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PRESENCE OF ACTIVE MOBILE PHONES AND HIDDEN CAMERA DETECTION

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ABSTRACT

In our day to day life the usage of mobile phones has been increased in restricted area such as exam venues, places of important meeting, offices, conference halls, prison etc. and the hidden wireless camera in trial rooms and hotels, public toilets. The radio frequency signals are transmitted from wireless camera and mobile phone during the video transmission, incoming call and outgoing call, text messages from one gadget to another. The detector will detect the transmitted signal and then it is gives as input to AT mega 8 microcontroller. As soon as the Arduino microcontroller receives the signal, it will turn ON the beep alarm and the information will be displayed on the LCD display and also sends the message like mobile detected with location, room number etc. to the mobile number stored in the microcontroller by using the GSM module. This system will be used to detect the mobile phones and the wireless hidden camera present in a room by the radio frequency signals which are transmitted by them.

Keywords: AT mega 8 microcontroller, GSM module, mobile phone detector, radio frequency signals.

I. INTRODUCTION

In recent years, there has been increasing issues relating to the use of mobile phones and camera in restricted areas. The mobile phone provides many ways for a student to cheat in an examination hall. The mobile phones are strictly prohibited inside the examination rooms. One of the existing approaches is to ensure the students are free of mobile phones in examination hall is by manual inspection in the entrance. Manual inspection cannot fully reveal the students having mobile phones all the time. These devices will ensures the connectivity between a student sitting inside the hall and outsiders have been considerably increased a burden to invigilators to ensure that malpractices are not committed during exams. A student may constantly communicate with other students outside the examination hall via Email and text messages. They can exchange information such as question and answer through whatsapp, Email attachments etc. By using a mobile camera a student can take the

snap shot of the question paper and send to other students for help. Sometimes there are more possibilities for leaking the question papers.Nowadays mobile has internet connectivity so that a student can post questions in online and gets quick response and in addition they can search for answers in search engines. The storage capacity in the mobile offers students to store lecture notes, books and other unauthorized materials that are related to the exam. Many applications installed in mobile phone allow a student to commit cheating, application such a scientific calculator, dictionary etc. as the technology keeps on advancing, the students also get access to those technologies to commit cheating[1].

The hidden wireless cameras, eavesdropping microphones etc. which are used in an illegal way in areas like trial rooms, hotels, and in places of important meetings. So there is need for the detection of signals which are emitted from the hidden wireless camera, microphones, mobile phone. Here we try to prohibit the unauthorized use of mobile phones by using a detector, that sense the presence of an activate mobile phone signals radiated by them and also the wireless camera which radiates RF signal. Efforts have been put in place to tackle this issue but they all have their own shortcomings. The circuit can detect the signals during video or audio transmission from hidden camera and microphones also incoming calls and outgoing calls, messages and video transmission from mobile phone.

The detector detects the RF signal and the signal information is indicated by using a beep alarm and displayed in LCD module, and also it is informed to the administrator number which is programmed in microcontroller. The alarm continues until the RF signal transmission get offThe transmission frequency range of the mobile phone signal is about 0.9 to 3 GHz and the wavelength of about 3.3 to 10 cm. so there is a need to design a circuit that detects GHz frequency signals.

LITERATURE REVIEW

The advancement in usage of mobile phones has been promoted them to become the learning media. Therefore the use of mobile phone into the instruction in the universities has increased [2]. In spite of the vital role played by mobile phone as a learning tool there are still challenges as they are used for cheating during exam and in school hostels[3]. Today schools have noted that increased use of phones to cheat in examination by students. Taking in to consideration that, some unofficial users of mobile phones may not be finding out by invigilators in exam halls, better equipment is needed for the detection of mobile phones in a room[4].

The first detection technique, tuned LC circuit is used to detect the RF signal from mobile phones-uses discrete component which is difficult to apply. The design incorporated tuned LC circuit which is used to detect the low frequency radiation in amplitude and frequency modulation bands. A capacitor is used as a part of the LC circuit as C while the coiled wire forms the L to receive frequency signals from the mobile phone[5].

Second “An intelligent mobile phone detector” developed by Mbaocha[6], which was able to detect the GSM signals emitted around it. The device had a capability of detecting SMS, calls etc. from mobile phones. However, the device was unable to peculiarize two specific mobile phones operating in the same frequency range.

“Design and Implementation of Cell-Phone Detection based Line follower Robot” by Kanwaljeet Singh, Mandeep Singh and Neena Gupta[7] developed line follower robot designated to detect the use of mobile phones in restricted premises. It is composed of cell phone detector circuit when the robot receives

the Radio frequency signals from mobile phone it stops moving and LED blinks along with alarm sound. It continues till the transmission signal stops.

