International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 04 | Apr 2021 www.irjet.net p-ISSN: 2395-0072

THE MOBILE PHONE SIGNAL DETECTOR

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Abstract - *The aim of this project is to design and create a digital signal detector that can detect incoming and outgoing signals from cell phones. This convenient, pocket-size mobile signal detector can detect the presence of an activated mobile phone from a distance of one and a half meters, and could be used to avoid the use of mobile phones in examination halls, sensitive spaces, and other places. It can also be used to track illegal video sharing and the use of a cell phone for surveillance. Even if the phone is in silent mode, the circuit will detect incoming and outgoing calls, text messages, and video transmission. When the device senses an active cell phone's Radio Frequency (RF) transmission signal, it sounds a beep warning and the Light Emitting Diode (LED) blinks. The alarm will continue to sound until the signal is lost. The circuit is built on a general-purpose PCB that is as thin as possible and housed in a small box.*

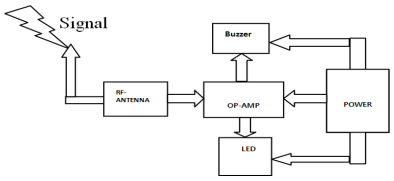
Keywords: **Signal detection, light emitting diode, operational amplifier, LC circuit, printed circuit board**

1. INTRODUCTION

The use of cell phones in limited, banned, and illegal areas has gotten a lot of attention in recent years. This increased interest is primarily due to disruption, as well as incorrect and improper use of cell phones by both owners and consumers. Churches, mosques, offices, and jails, to name a few, are not exempt from the law. In places like these, it's important to detect cell phone signals. Efforts have been made to address this issue, but each has its own flaws, one of which is the cell phone jammer. A cell phone jammer is a device that prevents mobile phones from transmitting signals from base stations[6]. The jammer essentially disables cellular phones when used. These devices can be used in almost any situation, but they're most common in areas where silence is anticipated and a phone call would be especially disruptive. The inability to make calls, particularly in an emergency, is a drawback of such technology.

2. METHODOLOGY

Due to the high frequency at which it transmits and the large amount of energy it emits, an ordinary RF detector using tuned LC circuits is not appropriate for detecting signals in the GHz frequency band used in cell phones



Block Diagram

The construction of this pocket size mobile phone signal detector is so simple and not expensive. For the construction to be understood and appreciated a more detailed description of the design [5]is required using the block diagram

The design consists of four stages as shown in the block diagram

The sensor stage

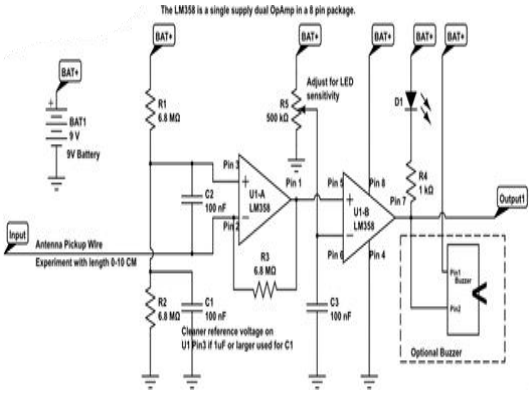
The power stage

Operational Amplifier(Op-Amp)stage

Response stage

From the above block diagram, once the RF [8]antenna receives wireless signal after the circuit has been powered by a 9 Volts dc battery, the operational Amplifier LM358AN amplifies the received signal which is turn triggers the buzzer and makes the LED[7] to flicker when signal is detected

This pocket-sized cell phone signal detector's construction is simple and inexpensive. A more detailed explanation of the design using the block diagram is needed for the construction to be understood and appreciated.



As seen in the block diagram, the design is divided into four stages.

