



# DESIGN AND IMPLEMENTATION OF CELL PHONE JAMMER

Ahmed A. Thabit

Department of Communications Computer Engineering, AL-Rafidain University, College Baghdad, Iraq

E-Mail: [drahmeda3@gmail.com](mailto:drahmeda3@gmail.com)

## ABSTRACT

The developments of wireless communication systems like mobile phones make it indispensable in our lives; this is due to the portability of mobile devices. Mobile phones features can produce inconvenience in the places where the silence and security are important. As well as, in certain locations the using of phones is refused due to the safety and security reasons and in exam places where the phone device is used in cheating. Jammers are devices which appeared now days in the markets. These jammers cut off the link between the cell phone and base stations via transmit a signal in the same frequency but larger power with no interference within communications other than cellular in the specified zone. Cell-phone signals usually emanate from a base-station that is usually made up of a very tall building and a small-building housing the radio-equipment. In this paper, Cell phone jammer device was proposed, designed and finally implemented to find dead zone to cell phones of Iraq to block the cell phone neither receiving nor transmitting the signals to the base station. LCD is used with Arduino to show a message if the signal is jammed or not yet. Cell phone jammers are firstly designed for the military forces to disconnect the communication by criminals and terrorists but recently it used civilian in the colleges and hospitals and so on. The designed system obtained the good results what we need to jam signals for dual band GSM 900,1800and 3G within a very short time reach to 30 sec.

**Keywords:** jammer, cell phone, GSM.

## 1. INTRODUCTION

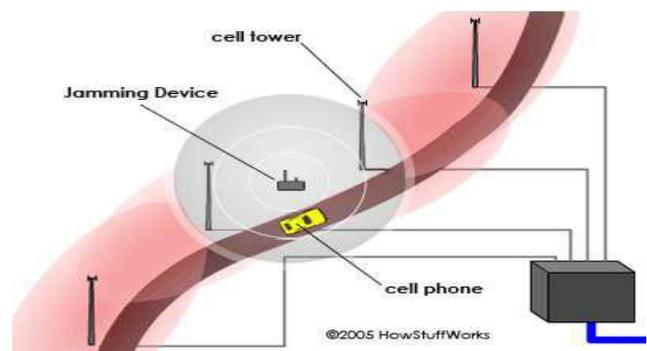
The telecommunication industry has seen a great development in mobile. According to International telecommunications union, about 5300 million people from the world use the mobile at 2010 [1]. The portability of the mobile make it easy to be carried, e.g. Libraries, Churches, Mosque, conferences and exam enters. The benefits of these devices can't count; however, their aptness can develop inconvenience in number of locations where the silence is very important, using of the mobile phones is not allowed for safety and security in certain locations. In addition to examination halls where the phones could help in cheating. The inconvenience usually is due to the clatter resulted by ringing the mobile; also, the judiciary doesn't allow to exchange the information using the phones inside that location. One way to overcome the Leaking information is to install a mobile phone jammer. Jam on the signal is a method of transmitting power on a communications links that minimize the effective use of the frequency spectrum for authorized telecommunications [1, 2].

The GSM mobile jammer transmits signals caused by noise in the similar frequency band as for mobile phone, thus the calling by mobile phone at that region is unusable. Usually mobile operators use the900MHz to 1800MHz.

Jammers are firstly developed and used via the military to reject exchange the information between the enemy forces. Now days, mobile phone jamming devices became using by civilian. The technique of the mobile jammers includes: the jamming device radiate RF signal at the same frequency of cell phones; then the signals interference with cell phone signal, which produce in a "no network available". All phones within the radius of the jammer will be idle. This means that the phone will lose the ability to make or receive calls [3, 4].Cellular

phone damage the connected link between cell-phone base station and the device as shown on figure (1).This results interference between cell phones and towers to make the phones unusable. [3].

Figure-1 represents the basic principle of jamming process. As clearly seen from this figure, the gray circle represents the jammer region that will prevent the communication to be happened as shown in the pinky color [5].