"Mobile Sniffer and Jammer" designed by Sujith M[8] has capability to detect the use of GSM signals. It consists of RF detector and PIC microcontroller, jammer circuit will block the mobile phone signal transmitted by cell phones. This device will detects the RF signal level and produces the warning alarm when the signal strength level increases.

I. SYSTEM DESIGN

The main purpose of the overall system is to detect the RF bugs present in a room. The circuit detects the RF signal and report to the administrator number stored in microcontroller. And the RF signal radiated from hidden camera is detected and it is displayed with the help of LCD module.

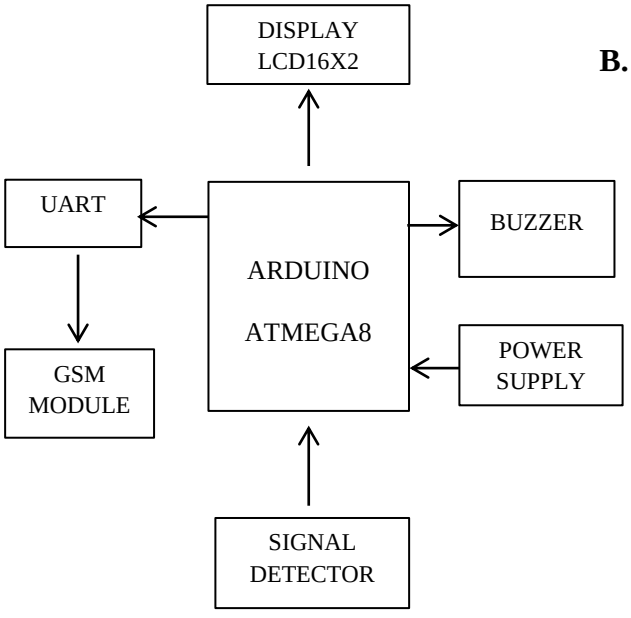

Fig.1: Block diagram

A. Mobile Phone Detector

The system consists of RF signal detector, ATmega 8 microcontroller, LCD module, GSM module, and buzzer alarm.

The basic principle of mobile detector is the idea of using disc capacitor to detect the cell phone signal with the frequency range 0.9 to 3GHz within 1.5 meter radius. The capacitor and the lead acts as a loop antenna, which is capable of receiving the transmitting signal from the activated mobile phone[9] and the wireless camera which is transmitting the live video in a room.

The signal is received by the RF detector by mutual induction between the capacitor and lead. The signal is given as an input to the ATMEGA 8 Microcontroller, there the signal is rectified and then it is sent for further process. The signal received is an analog signal. The analog signal is converted into the digital signal using Analog to Digital converter, this A/D converter is induced in the microcontroller. It is programmed by using Arduino software.

B. Arduino microcontroller

When the device is powered by 9v dc supply, the RF antenna will receive the wireless transmission signal from mobile phone or from camera and the signal is given as an input to the microcontroller. Here we use ATmega 8 arduino microcontroller which is programmed to send the information to LCD display and also report message to the administrator via GSM module. Fig 2 depicts the Arduino microcontroller.

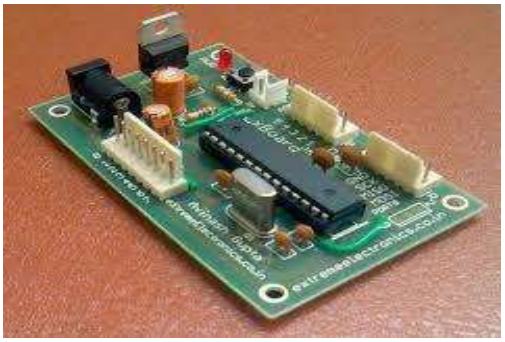

Fig.2: Arduino microcontroller

The ATmega 8 microcontroller consists of In-System programmable flash memory of 8Kbytes, 1KB of SRAM and 512B EEPROM. This device supports 16 MIPS throughput at 16 MHz and operates at 2.7v to 5.5v. In order to make fit it for monitoring and real time applications, the microcontroller is induced with 8 channel 10 bit Analog to Digital converter. And to avoid the removal of microcontroller, arduino board is enabled for updating new program codes to make the port connect and disconnect with standard headers. Fig 3 ATmega microcontroller.