The stage of the sensor
The first stage
Op-Amp (Operational Amplifier) stage
Stage of reaction

When the RF antenna receives a wireless signal after the circuit has been operated by a 9 Volts dc battery, the operational Amplifier LM358AN [9]amplifies the received signal, which then activates the buzzer and causes the LED to flicker when the signal is detected, as seen in the above block diagram. When C2 detects a cell phone detector signal, U1's output alternates between high and low depending on the signal's frequency. The LED flickers as a result of the resistor R4 connected to the U1's output pin 7, which activates the buzzer.

3.CONSTRUCTION ON BREAD BOARD

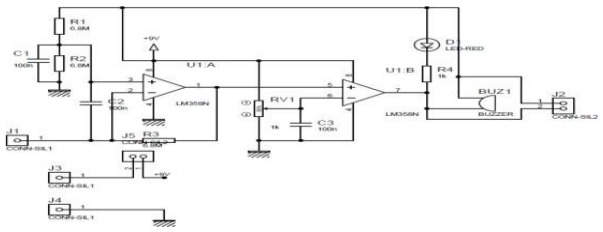
The construction was first done on a bread board before been transferred on to a PCB. The Op- Amp IC chip (U1) was placed on board straddling the channel. The orientation of the chip was noted after which the variable resistor was then placed with the pins on separate rows.

The center pin of the variable resistor (R5) is connected to pin 6 of the IC, and top and bottom pins to the bottom rows of the board. The bottom two rows are where the battery will be connected. One capacitor[10] (C3) is inserted between the middle and top pins of the variable resistor. Pin 4 of the IC is connected to the bottom left row. Several other locations will use this connection for ground

It was first built on a panel before it was transferred to a PCB. On the channel side was the Op- Amp IC chip (U1). After the variable resistor is then moved on separate lines with pins, it is indicated the orientation of the chip.

In pin 6 of the IC the center pin of the variable resistance (R5) and the top and bottom pins of the board are connected to the bottom rows. The two bottom rows contain the connection of the battery. Between the middle and top pins of the variable resistor is inserted one condenser (C 3). The bottom left row is connected with the pin 4 of the IC. This connection is used for ground by several other places

A resistance 6.8 Mohms (R2) and a condenser (C1) connects pin 3 to pin 4 on the IC. Pin 4 is connected to ground, it is worth noting. A condenser (C2) is connected from pin3 to pin 2 of the IC.



A resistor 6.8 Mohms (R1) is linked between the IC pin 3 and the variable resistor pin bottom. This connection requires a wire. The bottom pin of the variable resistor should be connected to the positive end of the battery.

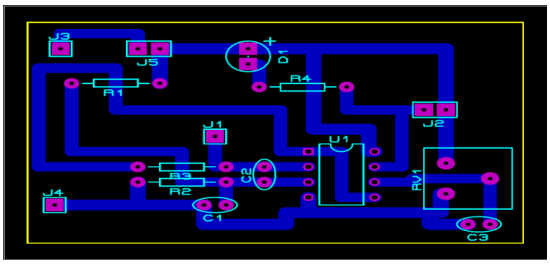
The 6.8 ohms (R3) of IC pin 1 and 2 are also connected.

Pin 1 and pin 5 of the IC are connected by a wire. The 1Kohms (R4) is connected with IC pin 7. The other leg of the LED is connected to pin 8, while the short leg is connected to row 8. (the row where one of the 1Kohms resistor leg is connected).

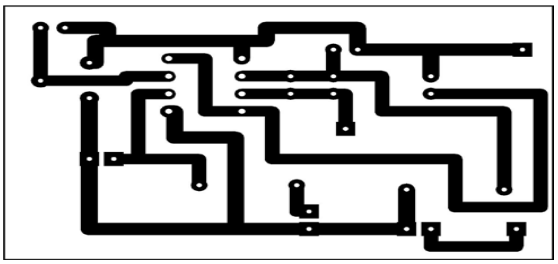
The lower right row with the long LED leg is connected to a wire (pin 8). One end is connected with pin 2 of the IC with the long wire (antenna). The black wire is linked to the left bottom of the board and the battery's red wire is attached to the right lower part of the board.

