# Electromagnetic Field (EMF) Radiation Detection and Control using Arduino

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*Abstract*— This project presents the detection and control of high Electromagnetic (EMF) radiation generated from home appliances and other electronic devices. The high range of Electromagnetic field radiation causing diseases like regular headache attacks, uneasiness, insomnia, anemia and even cancer. The EMF radiation detector detects the high radiation and it is sent to Arduino controller. The high radiation controlled by using the EMF neutralizer.

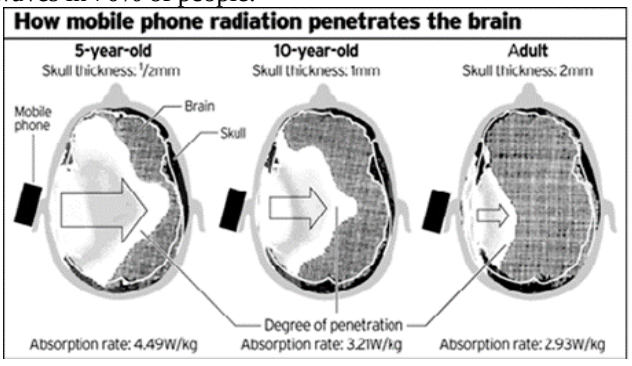
***Keywords:*** Arduino, Cancer, EMF, Electronic Device, Neutralizer

## I. INTRODUCTION

The Electromagnetic field is a combination of an invisible electric and magnetic force field. They are generated by natural phenomena such as the electromagnetic field of the Earth, but also by human activities, mainly through the use of electricity. The EMF that surrounds us can be classified basically into RF of high frequency radio waves and extremely low frequency electromagnetic fields. It has been shown that both types have their negative impact on our health, however, it is believed that the easier to reach low frequency electromagnetic fields are potentially much more damaging than radio frequency. The main sources of these ELF EMFs could be the radiations of our 50/60 Hz home network through televisions, mixers, amplifiers, ovens, mobile phones, power lines, electronic devices and computer screens, etc. reverse direction at regular time intervals, from high radio frequencies (mobile phones) to intermediate frequencies (computer screens) at extremely low frequencies (power lines). To neutralize the field with the help of inductor randomly generate EMF over existing harmful radiation.

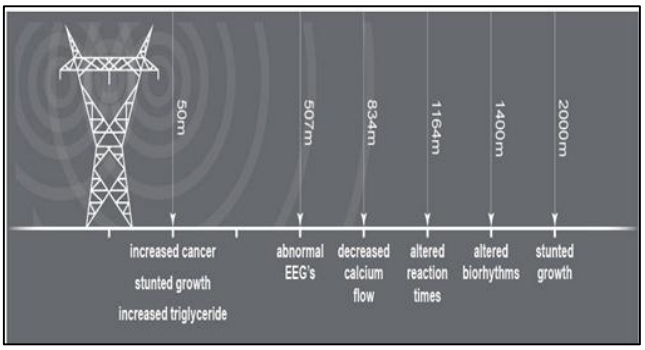
## II. HEALTH RISK

Cell phones- When you put the phone near your ear, 10% - 80% of the phone's radiation penetrates your brain by two inches. In children, penetration is even deeper. Studies have shown that cell phones near the head cause changes in brain waves in 70% of people.




### A. Power Lines

Electromagnetic radiation from high-voltage lines is something that can affect people's health in urban and rural communities. Strong and artificial electromagnetic fields that are irradiated by power lines can mix and interfere with the body's natural electromagnetic fields, influencing everything from sleep cycles and stress levels to the immune response and DNA.




### B. National Standards:

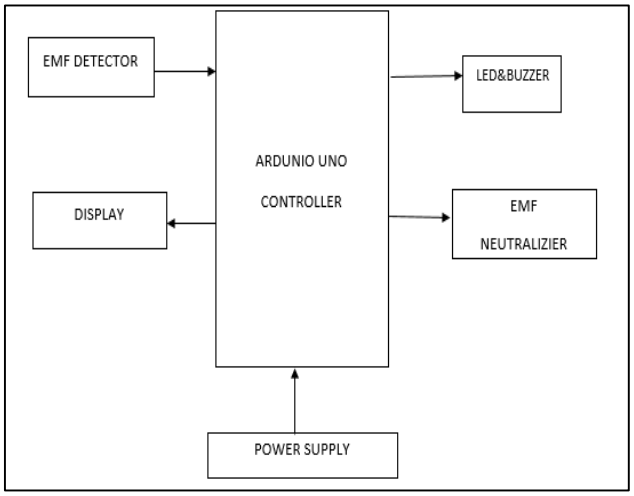
The acceptable RF-EMF exposure levels vary widely from country to country. As indicated in the Bio Initiative report for the RF frequency range of 800-900 MHz, exposure levels range from 4 µW / cm2 (Switzerland), 6 µW / cm2 (China) and 10 µW / cm2 (0, 1 W / m2) in Russia and Italy at 580 µW / cm2 (5.8 W / m2) in the United States and 5800 µW / cm2 (58.0 W / m2) in the United Kingdom.

