IoT -based Computer Generated Electromagnetic radiation Detector –Monitoring System

Dr. Jagdev Singh Rana
Professor (Computer Science), Dean - School of Science & Engineering
Indus International University – Himachal Pradesh

Abstract: ***The main aim of proposed work is to monitor EMF radiation from Computer and other electronics and electrical appliances. The system is mainly composed of Arduino Uno meter and radio frequency detector, display unit. Arduino Uno work as a controller and converter for voltage level to electric value. If the electric-filed value is greater than the allowed range, the electric buzzer will turn on.***

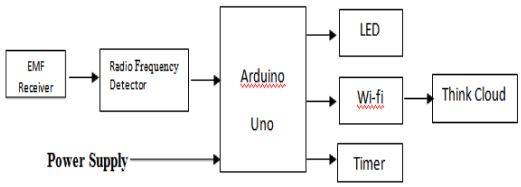
A camera module is used to take pictures, a microcontroller is used to process and communicate with Internet of Things services, and a cloud-based server is used to store and manage facial data. The gadget conducts face detection and identification locally using machine learning algorithms, and then sends encrypted data to the cloud for additional processing and storage. This hybrid method guarantees flexibility in cloud analytics and storage together with quick local processing.

Keywords: Arduino-Uno, IoT, EMF, Microcontroller, Cloud Analytics, Gadget, EMF detector, think cloud, Mega board, Micro-Gauss, Regression, mG etc

INTRODUCTION

The Internet of Things (IoT) has completely changed how we interact with gadgets in the age of smart technology, enabling more automation and better security measures. The creation of an Internet of Things-based facial recognition gadget for real-time authentication and identification is presented in this project. The system combines cutting-edge face recognition algorithms with Internet of Things (IoT) capabilities to produce a scalable, reliable, and effective solution appropriate for a range of uses, such as attendance tracking, security access control, and customized user experiences.

Internet of Things (IoT)-based facial recognition gadget is a major development in smart security systems, providing a flexible and effective solution for a range of sectors. Its ability to fulfill the demanding requirements of current applications is ensured by its mix of real-time processing, cloud connection, and strong security measures, opening the door for more intelligent and connected environments



Block Diagram of IoT base EMF detector

Component Specification Complete

EMF Receiver : The emf receiver receive electromagnetic forces by uses of 2N2222 NPN bipolar transistor configured to give a high current gain, so any charge near the antenna will shows the result and illuminating the LED

Radio Frequency Detector :

A radio frequency detector monitors the output of the Radio Frequency Circuit and develops a DC current output. RF detector is used to measure and controls Radio Frequency Power in wireless systems.

Arduino UNO

The Arduino UNO is a standard board of Arduino. Here UNO means 'one' in Italian. It was named as UNO to label the first release of Arduino Software. It was also the first USB board released by Arduino. It is considered as the powerful board used in various projects. Arduino.cc developed the Arduino UNO board. Arduino UNO is based on an ATmega328P microcontroller. It is easy to use compared to other boards, such as the Arduino Mega board, etc. The board consists of digital and analog Input/Output pins (I/O), shields, and other circuits.

LED

A Light Emitting diode is a semiconductor device that emits light when current flows through it. Electrons flow in the semiconductor with electron

holes, releasing energy in the form of photons. The color of the light is determined by the energy required for electrons to cross the band gap of the semiconductor

Wi-fi

wi-fi is a wireless network protocols based on the IEEE 802.11 family, which are commonly used for LAN of devices and Internet access allowing nearby digital devices to exchange data by radio waves. When we access wi-fi we are connecting to wireless router that allows us wi-fi compatible devices to interface with internet

Timer

Timer: Timer is a device that allows us to shift the display on a digital clock from the time to count up or countdown display. This device can be utilized in a variety of settings where keeping track of the elapsed time is needed.

Think Cloud

The cloud refers to serves that are accessed over the internet and the software and data based that run on those servers

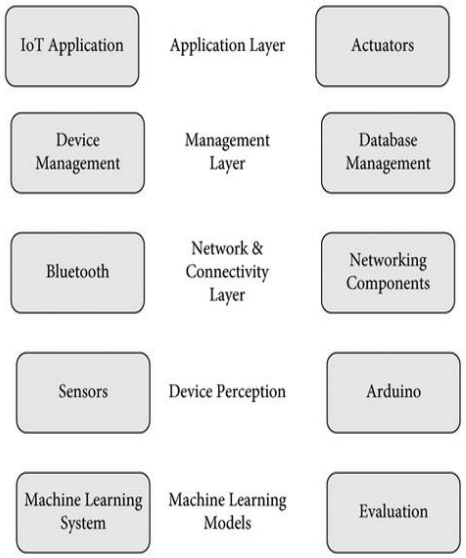
Working Principle

The emf receiver receive electromagnetic forces / field produced by the Computer System and when current is passed from the Computer System - Arduino UNO passes electromagnetic field and display unit shows EMF produced by the computer in milli Gauss (mG) micro Tesla μT., Wi-fi also caches and produce EMF particularly radio waves and timer shows duration in which emf is measured