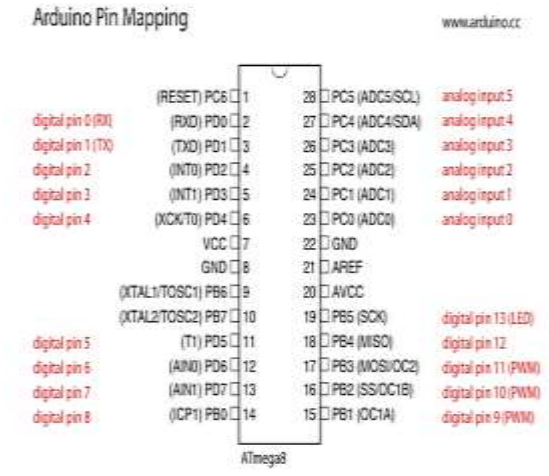

Fig.3: ATmega 8 pin configuration

C. LCD Display

Liquid Crystal Display is the material, which have the molecular structure and flows like a liquid. LCD module is a low power device. Properties of the molecular structure are associated with the solid structure. The power requirement for LCD is in the order of microwatts. LCD's are subjected to chemical degradation, so it is operated at the temperature range from 0 to 60 degree Celsius and the lifetime is short.

Classification of LCD:

1. Dynamic-scattering LCDs
2. Field-effect LCDs

Fig.4: 16×2 LCD Display

Apart from scattering type LCD, all others absorb less power source but their cost is high and height is upto 2 inches, while dynamic scattering LCDs are available at 8 inches height.

The ON and OFF time of the LCD is one of the important consideration in all displays. LCDs response time is up to 100 to 300ms. Standard lifetime is beyond 1000+hours.

D. Telescopic antenna

An antenna who's receiving elements such as arms of dipole is made in forms of a flexible system of metal tubes of approximately equal length. Changing the length of the antenna elements during tuning and let the size of antenna to be reduced and when is not in the operation. These antennas are used predominantly in incorporation with radio

receivers, radio transmitters and television receivers installed in moving objects.

E. GSM Module(SIM 900)

GSM module is used here to send information to the registered mobile number in the controller.For cost effective and to have small dimension SIM Com module is induced with single chip processor affiliating AMR 926EJ-S and quad band –GSM /GPRS module of SMT type.

Fig.5: GSM Module SIM 900

II. WORKING PROCEDURE

The RF detector detects the RF signal and sends to microcontroller totransmission signal into digital signal. And the microcontroller sends the information to the LCD and to GSM module.Here the circuit uses disc capacitor 0.22µF, in order to capture the RF signal transmitted from wireless hidden camera and mobile phones. The lead is fixed in order to get desired frequency. The disc capacitor along with the lead acts as a loop antenna to capture the RF signal from RF bugs hidden in a room.

Op-amp IC CA3130 is used for current to voltage conversion with capacitor C3 which is connect in between inverting and non-inverting inputs of the op-amp. The P-channel MOSFET transistors present in the input to provide very high input impedance, very low current and high speed performance IC-555 timer is a highly stable controller which is capable of producing accurate timing pulses. And the monostable operation the time delay is controlled by the external resistor and one capacitor. With an astable operation the frequency and duty cycle are

