket-size. The unit will give the warning indication if someone uses Mobile phone within a radius of 1.5 meters.

Introduction

This mobile phone detector can sense the presence of an activated mobile phone from a distance of four to five metres. 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, SMS, 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.

Circuit diagram of the mobile phone detector



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. This is indicated by the flashing of LED1. Preset VR1 (2.2M) is used to vary the range of the circuit. Transistor T1 is used to amplify the signal obtained at pin 1 of IC1. The circuit is applicable for 2G networks, GPRS and network search (manual/automatic).

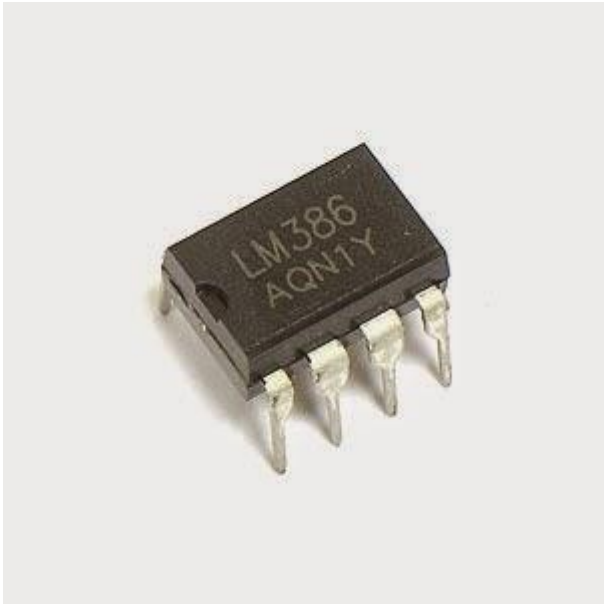
Description of circuit diagram

This circuit consists of an op-amp with some active-passive components. A LED is used for an indication of the presence of a cell phone. Op-amp is configured as Frequency Detector and its output is connected to a LED. The circuit can be either assembled in a breadboard or in a PCB Board. When the mobile phone radiates energy in the form of RF signal, Capacitor C2 absorbs it and used as an input to LM358 IC. The output of LM358 is connected to LED which gets turned ON. Then the flashing of LED is observed.

List of Components

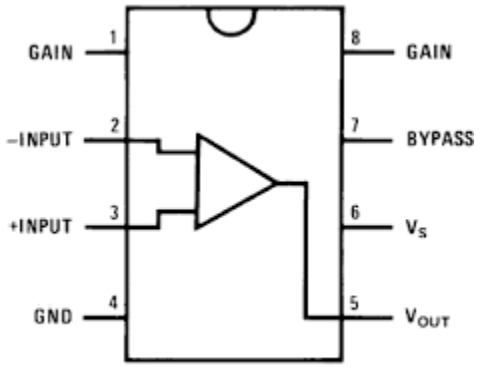
1. LM386 Audio Amplifier IC
2. 1N34 Germanium Diodes
3. 10 Micro Farad Capacitor
4. LED
5. Connecting wires

LM386 Audio Amplifier IC:



The LM386 is a power amplifier designed for use in low volt- age consumer applications. The gain is internally set to 20 to keep external part count low, but the addition of an external resistor and capacitor between pins 1 and 8 will increase the gain to any value up to 200.

Pin Configuration of IC LM386:



LM386 Pin Diagram

- **Pin1** (Ga+-gain Pin): Pin-1 is gain pin, used adjust the amplifier gain by connecting this IC to an external component capacitor.
- **Pin2** (+IN-Non-inverting): Pin-2 is the non-inverting pin, is used to provide the audio signal.

- **Pin3** (+IN): Pin-3 is the inverting terminal and it is normally connected to ground.
- **Pin4** (GND): Pin-4 is a ground pin connected to the ground terminal of the system
- **Pin5** (Vout): Pin-5 is the output pin, used to provide amplified output audio, and allied to the speaker.
- **Pin-6** (VCC or VSS): Pin-6 is connected to the power
- **Pin-7** (Bypass): Pin-7 bypass pin is used to connect a decoupling capacitor.
- **Pin-8** (Gain): Pin-8 is the gain setting pin

Capacitors:

A capacitor or condenser is a passive electronic component consisting of a pair of conductors separated by a dielectric. When a voltage potential difference exists between the conductors, an electric field is present in the dielectric. This field stores energy and produces a mechanical force between the plates. The effect is greatest between wide, flat, parallel, narrowly separated conductors.