**Figure-1.** The basic principle of jamming process.

## 2. PROPERTIES AND SPECIFICATION OF THE JAMMER

Due to the design considerations, the jammer transmit signal at the same frequencies of GSM bands (900and 1800MHz). The design parameters are selected carefully to get the needed characteristics. These parameters can be summarized as:

### A) The distance (D) (range of the jammer):

The distance is important in the design since the output power for jammer based of area that needed jammed. In this paper the distance is selected to be  $D=10$  m for GSM 1800 and  $D=15$  m for GSM 900.



**B) The jammer frequency:** In Iraq, mobile network operates on the 900 MHz, 1800 MHz, and 2 GHz (3G). In this design, the jamming frequency must be the same for the downlink, because it takes a low power to get the jamming than the uplink range and no need to jam the base station [6].

**C) The Jamming to Signal Ratio (JSR)** is the ratio between jamming power and the signal power on the receiver that determines the degree of successful jamming. The role of the jammer signal is based on JSR, interleaving, type of modulation, the technique of channel coding. The loss that is generated during the distance and the path is also needed to calculate. Equation (1 & 2) represents the JSR and the free path loss calculation [4]:

$$\frac{j}{s} = \frac{P_j G_{jr} G_r R_{tr}^2 L_r B_r}{P_t G_{tr} G_{rt} R_{jr}^2 L_j B_j} \quad (1)$$

$$\text{The Freespace loss} = \text{Path Loss (in dB)} = 32.44 + 20 \log D \text{ (in km)} + 20 \log f \text{ (in MHz)} \quad (2)$$

Where:  $P_j$  = is the power of Jammer

$P_t$  is the power of Transmitter  
 $G_{jr}$  is the gain of Antenna from Jammer to the receiver

$G_{tr}$  is the gain of Antenna from Transmitter to the receiver

$G_{jr}$  is the gain of Antenna from Receiver to the Jammer

$B_r$  is the bandwidth of Communications receiver  
 $G_{rt}$  is the gain of Antenna from Receiver to Transmitter

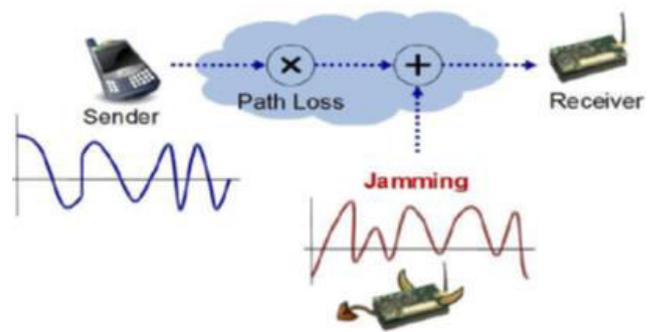
$B_j$  is the Bandwidth of Jamming Transmitter  
 $R_{tr}$  is the Range between communication transmitter and receiver

$R_{jr}$  is the Range between Jammer and communication Receiver

$L_j$  is the Jammer Signal Loss, this includes polarization loss

$L_r$  is the Communication signal Loss [7, 3].

The above equations determine that the power radiated from the jammer (a product between output power and antenna gain) should be high. On the other side, so as to decline jamming, the gain of the antenna toward the communication must be higher than the gain of the jammer. If the distance of the jammer and receiver is twice, the jammer is quadruple its output to get the same effect. It must also be noted that the jammer path loss is different from the communication path loss. The operation of adding the jamming signal and path loss is shown in Figure-2:



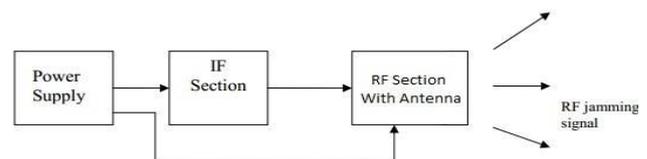
**Figure-2.** The basic operation of JSR process [7].