### C. Department of Telecommunication:

The present limits/levels for antennae (Base Station) EMF emissions for general public exposure are detail below –

| Frequency Range | E-Field Strength (Volt/Meter) | H-Field Strength (Amp/Meter) | Power Density (Watt/Sq.Meter) |
|---|---|---|---|
| 400MHz to 2000MHz | 0.434f ½ | 0.0011f ½ | f/2000 |
| 2GHz to 300GHz | 19.29 | 0.05 | 1 |

## III. HARDWARE DESIGN



### *A. Arduino Uno*

Arduino Uno is the microcontroller and is the open source computer hardware and software is a single board microcontroller kit that can be used for various application in several area it is completely based on the microchip AT mega 328p. The Arduino Uno board have set of analog and digital pins that can be connected to the bread boards (shields) and other circuits. The board have 6 analog pins and 14 digital pins and also have integrated developed environment. It was powered by USB cable by external 9 volt. It is also similar to the AT mega 2560 and Arduino Nano.

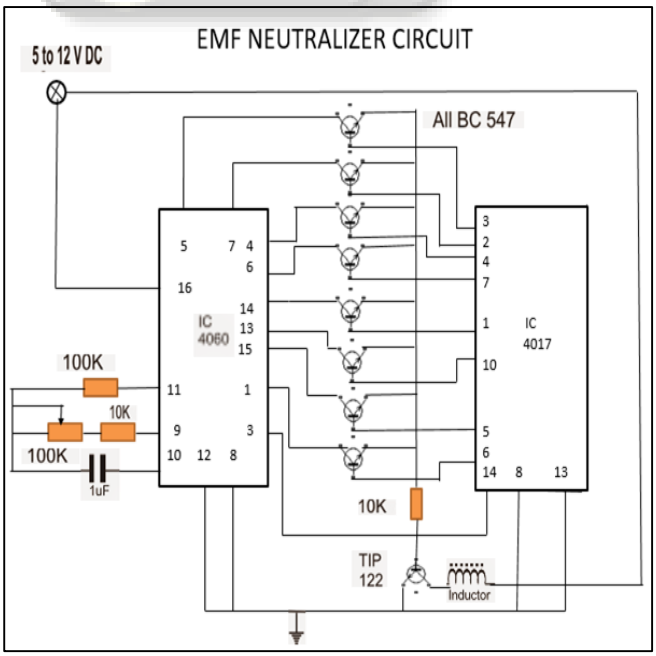
### *B. Detector*

The EMF detector coil is a test and measurement device used in various industrial applications to detect problems in electrical connections and power lines.The EMF coil gives information about the workflow in the electromagnetic field by the measuring electromagnetic radiation flux density in comparator. Moreover, this instrument can track the changes in the electromagnetic field that occur over a confident period of the time (AC fields).

### *C. LCD Display*

This is an LCD screen designed for electronic locks. It is an alphanumeric LCD screen with 16 characters and 2 lines connected to a single 9-way D-type connector. This allows the device to connect to most E-Block E / O ports. The LCD screen requires data in a serial format, which is detailed in the user guide below. The screen also requires a 5V supply. Be careful not to exceed 5V, as this may damage the device. The 5V are best generated by a multiple E-block programmer or by a fixed 5V regulated power supply. The RV1 potentiometer is a contrast control that must be used to adjust the screen contrast for the environment in which it is used.

### *D. EMF Neutralizer Circuit*




The IC 4060 is normally configured as a free-running oscillator. The outputs from pin # 1 to pin # 7 produce frequencies that vary by a factor of 2x, which means that a particular output could be a constant 2x frequency compared to the previous pin out or x / 2 compared to the previous pin out. All these pin outputs with individual frequency outputs are connected to the respective configuration of the common collector transistor. The bases of these transistors are in turn controlled by the sequential switching output of the IC 4017, which is synchronized by the lowest frequency pin outside the IC 4060 itself. Therefore, the 8 transistors are randomly switched to allow randomly selected frequencies appear at the base of the TIP122 power transistor. The TIP122 responds to these random frequency variations and the connected inductor fluctuates accordingly. The coil that is subjected to these oscillations at high current levels begins to emit the respective Electromagnetic fields (ELF) in the surrounding atmosphere due to the effects of neutralization expected on the harmful radiation of the existing network. The power required to operate this neutralizer or the proposed EMF protection circuit is 12 V at 3 amps.

### *E. Result and Discussion*

The output of the project displays the amount of Electromagnetic field detected in terms of mill gauss because the EMF value is measured in Tesla or Gauss and the amount of field is controlled by the EMF neutralizer effectively. The project future scope is to neutralizer or control the high value of Electromagnetic radiation from wireless technology equipment's and other electronic devices

```
19:41:15.845 -> 1023
19:41:15.845 -> 512
19:41:15.845 -> 1023
19:41:15.892 -> 1023
19:41:15.892 -> 804
19:41:15.892 -> 658
19:41:15.892 -> 1023
19:41:15.892 -> 1023
19:41:15.892 -> 1
19:41:15.892 -> 512
19:41:15.892 -> 1023
19:41:15.939 -> 1023
19:41:15.939 -> 1
19:41:15.939 -> 731
19:41:15.939 -> 1023
19:41:15.939 -> 877
19:41:15.939 -> 74
```

## IV. CONCLUSION

The proposed Electromagnetic field detector is able to detects the 0.5mG to 5.0mG harmful range for affects the humans and able to control up to 2.5mG range for protect the human. In future the proposed system is implemented and used in industries, offices and household applications for real time use in the Electromagnetic field control.

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