Project Title: FM Radio receiver using Arduino TEA5767

Team details:

Nishant Jayaram Hegde: PES1UG23CS400
Nishant Holla: PES1UG23CS401
Pranav Hemanth: PES1UG23CS433

Section G

1. Abstract

This project explores the integration of the TEA5767 FM radio module with an Arduino to create a simple yet functional FM radio receiver. The TEA5767 is a low-power FM radio chip that communicates via the I²C protocol, allowing precise frequency tuning and stereo audio output. An Arduino Nano microcontroller is used to interface with the TEA5767 module, manage frequency tuning via user input (buttons or potentiometer), and display the current frequency on a TFT SPI LCD screen. The received audio is amplified using an audio amplifier and played through a speaker. The project demonstrates practical applications of the I²C communication protocol, embedded systems, and basic digital signal processing principles. It serves as a beginner-friendly introduction to FM communication and hardware interfacing.

2. Introduction

FM (Frequency Modulation) radio has been a staple in audio communication for decades. With the advancement of embedded systems, it’s now possible to replicate and build FM radio receivers using microcontrollers and integrated modules. The TEA5767 is a widely used FM radio receiver chip that provides digital tuning capabilities through the I²C protocol, making it ideal for integration with platforms like Arduino.

In this project, we aim to design a compact and customizable FM radio receiver using Arduino Nano and the TEA5767 module. The setup involves user interaction for tuning through a potentiometer or buttons, and a TFT LCD screen for real-time frequency feedback. The addition of an audio amplifier and speaker ensures adequate sound output for practical use.

This hands-on project helps understand key concepts in embedded systems, including I²C communication, user interface design, digital tuning, and audio signal processing.

3. Sensors and Modules Used

Component	Description
TEA5767 FM Module	FM radio receiver chip with I²C interface and stereo audio output
Arduino Nano	Microcontroller for control and interfacing
TFT SPI 1.8 LCD	Displays frequency and user interface
10K Potentiometer	Allows analog tuning of frequencies
Audio Amplifier	Boosts output audio signal from FM module
3W Speaker	Converts amplified audio to sound
FM Transmitter	(For testing) Transmits audio from phone or PC to FM module
Audio Cable	Connects FM module to amplifier

Breadboard & Wires	Used for prototyping and connections

4. Cost Structure

Component	Estimate Cost (in ₹)
Arduino Nano	200
FM Radio Module	770
TFT SPI 1.8 LCD	227
10K Potentiometer	60
Audio Amplifier	235
3W Speaker	199
Breadboard	171
Audio Cable	129
FM Transmitter	669
Arduino wire	60
Total	2710-2730

5. Working Principle:

- Signal Reception: The TEA5767 module receives FM radio signals and converts them to audio.
- Frequency Tuning: The Arduino communicates with the TEA5767 over I²C to set the desired frequency, based on user input from the potentiometer or buttons.
- Display Output: The current frequency is shown on the TFT screen using SPI communication.

- Audio Playback: The audio signal is sent from the TEA5767 to an audio amplifier and then played through a 3W speaker.

6. Schematic Diagram: