An Affordable Real Time Implementation of Channel Emulator with the Aid of Radio Frequency Circuit

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Abstract: The major problem in today's world is high frequency spread from mobile towers. Each country allocated some threshold value to all the network companies for using frequency. Using high frequency leads many hazardous to the living things in the world. In this paper we are going to detect the level of frequency spread from the mobile towers by using frequency tuners and radio frequency circuit. The circuit will implement by using nRF, microcontroller. If anyone of tower produce frequency beyond the threshold level. It will send to the government through message by using IOT device .Then the government will give alert to the responsible tower company. If they did not obey the rule their license will be cancelled by the government.

I. INTRODUCTION

Recent years have recorded a noticeable and widespread proliferation of diverse telecommunication devices such as smart phones and their back bone base station transmitters, globally. At present, the mobile cellular market is acknowledged the most viable part of the telecommunications industry and the entire ICT sector. This can be attributed to tremendous technical progress in the evolution of different cellular communication technologies and the daily increment in the subscription of their multimedia services by the end users, over successive generations. It has been reported that mobile phone usage is widespread with about 6.9 billion subscriptions globally. Consequently, the all-embracing use of the diverse mobile phones have resulted to a rise in the quantity of radio frequency Electromagnetic Radiations (EMR) that humans are exposed to daily from them. The central concern or fear has been whether the EMR level, especially while being in use might cause or lead to human health problems such as malignant cancer, meningioma, acoustic neuromas, etc. Their emission frequencies area unit usually from zero,1-10GHz (billion hertz), which are much higher than the low-frequency radiation from wired sources such as cables and transformers(AC frequency=50-60HZ).You are exposed daily to invisible magnetism air pollution from dozens visible and non-visible transmittal antennas: TV and radio broadcasting antennas, radars, cell phone masts, Wi-Fi wireless networks, cordless phones etc.
The World Health Organization (WHO) declared that wireless radiation is presumably malignant neoplastic disease."Scientific studies at the cellular level, whole animal level and involving human populations, shows compelling and comprehensive evidence that RF/MW (radio frequency/microwave) exposure down to very low residential exposure levels, levels that are a moment fraction of gift "safety standards", results in altered brain function, sleep disruption, depression, chronic fatigue, headache, impaired memory and learning, adverse reproductive outcomes including miscarriage, still birth and birth deformities.

HIGH FREQUENCY RADIATION SOURCES

Mobile phones

Your portable primarily emits periodic frequency radiation 900-2500MHZ whereas talking. The analysis for health effects is contradictory, however cellular phone use has been related to harm to deoxyribonucleic acid, destruction of nerve cells, brain cancer etc. Children square measure additional susceptible to the results of radiation from mobile phones, as a result of they need not totally developed immune systems and this can be why several scientific organizations have warned against the use of mobile phones by minors.

Cell phone masts

Cell phone masts unit placed in every of buildings in each neighbourhood and notably next to busy roads, in company buildings, factories, in densely inhabited areas with several offices, shops.

TV and radio broadcasting antennas

Broadcasting antennas unceasingly emit relatively high power signals and analysis has joined proximity to them with childhood malignant neoplastic disease, brain cancer and skin cancer(Merzenich [2], Ha [3], Hallberg [4] , Hocking[5]).Many radio amateurs broadcast radio signals with a good frequency vary and power. Television antennas in roof A-one square measure sometimes solely signal receivers and don't emit wireless radiation. The higher floor of the house, the more exposed to radiation from radio and TV broadcasting antennas etc.

Cordless Telephones (DECT) and wireless internet (modem-routers-Wi-Fi-WLAN)

The wireless web routers and also the bases of conductor phones square measure continuous wireless radiation emission antennas presently put in most homes. Their radiation has similar waveforms and frequencies however lower intensity than those of a cellular phone mast. However, being in nearest proximity to our bodies, they often submit us to a greater quantity of radiation than if we tend to have a telephone mast across the road. The cordless headphone emits radiation only while talking.