Sensor-Based Data Collection

Data collection through sensors is the first step in the proposed system, such as electromagnetic wave intensity through electromagnetic wave sensors and ultraviolet wave intensity through ultraviolet wave detection sensors. For the data collection process, sensors were connected to the Arduino Mega microcontroller. Electromagnetic wave sensors and ultraviolet sensors are connected to the microcontroller through analog ports of Arduino. A microcontroller works as a central point that takes inputs from sensors and transmits the data from sensors to the decision support system. The decision support system sends the data to the database after performing some action on the data. Then, the data are sent to the user through smart devices.

Layered architecture of Proposed Model



Predictive System

Predictive modeling is a statistical process that uses a probability distribution to forecast the output. Prediction was used to build models. These predictors are basically the variables that make up future results. When data were collected from various variables, a statistical model was designed based on probability. In this regard, researchers used different machine learning classifiers, i.e., logistic regression, support vector machines, Bayes, random forests, bagging trees, extra trees, decision trees, and adaptive boosting,

Important aspects

Real-Time Face Recognition: To reliably detect faces in a range of lighting and environmental circumstances, the gadget uses cutting-edge convolutional neural networks (CNNs).

Edge Computing: Latency is reduced and data transfer to the cloud is improved by handling initial processing on the device.

Scalability and Integration: The gadget may grow to handle sizable databases of face photos and is made to be readily connected with current IoT infrastructures.

Security and Privacy: To safeguard user information and guarantee privacy, secure communication protocols and data encryption are used.

Remote administration and upgrades: Without requiring physical access, the device allows for remote firmware upgrades and configuration administration over the cloud, enabling maintenance and feature improvements.

CONCLUSIONS

The proposed prototype is designed to demonstrate the monitoring of EM radiation levels produced by mobile towers, RF sources and base units. The prototype can be connected anywhere to monitor and detect the radiation levels and the alarm will be turned on once detected. The complete data is uploaded in think speak for analysis. EM radiations are everywhere and the sources of EM signals are base stations, mobile phones and other electronic gadgets. The proposed system is set with threshold a level below which indicates no harmful and if the value is above threshold indicates harmful to health. Future work can be extended by sending messages to the authorized people so that prior precautions can be taken

REFERENCES

[1] Shaik Mazhar Hussain Sami Abdullah Saud Ambu Saidi Anilloy Frank IOT based Monitoring and Detection of Electromagnetic (EM) Radiation Levels, Journal of Student Research Fourth Middle East College Student Research Conference, Muscat, Sultanate of Oman.

[2] Gabriel Galindo-Romera, *. J.-C.-M.-M. (2017). An IoT Reader for Wireless Passive Electromagnetic Sensors. Sensors.

[3] Javaid M., Haleem A., Singh R. P., Rab S., and Suman R., Significance of sensors for industry 4.0: roles, capabilities, and applications, *Sensors International*. (2021)

[4] Mavromatis, F., A. B., Samaras, T., C. K., & Sahalos, J. N. (2008). DESIGN OF A MONITORING SYSTEM FOR ELECTROMAGNETIC RADIATION MEASUREMENTS. XXIX General Assembly of the International Union of Radio Science. URSI GA, At Chicago, Illinois, USA.

[5] Singh S. and Kapoor N., Health implications of electromagnetic fields, mechanisms of action, and research needs, *Advances in Biology*. (2014)

[6] Nishat Tasnim1, R. F. (2014). Study on Electromagnetic Radiation Detection in a Mobile Communication System. Journal of Electrical Engineering . Venkatesulu,

[7] D. S., & Prasad, D. M. (2012). Real Time Monitoring System For Electromagnetic Radiation Measurements Using Arm Processor For Cellular Base Stations. International Journal of Engineering Research & Technology (IJERT), 1-4. Venkatesulu, Varadarajan,

[8] Gautam R., Singh K. V., Nirala J., Murmu N. N., Meena R., and Rajamani P., Oxidative stress-mediated alterations on sperm parameters in male Wistar rats exposed to 3G mobile phone radiation, *Andrologia*. 2019

[9] D. S., Prasad, D. M., & ramana, P. (2014). Monitoring Of Electromagnetic Radiation for Cellular Base Stations Using Arm Processor. International Journal Innovative Research in Computer and Communication Engineering,.

[10] Z. H. Bohari, M. F. (2014). A Novel Electromagnetic Field Detector for Extremely Low Frequency Energy. The International Journal Of Engineering And Science (IJES),