2nd International Conference on Emerging Trends in Materials,
Computing and Communication Technologies
International Journal of Scientific Research in Science, Engineering and Technology
Print ISSN: 2395-1990 | Online ISSN : 2394-4099 (www.ijsrset.com)

Design and Implementation of Sniffer for Detection of Mobile Phones

Kumaran. S[1], Abishek. Y[1], Ms.T.Tamil Selvi[2]
[1]UG Scholar, Department of Electronics and Communication, Jerusalem College of Engineering, Chennai, Tamil Nadu, India
[2]Associate Professor, Department of Electronics and Communication, Jerusalem College of Engineering, Chennai, Tamil Nadu, India

ABSTRACT

The proposed handy pocket-size mobile transmission detector or sniffer can sense the presence of an activated mobile phone from a distance of one and half-a meters. Hence, 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 phones for spying and unauthorized video transmission. The circuit can detect the incoming and outgoing calls, SMS and video transmissions 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 of the signal becomes ceases.
Keywords-- OP-AMP[IC CA3130], LED, RF signal.

I. INTRODUCTION

In this paper we will discuss the overview of Cell Phone Detector and see its demo circuits. The description of the circuit diagram is also of discussion. But before that, the knowledge of previous detection techniques which has been introduced already in the market is to be studied

The first signal detection technique, an existing design utilizing discrete component is difficult to implement. They are very affordable to construct, but require precision tuning. This design is analysed and found to be inaccurate.

The second signal detection technique, a design using a down converter, voltage controlled oscillator (VCO), and a bandpass filter was investigated for cellular phone detection. The performance of this technique through hardware and computer modelling is discussed and the results are presented. The new system is accurate and a practical solution for detecting cellular phone in a secure facility.

A mobile phone (also known as a cellular phone, cell phone, and a hand phone) is a device that can make and receive telephone calls over a radio link while moving around a wide geographic area. It does so by connecting to a cellular network provided by a mobile phone operator, allowing access to the public telephone network. By contrast, a cordless telephone is used only within the short range of a single, private base station.

In addition to telephony, modern mobile phones also support a wide variety of other services such as text messaging, MMS, email, Internet access, short-range wireless communications (infrared, Bluetooth), business applications, gaming and photography. Mobile phones that offer these and more general computing capabilities are referred to as smart phones.

A cellular network or mobile network is a radio network distributed over land areas called cells, each served by at least one fixed-location transceiver known as a cell site or base station. In a cellular network, each cell uses a different set of frequencies from neighbouring cells, to avoid interference and provide guaranteed bandwidth within each cell.

When joined together these cells provide radio coverage over a wide geographic area. This enables a large number of portable transceivers (e.g., mobile phones, pagers, etc.) to communicate with each other and with fixed transceivers and telephones anywhere in the network, via base stations, even if some of the transceivers are moving through more than one cell during transmission.

In a cellular radio system, a land area to be supplied with radio service is divided into regular shaped cells, which can be hexagonal, square, circular or some other regular shapes, although hexagonal cells are conventional. Each of these cells is assigned multiple frequencies (f1 – f6) which have corresponding radio base stations. The group of frequencies can be reused in other cells, provided that the same frequencies are not reused in adjacent neighbouring cells as that would cause co-channel interference.

The increased capacity in a cellular network, compared with a network with a single transmitter, comes from the fact that the same radio frequency can be reused in a different area for a completely different transmission. If there is a single plain transmitter, only one transmission can be used on any given frequency. Unfortunately, there is inevitably some level of interference from the signal from the other cells which use the same frequency. This means that, in a standard FDMA system, there must be at least a one cell gap between cells which reuse the same frequency.

In the simple case of the taxi company, each radio had a manually operated channel selector knob to tune to different frequencies. As the drivers moved around, they would change from channel to channel. The drivers knew which frequency covered approximately what area. When they did not receive a signal from the transmitter, they would try other channels until they found one that worked. The taxi drivers would only speak one at a time, when invited by the base station operator (this is, in a sense, time division multiple access (TDMA).

Practically every cellular system has some kind of broadcast mechanism. This can be used directly for distributing information to multiple mobiles, commonly, for example in mobile telephony systems, the most important use of broadcast information is to set up channels for one to one communication between the mobile transceiver and the base station. This is called paging. The three different paging procedures generally adopted are sequential, parallel and selective paging.