In recent paper, a GSM-900, 1800 and 3G Mobile phone Jammer is designed and built. The system was tested on Networks in Iraq (i.e. Asia cell and Zain Iraq) and has good work with an average distance of 15 m. The system faced problems at tuning VCO to the desired distance because of the power supply variation with the load current. To enhance the jamming, a power supply with good stability must be designed. Different locations were tested to show that the dependency of the jamming range is on the signal strength, in low GSM coverage area, the jamming range exceeded 20 m. Generally, the jamming attack is saved by the signal power of the network. It can be discovered that the immunization from the jamming signal in the GSM system is weak and could not resist the simplest jamming techniques. The main drawback of the mobile jammers is the transmission of the jamming signal which is prohibited by law on many states [8].

### 3. THE BASIC CONSTRUCTION OF THE JAMMER DEVICE

Generally, the jammer device consists of the main components as seen in Figure-3 [9]:

- Power Supply
- Circuitry (IF and RF stages)
- Antenna



**Figure-3.** The basic Diagram of Mobile Jammer.

As shown in Figure-3, the jammer consists of three sections: the Power supply that provides the required DC voltage. The IF region generates frequency by tuning the VCO. The RF stage converts the IF frequency to RF frequency by using a power converter. The RF frequency is amplified using a power amplifier and transmitted using a suitable antenna.

The power supply provides the driving force, i.e. electrical energy needed to drive all other sections of the system. This is successfully achieved by using a 9 volt battery as its power supply section [10].



The Circuitry is the main electronic components of a jammer device that founded in IF and RF stages i.e.

- VCO Generates a signal which interfered with the signal of cell phone.
- The circuit of tuning control on the frequency of the jammer by sending a voltage to the oscillator.
- Generator of the noise that produce output randomly in the allocated frequency range to jam the network of cell-phone.
- RF amplification to support power of the radio frequency output to enough levels in order to jam the signal [7, 11]

The IF stage is basically consist of the following components as seen in Figure-4.

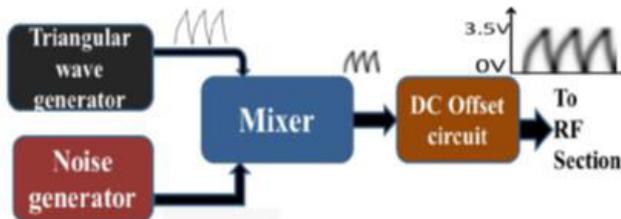


Figure-4. The IF stage of the jammer device [7].

The RF stage generally consist of the following components that seen in Figure-5.

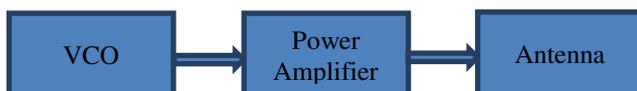


Figure-5. The RF stage of jammer device.

#### 4. PROPOSED SYSTEM DESIGN

The proposed system can be summarized in the following flowchart that represents the steps needs to generate the jamming signal.