Capacitance (symbol C) is a measure of a capacitor's ability to store charge. A large capacitance means that more charge can be stored. Capacitance is measured in farads, symbol F. However 1F is very large, so prefixes (multipliers) are used to show the smaller values.

LED:

A light-emitting diode (LED) is an electronic light source. LEDs are used as indicator lamps in many kinds of electronics and increasingly for lighting. LEDs work by the effect of electroluminescence, discovered by accident in 1907. The LED was introduced as a practical electronic component in 1962.

All early devices emitted low-intensity red light, but modern LEDs are available across the visible, ultraviolet and infra red wavelengths, with very high brightness.

LEDs are based on the semiconductor diode. When the diode is forward biased (switched on), electrons are able to recombine with holes and energy is released in the form of light. This effect is called electroluminescence and the colour of the light is determined by the energy gap of the semiconductor. The LED is usually small in area (less than 1 mm2) with integrated optical components to shape its radiation pattern and assist in reflection.

How the circuit works?

Ordinary LC (Coil-Capacitor) circuits are used to detect low frequency radiation in the AM and FM bands. The tuned tank circuit having a coil and a variable capacitor retrieve the signal from the carrier wave. But such LC circuits cannot detect high frequency waves near the microwave region. Hence in the circuit, a capacitor is used to detect RF from mobile phone considering that, a capacitor can store energy even from an outside source and oscillate like LC circuit.

Use of capacitor

A capacitor has two electrodes separated by a ‘dielectric’ like paper, mica etc. The non polarized disc capacitor is used to pass AC and not DC. Capacitor can store energy and pass AC signals during discharge. 0.22pF capacitor is selected because it is a low value one and has large surface area to accept energy from the mobile radiation. To detect the signal, the sensor part should be like an aerial. So the capacitor is arranged as a mini loop aerial (similar to the dipole antenna used in TV).In short with this arrangement, the capacitor works like an air core coil with ability to oscillate and discharge current.

How the capacitor senses RF?

One lead of the capacitor gets DC from the positive rail and the other lead goes to the negative input of IC1. So the capacitor gets energy for storage. This energy is applied to the inputs of IC1 so that the inputs of IC are almost balanced with 1.4 volts. In this state output is zero. But at any time IC can give a high output if a small current is induced to its inputs. There a natural electromagnetic field around the capacitor caused by the 50Hz from electrical wiring. When the mobile phone radiates high energy pulsations, capacitor oscillates and release energy in the inputs of IC. This oscillation is indicated by the flashing of the LED and beeping of Buzzer. In short, capacitor carries energy and is in an electromagnetic field. So a slight change in field caused by the RF from phone will disturb the field and forces the capacitor to release energy.

APPLICATIONS

(i) Colleges and Universities:

During tests and exams the use of mobile phones is prohibited, for the students could use it to send answers among each other. By using a GSM-detector this kind of fraud is prohibited. The presence of a GSM-detector can work in a preventing way, because when a GSM-detector is present, the use of mobile phones does not stay unnoticed.

(ii) Cinemas:

In a cinema the use of a mobile phone is undesired. Being called by someone during a movie is of course very bothering for other people.

With a GSM-detector the use of mobile phones is detected, so the visitor can be informed that this is not allowed.

(iii) Theatres:

Just like with a cinema, in theatres the use of mobile phones is not allowed. The gsm-detector can be used to prevent use.

(iv) Restaurants / Hotels:

In hotels and restaurants it is often undesired that a mobile phone is used at the table or in other areas. A GSM-detector can be installed in these areas to notify guests.

(v) Petrol stations:

When tanking at a petrol station, the use of mobile phones is prohibited, because the mobile signals can interfere with the tanking equipment and because a small spark within the mobile phone could set fire to possible gasoline vapour. With the GSM-detector this prohibition is pointed out to the tanking customer.

(vi) Airplanes:

In airplanes the use of mobile phones is prohibited, for it could interfere with the equipment in the airplane. All the while phones are still used illegally, especially in restrooms. By installing a GSM-detector there, this can be prevented.

(vii) Conference rooms:

It is often distracting to be called during a meeting. Also, confidential conversation could be overheard by using cell phones, especially by those with a spy function (when someone calls that phone it automatically is picked up without ringing, so that the person on the other end of the line can hear conversations in the room where the spy phone is placed).

By using a GSM-detector you can be assured that this is not the case.

(viii) Hospitals:

The signals emitted by mobile phones can interfere with some electronic equipment inside the hospital. This could have fatal consequences.

