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CHENNAI

PROJECT REPORT

SUBMITTED AS DIGITAL ASSIGNMENT I,II

F.M. TRANSMITTER

ANALOG COMMUNICATION SYSTEMS

Submitted by:

ASHRIT SAHA- 21BEC1257

ASMITA GHOSH- 21BEC1097

SCHOOL OF ELECTRONICS ENGINEERING

Submitted to:

Dr. MARKKANDAN S

Submitted on:

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ABSTRACT

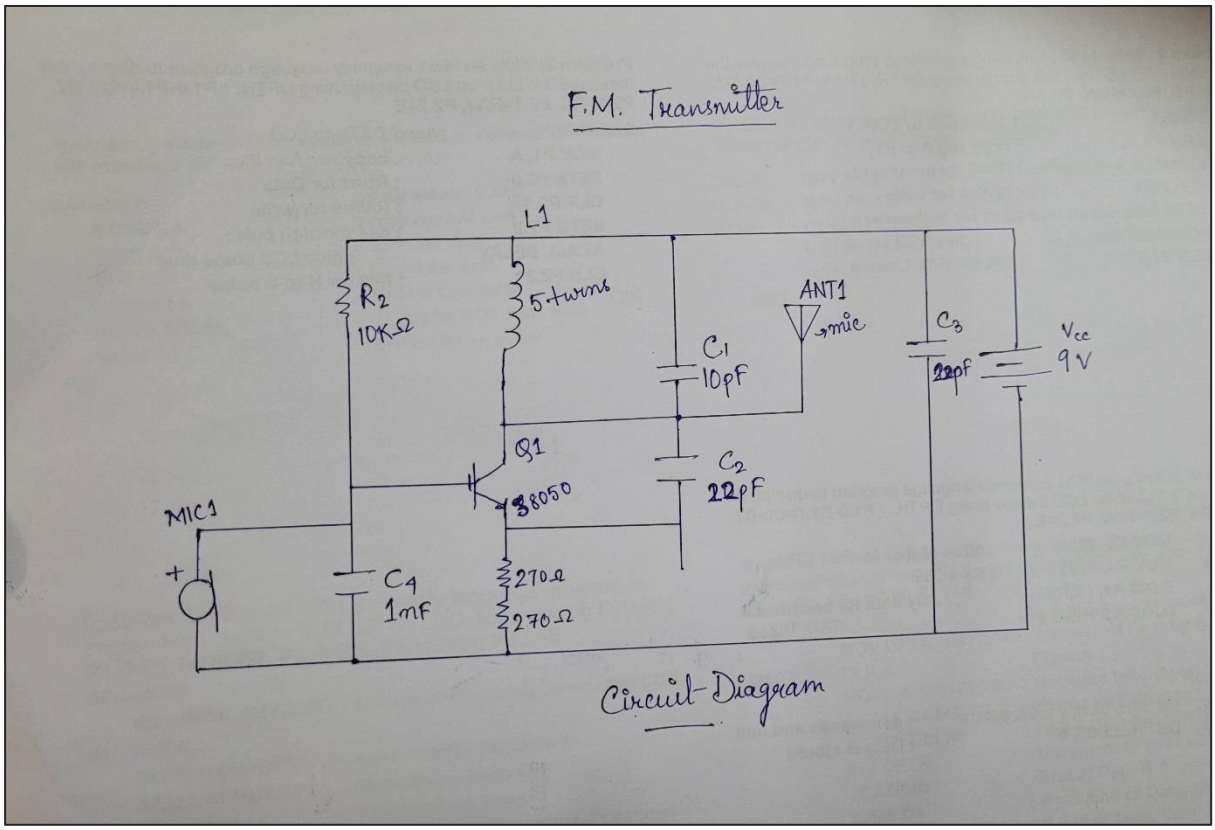
This report presents a low-cost F.M. transmitter, without the use of complex components. The objective of this project was to develop a low-power, portable FM transmitter that can be used for educational and recreational purposes. The transmitter was designed using these off-the-shelf components and assembled on a printed circuit board. The project involved designing the circuit, selecting appropriate components, and testing the final prototype. To achieve the desired objective, the electronics components used were NPN transistor, resistors, capacitors, copper wire, battery/voltage source, condenser microphone. The basic working principle of an FM (frequency modulation) transmitter is to convert an audio signal into a high-frequency radio signal that can be transmitted wirelessly through the air to an FM receiver.

F.M. TRANSMITTER

COMPONENTS USED:

- S8050 transistor for amplification and modulation of the radio frequency signal.
- 22pF capacitors (x2) for filtering and tuning the signal.
- 10nF capacitor (x1) for filtering and tuning the signal.
- 1nF capacitor for decoupling and noise reduction.
- 270 ohm (x2) resistor for current limiting and biasing the transistor.
- Condenser microphone for converting sound waves into electrical signals.
- 10k ohm resistor for biasing the mic.
- Copper wire for inductor used in the tank circuit for frequency selection.
- 9V battery for powering the circuit.

CIRCUIT DIAGRAM:



EXPLANATION:

Working Procedure:

In an FM transmitter, the audio signal (such as from a microphone) is first passed through a pre-amplifier to increase its strength. The pre-amplified signal is then fed into the base of a transistor, which serves as a voltage-controlled oscillator (VCO). The VCO generates a high-frequency oscillating signal that varies in frequency in proportion to the amplitude of the audio signal.

The output of the VCO is then fed into a power amplifier stage, which amplifies the signal to a level suitable for transmission. The amplified signal is then passed through a band-pass filter to remove any unwanted harmonics and noise, and the resulting clean, modulated FM signal is then transmitted through an antenna.

At the receiving end, an FM receiver detects the transmitted FM signal, demodulates it, and extracts the original audio signal. The audio signal is then amplified and sent to a speaker or other audio output device for playback.

Overall, the principle of FM transmission is based on modulating a high-frequency carrier wave with an audio signal, and then transmitting it wirelessly through the air to a receiver where the original audio signal can be recovered.

Work Flow:

- Started by placing the S805 transistor onto the breadboard, with the flat side facing towards us.
- Inserted the 22pF capacitors on either side of the transistor, connecting each leg of the capacitors to the adjacent leg of the transistor.
- Placed the 10nF capacitor between the emitter and collector legs of the transistor.
- Inserted the 1nF capacitor between the base and collector legs of the transistor.
- Connected two 270 ohm resistors in series and connected them between the base and emitter legs of the transistor.
- Inserted the condenser mic onto the breadboard and connected it to the circuit by connecting one of its legs to the positive power rail, and the other leg to the 10k ohm resistor, which is then connected to the base of the transistor.
- Created an inductor using copper wire by wrapping it around a cylindrical object (such as a pen or pencil) to form a coil. Left about 2 inches of wire on either end of the coil.
- Connected one end of the coil to the positive power rail of the breadboard, and the other end to the collector leg of the transistor.
- Finally, connected a 9V battery to the positive and negative power rails of the breadboard.

The FM transmitter is thus, complete. To use it, we play music into the condenser mic and tune a nearby FM radio to the frequency we have selected by adjusting the inductor.

OUTPUT:

The output of this FM transmitter will be a modulated radio frequency (RF) signal. The frequency of this signal will depend on the values of the components used in the circuit. In general, the frequency range of the signal produced by this circuit will be in the range of a few MHz to several tens of MHz.

The RF signal will be modulated with the audio signal from the condenser mic, allowing the transmitted signal to carry the sound or voice picked up by the mic. The modulation scheme used in this circuit is frequency modulation (FM), which varies the frequency of the carrier wave in proportion to the amplitude of the audio signal.

The power of the output signal will depend on the amplification of the circuit, which in turn depends on the specific values of the components used. In general, the power output of this type of FM transmitter is relatively low, typically in the range of microwatts to milliwatts. This means that the range of the transmitter will be limited to a few meters to a few hundred meters depending on the environment and any obstructions that may be present.

RESULT:

Hence, a F.M. Transmitter has been made and output observed.