FM Transmitter Using Proteus 8

[1]Meghana G, [2]Nishu K B, [3]Soujanya H and [4]Manasa S
[1,2,3,4] Department of Electronics and Communication, AMC Engineering College (Affiliated to VTU) Bangalore, India.
[1]meghanameghu472@gmail.com, [2]nishubha2019@gmail.com, [3]soujanyahulswar5@gmail.com,
[4]manasa.srinivas@amceducation.in

Abstract – FM (Frequency Modulation) signal transmitter is a small device that can be used to transmit Frequency Modulation signal over short range. It also protects signal from interference and unwanted signals. Audio signal/voice signal is modulated into radio frequency carrier, new radio frequency signal moves up and down in frequency. This document consists of most simple and economical technique for building a FM transmitter using basic electronic component like resistor, inductor, capacitor etc. The FM transmitter receives human voice signal through microphone. It further amplifies it, and modulates over carrier and finally gets transmitted to it. Frequency modulation transmitter has many merits over the (AM) Amplitude modulation. It protects the signal from interference and unwanted signal that is noise. It provides high Signal to Noise than Amplitude modulation. Overview of frequency modulation (FM) is the frequency of radio wave which is less endangered to the noise than AM. Frequency modulation are indigenous to reduce the noise which enhances the quality of radio reception.

Keywords - FM Frequency Modulation Transmitter, Proteus 8 Software Application, Low Cost.

I. INTRODUCTION

Frequency modulation (FM)[1] has low power transmitter. It allows listening to music and also other audio messages/texts which is from CD player, another audio system and it is used to be played in nearby FM radio station. It has low cost of equipment for FM transmitter, which leads to growth in year of World War II. After three years from the world war, FM station of 600 licensed were broadcasted in the US and also by the end of 1980 there was more than 4,000 stations present. Frequency modulator is done by using processes of the audio pre amplification, transmission (where frequency is modulated for encoding of the sound) and modulation.

Frequency modulator FM transmission [2] helps to overcome from these detriments (only when it reaches of being harmed/damaged state) and henceforth it can be utilized to transmit music, audio/voice signals and which leads to rising the number of auditors to famous and also classical music, in which frequency modulator station, which can be outlined for audience ratings and it can be compared to AM stations. Frequency modulator transmitter consists of MIC in which an audio signal is transmitted to different fragments of transmitter, once the processing of the signal from these portions is done, it will get transmitted through antenna and these signals are captured by the receiver side antenna.

Frequency Modulation transmitter is a signal transistor circuit. [3] In which telecommunication of the frequency modulation is transferred to the information of various frequency of carrier wave signal, according to message signals m(t). Mostly Frequency Modulation transmitter utilizes very high frequency of radio frequency from the range of 87.5 MHz - 108 MHz to transmit and receive the frequency modulated signal.

Objective
The specific scheme of the project is to develop and construct FM transmitter circuit using software of Proteus 8 application. Where the radio broadcast will range from 88-108MHz frequency band [4].

II. LITERATURE SURVEY

This journal paper consists of economical and also easier and finest way for constructing a FM transmitter circuit. Utilizing few basic electronic components such as resistors, inductor, capacitor, transistors etc. [5] FM transmitter receives the human audio signals through the microphone. Further it will get amplified, and carrier signal gets modulated and finally it gets transmitted. Voice or audio which is transmitted, is received at the output, if the power of signal is transmitted more, greater will be its range and immune noise becomes increasing. Usually, frequency modulator is immanent immune to random noise.

In this Paper we have discussed about recent tendency of wireless Communication system design flow using Software Defined Radio (SDR). It is technology which enables radio platform programme which serves as multimode transceiver. [6] The Universal Software Radio Peripheral (USRP) B200 (It is fully integrated single board which has continuous frequency coverage from the range of 70MHz-6MHz. board is being employed for constructing frequency modulator transmitter and Receiver. Utilizing Software Defined Radio (SDR), it is possible to design prototype of the Communication system and also possible to substantiate the real time execution of the system.

Calculating the power required for FM radio transmitter [7] to cover an isolated distance based on the available radio receiver sensitivity and also desired signal range. This research can be used to approximate transmitter power required to cover the pre-determined area/distance.

All-inclusive result of this project which is the outcome of construction procedures has divulged the successful achievement of the primary objective, the construction and design of an FM transmitter of appreciable range operating on power supply is 12v. This study has showed that practical FM transmitter demands low power input that can be designed and implemented.