4. CONSTRUCTION ON PCB

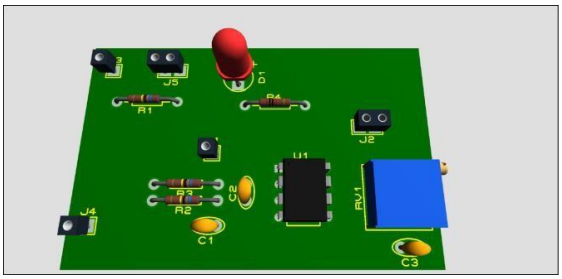
A PCB is a self-contained electronic module that can be found in devices that come from common beps or pagers and are equipped with radios to sophisticated radar and computer systems. The circuit consists of a thin layer of conducting material deposited[12] or printed on the surface of a so-called substrate insulation board. On the surface of the substrate, each individual electronic component is soldered to the interconnecting circuit.



This circuit is designed with PCB123 [11]software and printed on a special paper. It also was used to create a circuit and board print, which were designed for 3D purposes



After printing, onto the board called the substratum, which is the circuit path on the board is ironed on the design in this specific paper.



Then the substratum[14] is grated and left on the panel only, the electronic components are boiled and the entire board is cleaned and prepared for the components to be placed in position.

5.RESULT

This design was tested in the laboratory and proven by reading each component before and without the signal detector. A spectrum analyzer and signal generator were used for three laboratory tests. A mobile phone has also been used to test the completed project. The laboratory testing was conducted with the use of an input and output connected signal generator and spectrum analyser[13] using coax cables from the BNC. The second test consisted of how the LED worked in conjunction with the buzzer and the second test showed how bright and loud LED and buzzer could be if the circuit received signal from the signal generator.

The first test was done for the LM 358AN Op-Amp. The detector works with high efficiency at the end of these tests, as anticipated. The voltage values of the components were taken by a multimeter[16]. In case of not having a signal or mobile phone enabled near the detection range, there can be a constant value from the table for each component. The reason is not remote since the battery supplies the voltage, it passes across each component through the circuit. The LED and buzzer voltage is not enough to generate an alert, because the sound out of the buzzer has been alerted at 3V to 24V, and the LEDs at 1V to 3V.

If a phone is activated, the voltage of the components increases or falls across the detection range. The condensers (C1, C2, and C3) and op-amps LM358AN are fluctuated by a voltage drop as the antenna receives the signal. It's because the signal is irregular because it's a sinus wave that fluctuates[14]. The voltage across the buzzer increasingly fluctuates between 3.5Volts and 1.78Volts, with a sharp 3.5Volts sound only but a faint 2.75Volts sound and no sound at 1.78Vols. The voltage over the LED also increases and changes with the signal coming and going, but only increases at a voltage of 1Volt and higher.

When the bug detects the RF transmission signal from an activated cell phone, a beep warning begins and the LED is blinkered as illustrated in Figure 8. The warning is continued until the signal is stopped. When no signals are received, Figure 9 indicates the gadget. A telephone was activated for the mobile test and a telephone call with the detector was placed nearby. The LED comes in with a son, but later stops even if the call has not been aborted[18]. It is seen that after the call is made and the detector senses the signal. The wire used for the antenna was found to be weak and to have a better wire, and it functioned effectively and efficiently. after a lot of problems.

6. CONCLUSIONS

Mobile phone technology is increasingly developing new data capabilities. Bluetooth, high-resolution cameras, flash cards, and internet connectivity make them suitable for transferring data into and out of secure facilities. A cell phone employs a variety of transmission protocols, such as FDMA or CDMA[15]. These protocols govern how a cell phone connects with a tower.

Many businesses and organisations rely on information security and build fortresses, using techniques such as searching anyone entering and leaving, which takes a significant amount of manpower and resources.

This portable mobile transmission detector detects the presence of an activated mobile cell phone from a distance of 1m to 1.5m and can be used to deter the above-mentioned incidents as well as the use of mobile phones in inspection halls and confidential quarters, to name a few.

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