The GSM-detector can be placed in any area where the use of mobile phones could interfere with sensitive devices. The audio alarm will sound when a phone is used and this way, the person should immediately switch off his/her phone

(ix) Prisons:

In prisons the use of mobile phones is not allowed. It could occur anyway. By using the gsm-detector the staff can be notified when a mobile phone is used inside the facility.

(x) Power plants:

Power plants contain -just like hospitals- a lot of electronic devices that are sensitive for interference by mobile phones. Therefore, it is prohibited to use mobile phones there. Use a GSM-detector to inspect this.

Advantages

Our mission is to be the leading provider of cellular phone detection capabilities to both business and government institutions around the world. We are striving to bring a national debate to the growing proliferation of cell phone use in our society today. Using our state of the art products we are hoping to provide individuals and businesses the tools to detect and prevent the use of cell phone in sensitive areas.

This product was created in reaction to the growing use of cell phones around the world, and how that use was beginning to interfere with our daily lives. When businesses tried to find solutions to problems involving cell phones, they found a huge shortcoming in products and services.

Hence, our solution was created to supply this need. To date we have sold thousands of products to a very wide audience of businesses and government institutions. Many of these include prisons, casinos, embassies, classrooms and testing facilities, oil rigs, conferences, golf clubhouses, computer-rooms, data centers, hospitals, and restaurants, to name just a small few of the vast capabilities of our product.

Limitation

Range of the circuit:

The prototype version has only limited range of 2 meters. But if a preamplifier stage using JFET or MOSFET transistor is used as an interface between the capacitor and IC, range can be increased.

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 future we could be able to detect any range of frequency over a meters of range and this will be very useful to detect the cell phones where the cell phones are prohibited.

Observation Done

Things identified as inefficient / unskilled. Things that can be automated.

Complete analysis of Project done

Proliferation of Mobile Phones: Mobile phones have become an integral part of modern life, with billions of people using them daily. The increasing use of mobile phones has led to concerns about the long-term health effects of exposure to electromagnetic radiation, specifically radiofrequency (RF) radiation emitted by these devices.

Health Concerns: While the majority of scientific research has not conclusively established harmful health effects from mobile phone radiation within current exposure limits, there is ongoing debate and concern. Some studies have suggested a potential link between RF radiation exposure and certain health issues, including brain tumors and electromagnetic hypersensitivity.

Regulations and Safety Standards: Governments and international bodies have established regulations and safety standards to limit human exposure to RF radiation. These standards vary from country to country but are generally based on recommendations from organizations like the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and the Federal Communications Commission (FCC) in the United States.

Objectives

The primary objective of the invention of a mobile phone radiation detector using operational amplifiers (op-amps) is to provide a reliable and accessible tool for individuals to measure and monitor their exposure to radiofrequency (RF) radiation emitted by mobile phones.

Radiation Exposure Assessment: Enable users to accurately assess and quantify their exposure to RF radiation from mobile phones and other wireless devices.

This helps individuals make informed decisions about their device usage to potentially reduce exposure.

Health Awareness: Raise awareness among users about the levels of RF radiation they are exposed to and the potential health implications associated with prolonged or excessive exposure.

Compliance with Safety Standards: Ensure that the device complies with safety standards and regulations regarding permissible levels of RF radiation exposure. This allows users to assess whether their exposure falls within established safety limits.

Empowerment: Empower individuals to take control of their own RF radiation exposure by providing them with a tool that offers real-time measurements and feedback.

Personalized Usage Guidelines: Provide users with data that can help them establish personalized guidelines for safe and responsible mobile phone usage based on their specific exposure levels.

Education: Educate users about the importance of safe mobile phone usage, such as maintaining a safe distance from the body, using speakerphone or earphones, and reducing screen-on time when not in use.

Portability and Convenience: Design the device to be portable, user-friendly, and easy to carry so that users can use it wherever and whenever they want to measure their exposure.

Accuracy and Reliability: Ensure that the device provides accurate and reliable measurements, so users can trust the information it provides.

Data Logging and Analysis: Optionally, include features for data logging and analysis, allowing users to track their RF radiation exposure over time and identify patterns or trends.

Safety and Peace of Mind: Give users peace of mind by providing a tool that helps them gauge their exposure and make adjustments to their mobile phone usage habits if they desire.

Market Potential: Explore the market potential for such a device, considering consumer demand, potential applications, and the feasibility of commercialization.

Conclusion

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. It is also useful for detecting the use of mobile phone for spying and unauthorised 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 mobile phone even at a distance of about one and half a meter. It gave the indication of an active mobile phone by glowing the LED, according to the receiving frequency and by buzzing the sound of the buzzer. The alarm continues until the signal is ceases.

References

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