

**Electronic Circuits Lab (EC 211P)**

**Project Report**

Multi-Purpose Audio System

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International Institute of Information Technology, Bangalore

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## 1 Team Members

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## 2 Implementation

The parts we have used to implement our *Multi-Purpose Audio System* are :-

- Arduino UNO
- TEA5767 Radio Module with antenna
- 2 10W/4Ω speakers
- MH-M28 Bluetooth Audio receiver module
- LM386 Audio Amplifier
- LM393 Sound detection sensor
- 20 × 4 LCD screen
- 4 Buttons
- Bread boards and Dot boards

The TEA5767 radio module is running on the code uploaded on the Arduino UNO which implements the functions from the *TEA5767N.h* and *TEA5767Radio.h* libraries. An LCD screen displays the frequency at which the radio module is operating. Along with this, there are 4 buttons to change the input frequency accurately.

The bluetooth module works on the input from any device which supports bluetooth connection and can transmit audio files. The audio signal from the connected device and radio module is fed to the LM386 amplifier module through a switch. The amplifier then provides output audio to the speakers. The switch ensures that audio from only one module - The TEA5767 radio or the MH-M28 bluetooth is provided to the amplifier.

The LM393 sound detection module is equipped with a microphone which takes input from the speakers and varies the LED light intensity accordingly.

## 3 Circuit Diagram

The subsequent circuit diagram provides the detailed connections to all the modules and passive components(resistors) in the circuit. The LCD display shows the frequency broadcasted by the radio station.

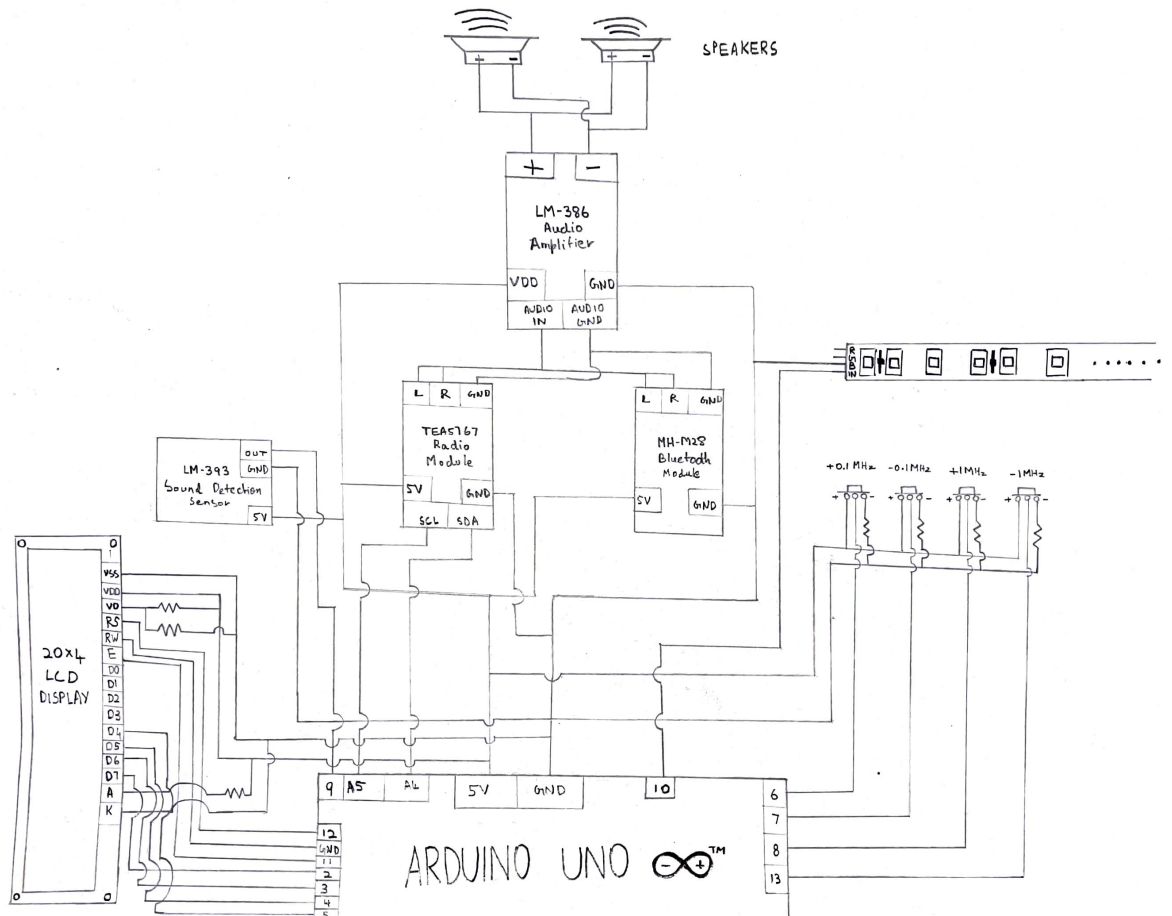


Figure 1

## 4 Device Functionality

The radio module gives us the output when tuned to a specific frequency using the buttons attached to the breadboard. A total of four buttons are present in the order  $+0.1MHz$ ,  $-0.1MHz$ ,  $1MHz$ ,  $-1MHz$  respectively. The output from the speakers are amplified using the amplifier module to give a boost

The toggle switch equipped with the device is used to switch between FM and Bluetooth modes. The LED lights wrapped around the device uses the sound sensors which picks up the beats produced by the song relayed by the device giving us a visual representation of the song.

The  $20 \times 4$  LCD screen displays the frequency of the radio station and also show a visual representation of said frequency. It can display a range of frequencies from  $88MHz$  to  $108MHz$ .

## 5 Future Aspects

### 5.1 Further Implementation

The following features are those which can be implemented in the future but could not be done presently due to the time and budget constraints.

- The FM radio can be equipped with a button to switch between specified frequency presets.
- The LCD display will show which mode our device is set to Bluetooth or FM Radio.

- The box used for our project could be made with a 3D printed material to make it sturdy and durable.
- A voice recognition library could be used to identify the song playing on the radio and show it on the LCD display.

## 5.2 Shortcomings in the project

- Although implemented, frequency control and volume control for proper functioning is tedious in the project.
- Above a certain volume and voltage drive, voice signals get slightly clipped giving rise to noise.
- