IoT-MICRO-CONTROLLER BASED RADIO FREQUENCY ELECTROMAGNETIC RADIATION METER

Introduction

Electromagnetic fields, radio waves, microwaves and wireless signals are referred to as radio frequency (RF) energy. RF energy is all around us. RF is used in various electronics and appliances, which include radio and television broadcasting, cellular telephones, satellite communications, microwave ovens, radars, and industrial heaters and sealers. These are just a few applications.

In this project, we are constructing a meter that can measure the amount and concentration of radio frequency electromagnetic radiation in our environment. This data along with the **environment's temperature**, **relative humidity**, and **geolocation (latitude and longitude)** are then continuously transmitted wirelessly at intervals to a secure web server which logs the data for visual and real-time usage. The data can then be obtained and monitored at any time via a web application on an internet-enabled device (smartphone, computer, etc.).

Key components used & technical specifications

(1) **AD8302 wideband Logarithm Detector & Amplifier:** Radio Frequency electromagnetic radiation detector with a frequency range of 100MHz – 2.7GHz. This is the standard and allowed frequency range for most RF devices including cell towers, cellphones, wireless transmitters, radio transmitters and receivers, etc. We are using this device to detect and measure the RF radiation energy within the device's environment.

(2) **SIM800L GSM/GPRS Module:** This is a miniature GSM 2G modem which we can use to accomplish almost anything a normal cell phone can; SMS text messages, Make or receive phone calls, connecting and logging data to internet through GPRS, TCP/IP, and more! In this project, we are using this module to ensure our device maintains communication to a web server via a wireless GPRS network.

(3) **DHT11 Temperature and Humidity Sensor:** This is a basic, low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air and return the humidity and the current temperature. In this project, we are using this device to measure the current environment's humidity and temperature.

(4) **ATmega 328P:** This is the preferred microcontroller to execute our project. It is a low-cost, and powerful chip from the Atmel family of microcontrollers. By executing powerful instructions in a single clock cycle, the device achieves throughputs approaching one MIPS per MHz, balancing power consumption and processing speed, which all runs on a 5V.

How it works

The device is operating on two mode of power supplies: Mains power supply (up to 245V which is then stepped down and rectified to 5V for circuitry), along with 5V battery power. When operating on either mode of power, the device shall display these following environmental parameters: **RF radiation energy, temperature, humidity, GPRS connection, and mode of operation (power).** Also, these parameters are transmitted wirelessly to a web server for continuous data logging, visual graphical representation and accessing via an internet-enabled device.