The details of the process of paging vary somewhat from network to network, but normally we know a limited number of cells where the phone is located (this group of cells is called a Location Area in the GSM or UMTS system, or Routing Area if a data packet session is involved; in LTE, cells are grouped into Tracking Areas). Paging takes place by sending the broadcast message to all of those cells. Paging messages can be used for information transfer. This happens in pagers, in CDMA systems for sending SMS messages, and in the UMTS system where it allows for low downlink latency in packet-based connections.

In a cellular system, as the distributed mobile transceivers move from cell to cell during an ongoing continuous communication, switching from one cell frequency to a different cell frequency is done electronically without interruption and without a base station operator or manual switching. This is called the handover or handoff. Typically, a new channel is automatically selected for the mobile unit on the new base station which will serve it. The mobile unit then automatically switches from the current channel to the new channel and communication continues.

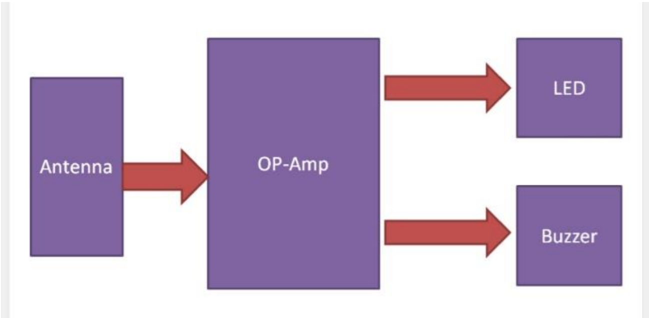

Figure 1 Block Diagram

II. CIRCUIT COMPONENETS

CA3130 IC

CMOS version gate-protected p channel MOSFET it act as an differential amplifier used in a circuit as current to voltage convertor. It provides very high input impedance, very low input current and very high speed of performance.

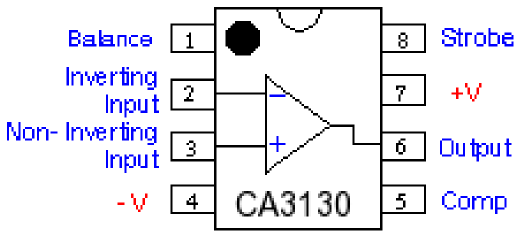

Figure 2 CA3130 IC pin diagram

1K Ohm Resistor

Color code sequence Brown, Black, Yellow, Gold. It keeps the non-inverting input stable for easy swing of the output to high state.

Figure 31K Ohm Resistor

100K Ohm Resistor

Color code sequence Brown, Black, Yellow, Gold. It provides the discharge path for 0.22µF Capacitor.

Figure 4 100K Ohm Resistor

0.22µF Capacitor

Ceramic capacitor type. It acts as a small Giga hertz (GHZ) loop antenna to collect the RF signals from the mobile phone The lead length of 18mm along with spacing of 8mm between the leads to get the desired frequency.

Figure 5 0.22µF Capacitor

BC548 Transistor

n-p-n type epitaxial silicon transistor. B indicates the material Silicon and C stands for low audio frequency. Mainly use for switching and amplication purposes.

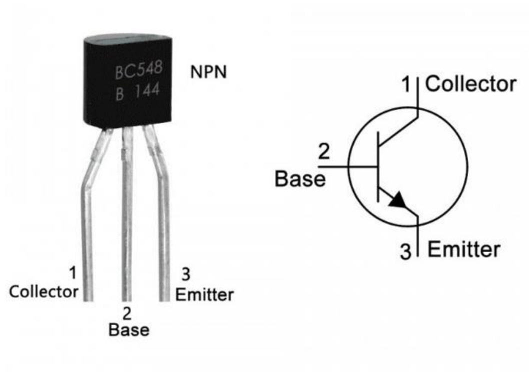

Figure 6 BC548 Transistor

2.2 MΩ Resistor

Color code red ,green and gold. Makes the inverting input high when output become high.

Figure 7 2.2 MΩ Resistor

47 pF Capacitor

Ceramic Capacitor acts as the dielectric. Connected across strobe (pin8) and null Input(pin 1) of the IC. For phase-composition and gain control to optimize the frequency response.