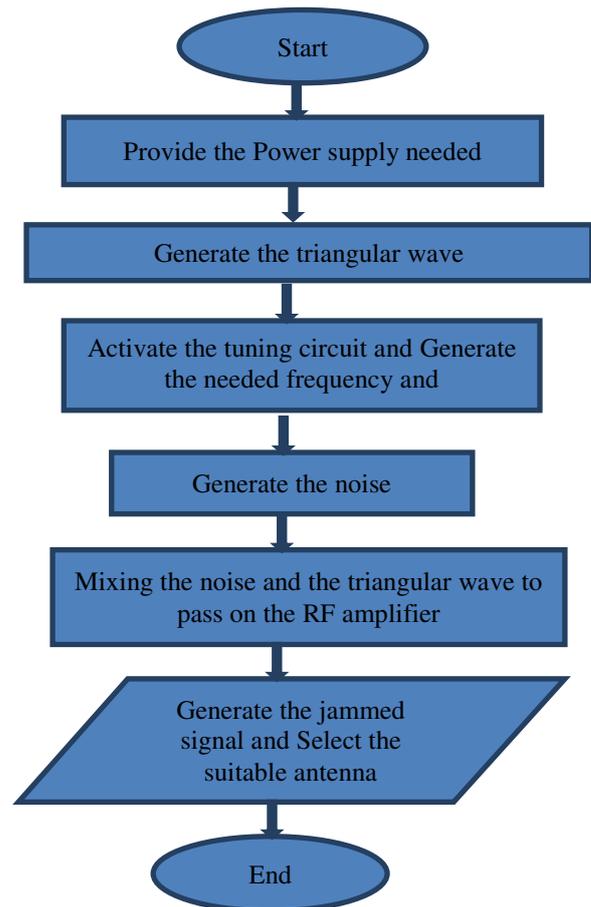


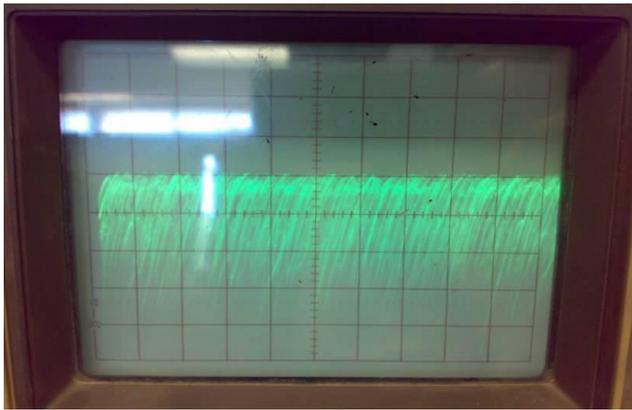
Figure-6. The flowchart of the proposed system.

The basic circuit proposed in this paper is shown in Figure-7.

This figure is basically consists of the following stages:

The power supply (9v, 12v), triangle wave generator, noise generator, the intermediate frequency and finally RF stage and the antenna. The values of the electronic components such as the resistances, inductors, transistors, power amplifiers and the capacitors that used in the design are selected according to design requirements to jam the signals. The function of each stage is mentioned early in this paper. It is important to note that this Figure can be used for GSM 900, 1800 and 3G the difference is the power amplifier and the antenna only.

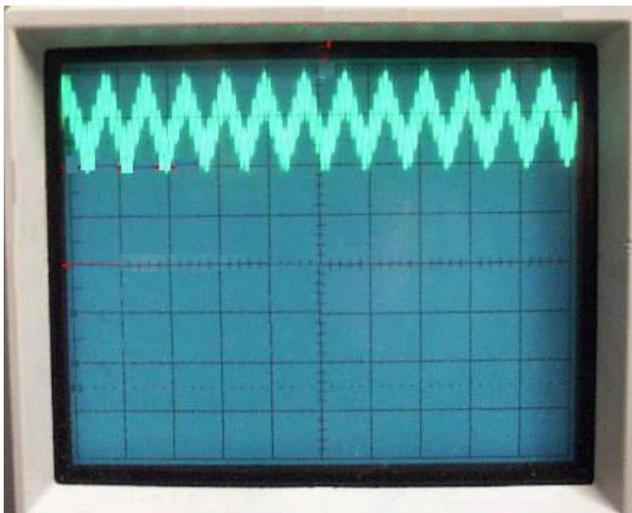




**Figure-10.** The generated noise.

C. VCO is a device required in the cellular jamming circuit. It is an oscillator circuit that the output frequency is based on the input voltage.

D. Mixing the signals by an Op-Amp as a summer between the triangular wave and noise to combine noisy triangular wave as shown in Figure-11 that represents the mixing between the noise and the triangular wave. The resulting RF signal from the VCO will sweep through the cellular downlink frequencies and will be frequency modulated with the noise signal.