III. METHODOLOGY

This paper is to develop, construct and simulate the FM transmitter by using software known as Proteus 8 application. Here we are using proteus8 software version. [8] In the telecommunication the frequency modulation transmits the information by varying frequency of the carrier wave signals. According to the message signal, the frequency modulator transmitter using VHF (Very High Frequency) its wavelength range will be from 10 to 1m and 87.5 – 108.0 MHz is radio frequency to transmit and receive the frequency modulated signal.
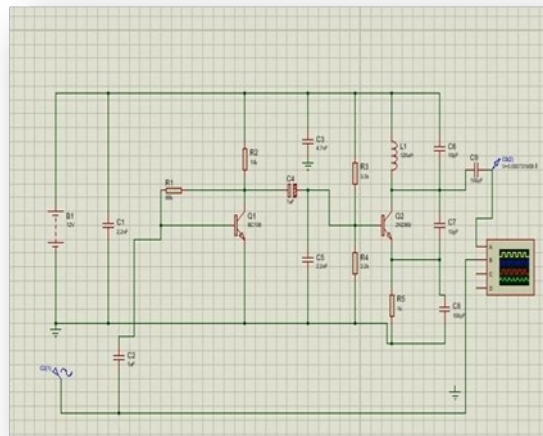
Circuit Diagram

Fig 1. Circuit diagram

Description Circuit
The circuit set up (Fig 1) essential operates in four steps. [9] Firstly, a condenser microphone (which is used to capture vocal and high frequency) takes input, then amplifier does amplification, the amplified signal is modulated with frequency being generated by LC (Inductor Capacitor) oscillator and eventually antenna will transmit the signal. [10] The inductor L1 and capacitor C3 forms an oscillating tank circuit along with the transistor 2N2369 (2N2369 which is NPN transistor used in electronic switching which has capacity to handle 200 Ma of maximum extent and frequency will be high as 100MHz that can be used as amplifier).

As long as current subsist across the inductor coil L1 and the capacitor C3, tank circuit will oscillate the resonant frequency carrier for FM transmitter (Fig 2). Whereas the capacitor C1 will act as negative feedback to the oscillator circuit. Modulated signal from the antenna is radiated as radio signal wave at FM frequency band.
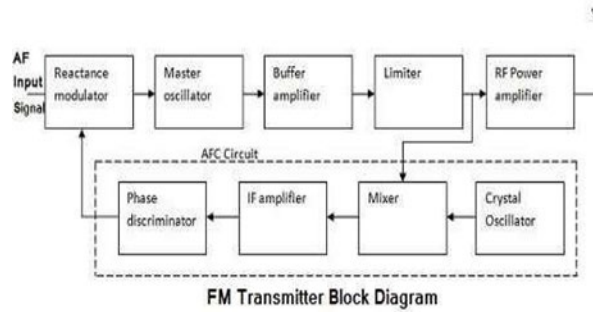
Block Diagram

Fig 2. FM Transmitter Block Diagram

Components Used for Proteus

Resistors, capacitors, transistors battery which should be of DC voltage source, cap (which is of generic electrolytic capacitor), inductor, BC108(NPN low power bipolar transistor),2N2369 an NPN transistor, and few terminals, oscilloscope.

IV. RESULT AND DISCUSSION

FM transmitter can be replicated by using tools from various software applications, in this simulation we opted Proteus 8 software for simulation. Circuit is built by using tools, components and parts/segments from library, customized for circuit designing. As we know oscilloscopes have at least two channels of input, in which each channels displays waveform. Result of simulation is demonstrated in Fig 3.
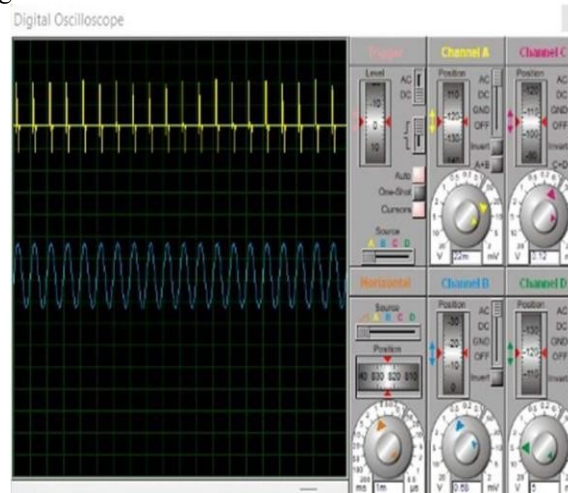

Fig.3: Digital Oscilloscope

The frequency will be set to get proper and clear audio signal which is transmitted and audio signal will be generated of 22mv.The transmitter output power is defined as the power that is produced in 50ohms load connected at the radio antenna port. In the transmit mode the synthesizer emits desired transmitting frequency with the frequency modulation. The transmitter will amplify the signal up to the final power level. Then the signal is passed through transmitter/receiver switch before being filtered to remove undesirable harmonics.

V. CONCLUSION

Consequently, we conclude that this estimation is indeed which is acceptable for Electronics and communication Engineering students. Peculiarly for students who opt up FM reception in electronic communications theory subject. We have implemented audio amplifier and FM receiver respectively. At very conception while designing frequency modulator FM receiver circuit, we will come across certain problems that is using transistors. After replacing transistors with IC, we acquire good feedback good response. As we have seen few certain applications such as wireless communication, FM frequency modulation and demodulation also amplifiers. It is also widespread commercial and also has simplicity. There are few advantages and disadvantages of frequency modulation. Major advantage is efficiency of transmitter will be high. In spite of having

disadvantages, it is also suitable for many other applications. To have enable choice of best modulation to be made, it is necessary to know few advantages and disadvantages of the frequency modulation.

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