Radars

The signal emitted from radars is powerful pulses of high frequency no particulate radiation (usually 2-10GHz) that scans the complete space, rotating 360 degrees by touching every purpose at intervals kilometres each few seconds (like a lighthouse).

They are usually situated at:

- Airports
- Military airbases

Voice Picking Technology

Voice picking technology is mainly used in warehouses. It consists of a central antenna that communicates with the antennas in the workers belts (typically at the frequency of 2,4 GHz, as the WLAN - Wi-Fi).You can cut back the radiation from the central antenna by moving it more removed from the high use areas (but this fashion you may have signal reception problems).The main drawback for the staff is primarily the antenna situated in their belts with that square measure in direct contact.

Smart meters - Smart Devices - Smart grid

New technology "smart" digital electricity meters can step by step replace existing analog sort meters all told homes. The sensible grid can greatly increase current levels of magnetic force pollution, since the sensible meters, and sensible appliances already on the market, can emit radiation either wirelessly or via the ability cables to speak with one another.

Other wireless applications

Today's unprecedented wireless radiation levels are increasing, each in intensity and during a type of magnetic force signals by adding new wireless applications:

- Devices that work with Bluetooth continuously activated
- Wireless alarm system, fire detection and temperature control.
- Radio network for police, private security companies, transport companies etc.

II. PROBLEM DESCRIPTION

EXISTING SYSTEM

Despite their dependableness, on-the-spot measurements square measure time intense and near actions for the analysis of recent devices, channel emulators square measure wide used activity instruments to come up with desired environmental channel effects in laboratory environments. Within these instruments, baseband emulators square measure valuable, and reverberation chambers offer restricted management of the channel. However, radiofrequency (RF) circuit implementation of channel emulators provides an inexpensive and simple tool to check performances of recent systems and strategies below completely different channel effects.

In this paper, a replacement RF domain physicist copycat, that is compact and simple to regulate, is given for activity signal characteristics underneath frequency dispersive channel conditions. The circuit has been enforced victimization variable attenuators, switches, and power splitters to emulate the physicist unfold of air-ground channels, and also the performance is evaluated through measurements. ON-SITE measurements provide reliable and realistic results for the evaluation of prototype devices.

DOPPLER SPREAD IN WIRELESS CHANNELS

1) As design criteria, phase unbalance of the power splitters should be as minimum as possible, since it disturbs the signal when combined again. In the components used in our design, the maximum phase unbalance introduced by 2 way-90° power splitter as 3.8° at 1.2 GHz. Considering this value, the error caused by the given phase unbalance can be calculated as −23.6 dB using error = $\alpha(t)\{1-e\ j\pi 3.8/180\}$. This problem can be fixed simply by increasing the trace length between 90° output and the switch. The required increment should be enough to introduce additional 3.8° phase shift. Since the disturbance error is too low, it has been ignored in our design. To keep the error below 1% of the desired signal, the phase unbalance should be kept below 5.7°.
2) The Doppler bandwidth that can be introduced by the circuit is limited by the processor speed. From the Nyquist theorem, the relation can be given as $B<2$ $f$control where f control is the frequency that the processor can support to change each control port. Note that the rise and fall times of the active components (i.e., switch, VCA) should be compatible with the desired speeds.

PROPOSED SYSTEM

This paper proposed the system of finding high frequency channel emulator. In this we are implementing the project for finding towers which one use unauthenticated frequency and also update the news to the government. Here we use Arduino Uno controller, frequency tuner, neural radio frequency device and relay for implementing channel emulator.