Figure 8 47 pF Capacitor

III. WORKING OF SNIFFER

In this circuit we have used a CA3130 OP-Amp IC for detecting incoming or outgoing signal around it. Op-amp non-inverting end is connected to Vcc through 2.2M resistor and it is also connected to the ground through 100K resistor and 100uF Capacitor. Its inverting terminal is feedback from its output through a 2.2M resistor for amplify the signal. Two 100nF capacitors are connected between inverting and non-inverting terminal, working as loop antenna for the system. Two 100nF capacitors are connected in series between Pin 1 and 8 of op-amp to boost the gain of the current to voltage converter at its output pin.

Output of this op-amp is connected at the base of NPN transistor namely BC547 through a 1k resistor and a LED is connected at its emitter for indication. And a 9 volt battery is used for powering the circuit. Rests of connections are shown in the Circuit Diagram below.

The circuit uses a 0.22µF disk capacitor to capture the RF signals from the mobile phone. This part should be like an aerial, so the capacitor is arranged as a mini loop aerial. In short with this arrangement the capacitor works like an air core with ability to oscillate and discharge current.

The output of transistor is within 10 mV of either supply voltage terminal. The lead inductance acts as a transmission line that intercepts the signals from the mobile phone. An ordinary RF detector using tuned LC circuits is not suitable for detecting signals in the GHz frequency band used in mobile phones that's why circuit detecting gigahertz signals is required for a mobile bug.

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 the inputs of IC1 are almost balanced with 1.4 volts. In this state output is zero.

But at any time IC can give a high output if small current is induced to its inputs. When mobile phone radiates, due to high energy pulsations, capacitor oscillates and releases energy. This allows the LED to flash until the signal ceases.

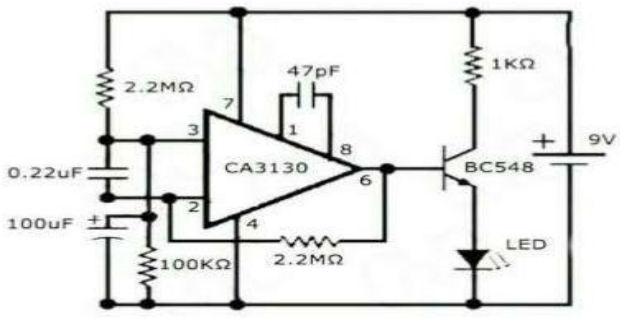

Figure 9 Circuit Diagram

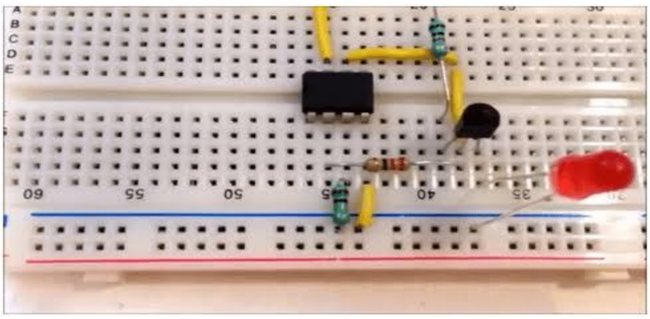

Figure 10 Circuit

Applications of Detector (SNIFFER)

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.

Cinemas or Theatres:

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.

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.

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.

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.

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).

Hospitals:

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

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.

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.

IV. CONCLUSION

The proposed pocket-size mobile transmission detector or sniffer can sense the presence of an activated mobile cellphone from a distance of one and-a-half meters. 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. 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.

V. FUTURE APPLICATION

Trying to increase the detecting range of mobile bug to few more meters for observing wide ranges of area is of interest in future. In the future developments, this detector will be improved and 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 strictly to be prohibited.

VI. REFERENCES

[1]. D.Roy Choudhury and Shail B.Jain“linear Integrated Circuit”,4th Edition,2012,PP-37-40&207-209

[2]. J.B.Gupta“Electronic Devices and Circuits”,5th Edition,August2012,PP-610-611&487-488

[3]. Nicholas W. S. 2011, “Study of Cellular Phone Detection Techniques , unpublished Thesis, Faculty of The Graduate College at the University of Nebraska

[4]. Christian C.M. 2012. "Design and Implementation of Intelligent Mobile Phone Detector". Academic Research International. Vol. 3, No. 1.

[5]. Mohan Kumar, D. 2008. “Mobile Bug”. Electronics for you magazine. www.espow.com/jammers/securitysurveillance

[6]. Oke A. O., Falohun A. S, Adigun A. A, “ The Design and Implementation of a Mobile Phone Detector Device with a Frequency Jamming Feature” International Journal of Computer Applications (0975 – 8887) Volume 143 – No.1, June 2016