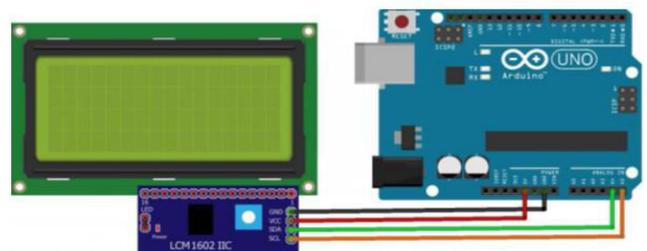


**Figure-11.** The mixing between the noise and the triangular wave.

E. RF Power Amplifier (PA) is an amplifier usually represents the last amplification stage. PA designed in order to produce the required output power, i.e. it converts IF signal into signal with significant power. The output from VCOs does not produce the required output power of GSM jammer; therefore, an RF power amplifier is required to reach the Jamming power.

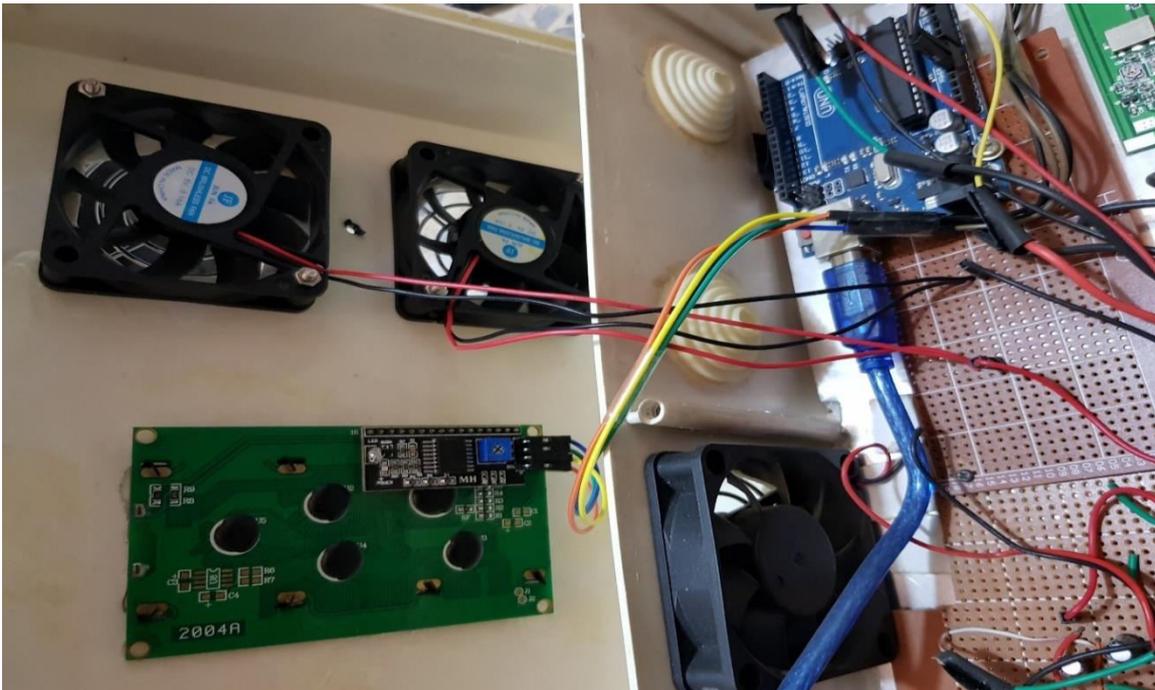
F. The Antenna is a key element in wireless communications system. In this paper the antenna is employed to radiate RF signals to the free space. The designed jammer in this paper required three antennas for different frequencies operating simultaneously in the 900 and 1800MHz and 3G. The properties of the antennas are: the length is  $\frac{1}{4}$ wavelength monopole, 2dBi as a gain, Omni-directional, VSWR <2 and 50Ω as input impedance.

G. The Arduino microcontroller has analog and digital I/O pins that can be combined with different shields. Uno Arduino that used in this paper simultaneously with LCD to show the message about the case of jamming process. It is programmable with the Arduino Integrated Development Environment by USB cable. The power comes from a USB cable or an external battery of 9volts. It works with 7 to 20 volts. The Arduino UNO is generally considered the most user-friendly and popular board, with boards being sold worldwide. Figure-12 represents the connection between the LCD and the Arduino.