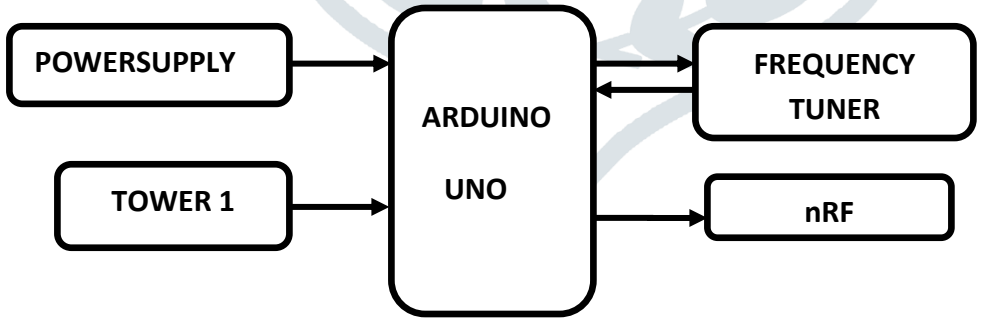

Fig: Block Diagram of input module

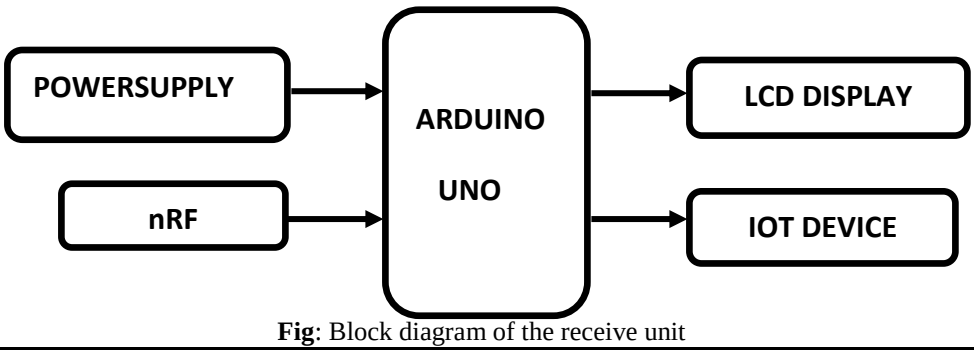

Fig: Block diagram of the receive unit

The above block represents the transmitter diagram which is placed in a tower unit. Here the frequency tuner is used to tune the frequency manually and this will transmit via nRF transmitter. The tower station output will get from the neural radio frequency device and it will operate in a 2.4GHz frequency. The above block and description is same as for second transmitter.

The above block represents the receiver unit. Here nRF receiver is used to receive the signal from the transmitter which contains the information of frequency used in the first two transmitter and this will viewed on hypertext pre-processor(PHP) view in IOT device by higher authorities. If any one of the tower used high frequency or unauthenticated frequency it will control via control view in IOT device and the power supply of tower will shut down by using relay unit. Here relay is act as a switching circuit.

III. HARDWARE SPECIFICATION

Arduino controller: The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 will be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button.

nRF24L0:nRF24L01 is a single chip radio transceiver for the worldwide 2.4 - 2.5 GHz ISM band. The transceiver consists of a fully integrated frequency synthesizer, a power amplifier, a crystal oscillator, a demodulator and modulator. Output power, frequency channels, and protocol setup are easily programmable through a SPI interface. Current consumption is extremely low, only 9.0mA at an output power of -6dBm and 12.3mA in RX mode. Built-in Power Down and Standby modes makes power saving simply realizable.

Frequency tuner: A tuner could be scheme subsystem that receive radio frequency (RF) transmission like radio broadcasts and converts the selected carrier frequency and its associated bandwidth into a fixed frequency that is suitable for additional process, usually because a lower frequency is employed on the output.

IV. CONCLUSION

Despite their reliability, world's high frequency spread from mobile towers. Each country allocated some threshold value to all the network companies for using frequency. Using high frequency leads many hazardous to the living things in the world. In this paper we are going to detect the level of frequency spread from the mobile towers by using frequency tuners and radio frequency circuit. The circuit will implement by using nRF, microcontroller. If anyone of tower produce frequency beyond the threshold level. It will send to the government through message by using IOT device .Then the government will give alert to the responsible tower company. If they did not obey the rule their license will be cancelled by the government.

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