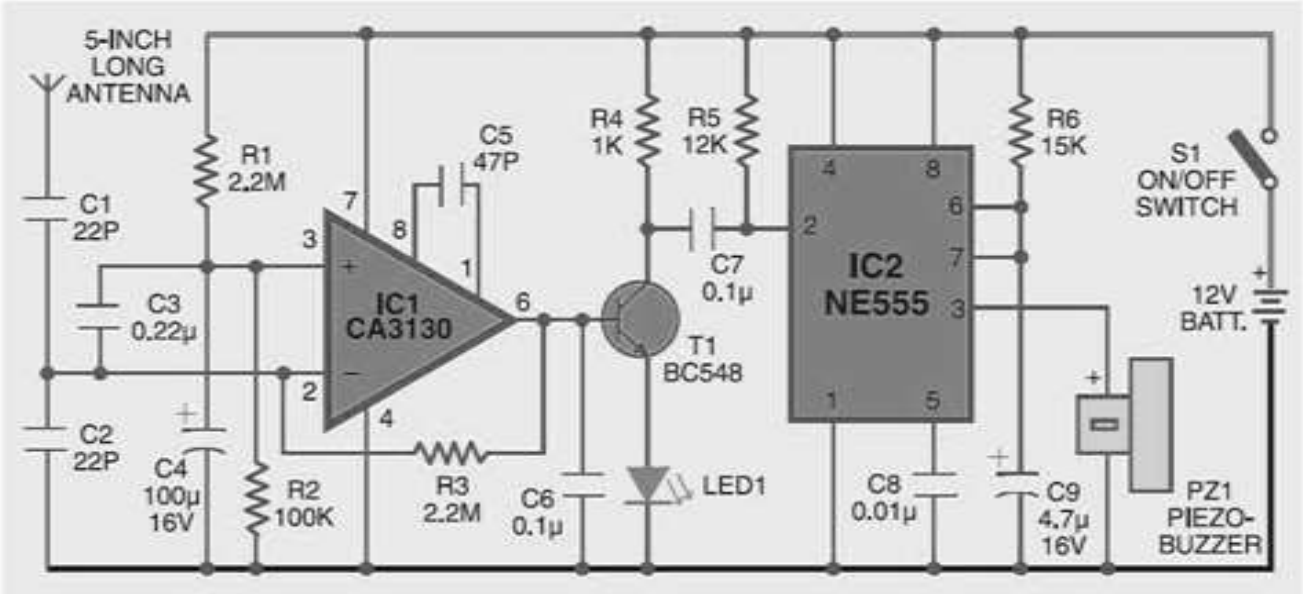

Fig.6: RF signal detector circuit

controlled by two external resistors and one capacitor. Capacitor C3 creates a field and stores energy.Then transfer the stored energy into current which is input to the IC1 and convert into voltage. Capacitor C4 with the resistor R1, keeps the non-inverting input stable for high state output. Capacitor C4 discharges and the feedback resistor R3 will make the inverting input high for high output. Capacitor C5 (45pF) strobe and null of IC1 for the phase compensation and the gain control to get better frequency response.

When the capacitor C3 detects the RF signal, the output of the IC1 becomes low and high alternately. The frequency of the signal is indicated by LED1. This signal will trigger the IC555 timer through capacitor C7. Capacitor C6 maintains bias voltage of the transistor T1 for fast switching action. The components R6 and C9 produce very short time delay.

The microcontroller gets the input RF signal and performs the operation programmed in it. It sends the information to LCD module and it is displayed as "MOBILE DETECTED" or "CAMERA DETECTED". And it report to the administrator mobile number stored in the controller. And alarm sounds until it stops receiving the RF signal

III. PCB LAYOUT

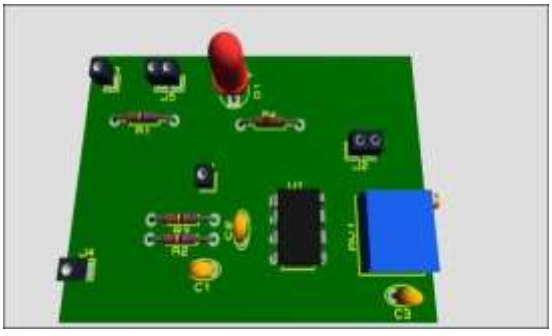

Fig.7: 3D design circuit (Front view)

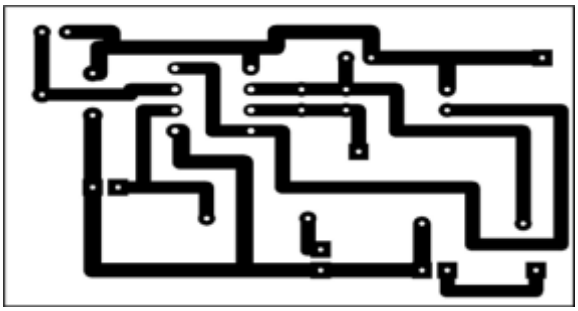

Fig.8: Design printed on board

IV. RESULTS

This paper detects RF signal which are emitted from the mobile phones and the hidden wireless camera during incoming and outgoing calls, messages and direct video transmission from one device to another with the alert system. This will continuously monitors the RF level with in a room. If the RF signal level increases a warning message is send to the number via GSM module which is registered in ATmega 8 microcontroller and the message is displayed through the LCD display as RF signal is detected.

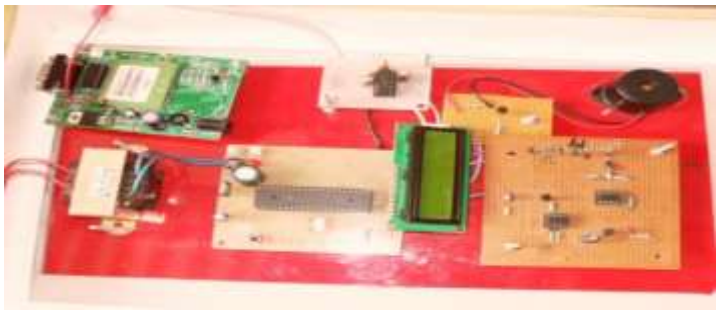

Fig 9: Original prototype

V. FUTURE SCOPE

Trying to increase the detecting range by using the preamplifier stage using JFET or MOSFET transistor used in an interface between the capacitor and IC. Being able to detect the Bluetooth transfer. Current system

only detects the 2G/3G transmission signals. To determine the exact position of mobile phone and camera hidden in a room.

VI. CONCLUSION

Mobile technology and wireless camera gains new data capabilities rapidly. Features like direct transmission of video from small wireless camera to other devices. A mobile phone uses many different transmission protocols, which dictates how cellular phones communicate with towers. Many institutions depend on keeping information secured and to build fortresses imploring methods to check every one. It requires a lot of manpower. This detector sense the signal with 1.5 meter radius to prevent the malpractices in restricted areas.

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