

Mobile Phone Detector using OP-AMP

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ABSTRACT: This handy, pocket-size mobile transmission detector or sniffer can sense the presence of an activated mobile 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 used for detecting the use of mobile phone for spying and unauthorized video transmission even if the mobile phone is kept in the silent mode. The moment the Bug 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.

KEYWORDS: OP-AMP[IC CA3130], Timer[IC NE555], Piezo Buzzer

I. INTRODUCTION

As increase in the technology in the world using the electronics equipment are being used in a wrong way like, in the examination halls and confidential rooms. To avoid this we are introducing a project called CELLPHONE DETECTOR.

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, SMS and video transmission even if the mobile phone is kept in the silent mode. The moment the Bug 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.

II. LITERATURE SURVEY

The adaptability of the mobile phones cannot be underestimated. They are portable and perform functions like simple call, sms, and data services.

The focus of detecting mobile phones by its features to determine potential vulnerability. Tests were carried out at Pacific Northwest National Laboratories, USA.

The first part of determining the RF signal as a detection point was carried out by looking at the internal oscillators necessary to operate the microprocessor and RF synthesizer.

The second part of the experiment was carried out to detect the cell phone by detecting the RF transmitter. They found out that since the mobile phone keeps a continuous communication with the tower, this technique was successful.

III. EXISTING SYSTEM

RL tuned circuit(Resistor-Inductor circuit) is not suitable for detecting the RF signal(30kHz-300GHz) and an ordinary RF detector using tuned LC circuit in the GHz frequency band used in mobile phones. The transmission frequency of mobile phone range from 0.9 to 3GHz with a wavelength of 0.033 to 0.1m.

IV. PROPOSED SYSTEM

A circuit detecting gigahertz signals is required for a mobile bug which catches frequencies about 0.8 to 3GHz (Mobile band frequencies). Cell phone detector is a circuit that can sense the presence of any activated cell phone nearby and gives an indication of activated cell phone near and around it. Basically, cell phone detector is a frequency detector or a current to voltage converter.

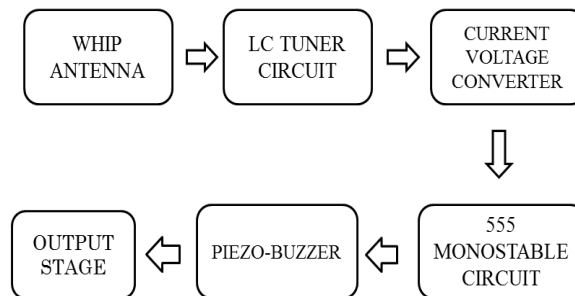


Fig.1 Block Diagram

V. WORKING PRINCIPLE

PURPOSE OF THE CIRCUIT

This circuit is intended to detect unauthorized use of mobile phones in examination halls, confidential rooms etc. It also helps to detect unauthorized video and audio recordings. It detects the signal from mobile phones even if it is kept in the silent mode. It also detects SMS.

WORKING

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.

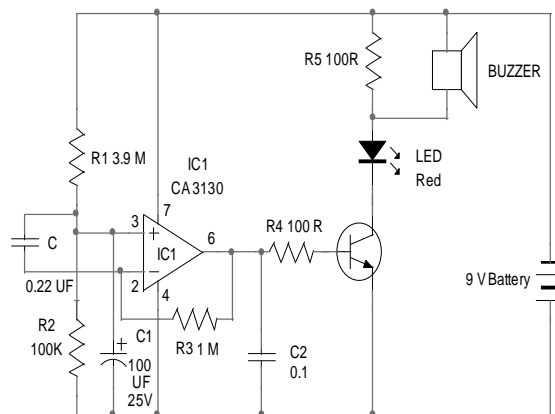


Fig.2 Circuit Diagram

CONCEPT

Mobile phone uses RF with a wavelength of 30cm at 872 to 2170 MHz that is the signal is high frequency with huge energy. When the mobile phone is active, it transmits the signal in the form of sine wave which passes through the space. The encoded audio/video signal contains electromagnetic radiation which is picked up by the receiver in the base station. Mobile phone system is referred to as "Cellular Telephone system" because the coverage area is divided into "cells" each of which has a base station. The transmitter power of the modern 2G antenna in the base station is 20-100 watts.