**Figure-12.** The connection between the Arduino and the LCD.

The practical connection on the board between LCD and the UNO Arduino can be seen in Figure-13.



**Figure-13.** The connection between the LCD and the Arduino.

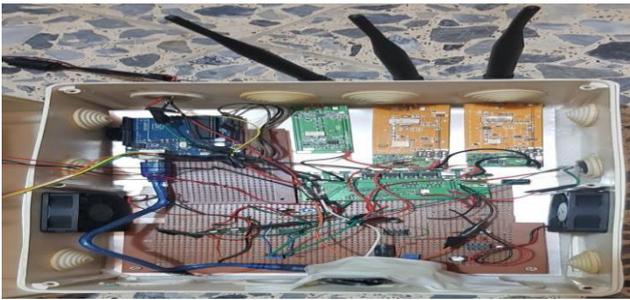
It is important to say that this system contain 4 fans for cooling the system. The front side of Figure-13 is

seen in Figure-14 that shows the message on the LCD when the signal is jammed.



**Figure-14.** LCD when it is worked.

However, the total system can be seen clearly on Figures (15, 16 and 17) which shows the details of the total designed jammer circuit.



**Figure-15.** The total system inside box during the connection.



**Figure-16.** The total system inside box during the work.



**Figure-17.** The total system inside box after closing the cover.

## 6. CONCLUSIONS

After completion of this paper there are conclusions can be estimated from the implementation of this system. One of these points is the lower cost of this design (approximately 60\$) this is low cost if compared with advantageous of this system either in military or civilian. This system also has advantage over the other designs that is used LCD together with the Arduino to display a message that tell us when the system began jamming the Cell phones. The other benefit over the other systems is using more fans (4 fans) that provide more cooling for the system which will provide longer life time for the system. However, it is important to remember that this system is refused in number of countries.

## REFERENCES

[1] 2011. Assessment of the global mobile broadband deployments and forecasts for International Mobile Telecommunications. Report ITU-R M.2243.

- [2] Mupparaju. V., Yembadi S. 2013. Advanced Mobile Phone Signal Jammer for GSM, CDMA and 3G Networks with Prescheduled Time Duration using ARM 7. International Journal of Professional Engineering Studies.
- [3] Nsikan N., Iwu C. Lawson, F. Idachaba, Ibinabo B. 206. Design and Implementation of a Dual Band Mobile Phone Jammer. Proceedings of the World Congress on Engineering and Computer Science, USA.
- [4] Diana S. M. Edwin A. and Simiyu S. 2016. Design and Testing of a Mobile-Phone-Jammer. Innovative Systems Design and Engineering. 7(7).
- [5] GSM 900 Mobile Jammer. Dept. of ECE VBIT Pembarthi
- [6] Pradip M. J., mangesh M. G., Dr. M. S. Ali 2010. A survey of mobile ad hoc network attacks. International journal of engineering science and technology. 2(9): 4063-4071.
- [7] Aryan kumar, karthikeyan R., M. aditya, nikhil kumar. 2016. Signal jammer. Report, visvesvaraya technological university.
- [8] P. Naresh, P. Raveendra Babu 2, K. Satyaswathi. 2013. Mobile Phone Signal Jammer for GSM, CDMA with Pre-scheduled Time Duration using ARM7 International Journal of Science, Engineering and Technology Research (IJSETR). 2(9).
- [9] <https://www.rfwireless-world.com/Terminology/rf-jammer.html>
- [10] AFFO ALEX, EFFAH ONASIS, IBRAHIM I. FAREED. 2012. Design and construct a dual band mobile jammer for GSM 900 & GSM 1800.
- [11] Stephen B. Joseph, Digima Mustapha. 2018. Design and Testing of a Cell phone RF Signal Detector. Emmanuel G. Dada, Journal of Scientific and Engineering Research. 5(4): 288-295
- [12] Mohamed O.H. Saeed. 2017. Cellphone jammer circuit. Thesis, department of electrical and electronics engineering, university of khartoum.