When a GSM (Global System of Mobile communication) digital phone is transmitting, the signal is time shared with 7 other users. That is at any one second, each of the 8 users on the same frequency is allotted 1/8 of the time and the signal is reconstituted by the receiver to form the speech. Peak power output of a mobile phone corresponds to 2 watts with an average of 250 milli watts of continuous power. Each handset with in a 'cell' is allotted a particular frequency for its use.

The mobile phone transmits short signals at regular intervals to register its availability to the nearest base station. The network data base stores the information transmitted by the mobile phone. If the mobile phone moves from one cell to another, it will keep the connection with the base station having strongest transmission. Mobile phone always tries to make connection with the available base station. That is why, the back light of the phone turns on intermittently while traveling. This will cause severe battery drain. So in long journeys, battery will flat within a few hours.

AM Radio uses frequencies between 180 kHz and 1.6 MHz, FM radio uses 88 to 180 MHz, TV uses 470 to 854 MHz Waves at higher frequencies but within the RF region is called Micro waves. Mobile phone uses high frequency RF wave in the micro wave region carrying huge amount of electromagnetic energy. That is why burning sensation develops in the ear if the mobile is used for a long period. Just like a micro wave oven, mobile phone is 'cooking' the tissues in the ear. RF radiation from the phone causes oscillation of polar molecules like water in the tissues. This generates heat through friction just like the principle of microwave oven. The strongest radiation from the mobile phone is about 2 watts which can make connection with a base station located 2 to 3 km away.

USE OF A 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. 0.22 μ F 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.

VI. RESULTS

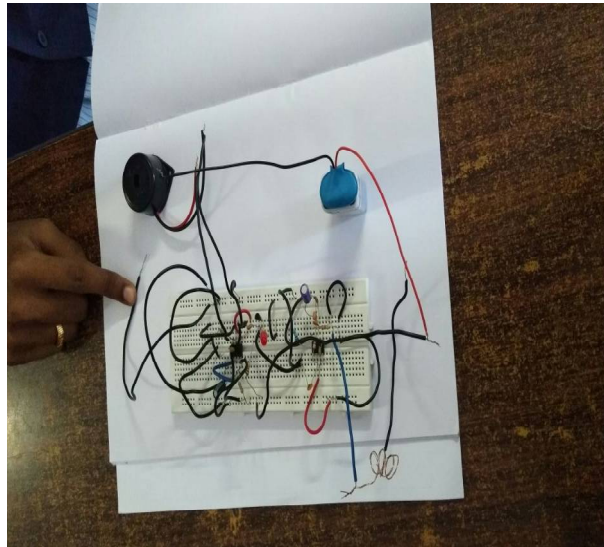


Fig.3(a) Circuit when not detecting RF signal

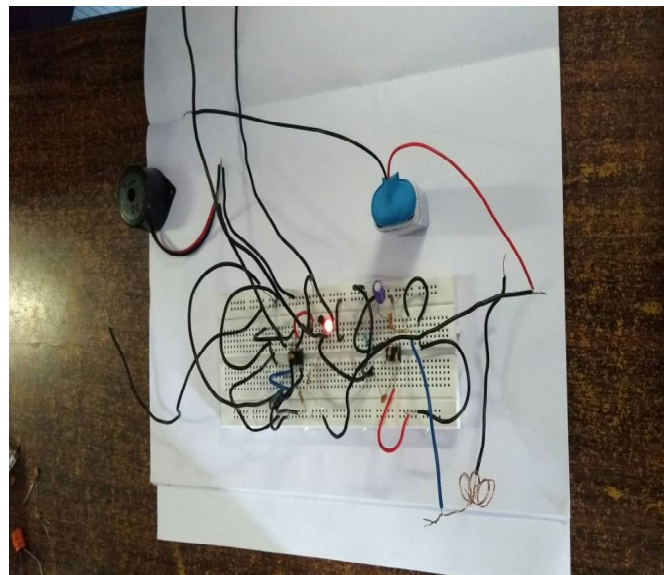


Fig.3(b) Circuit when detecting RF signal

VII. CONCLUSIONS

We described this pocket size mobile transmission detector or sniffer that senses the presence of activated mobile phones from a distance of one and half meter. So it can be used to prevent the use of mobile phones in examination halls, confidential rooms, etc. It is also useful for detecting the use of mobile phones for spying and unauthorized transmission.

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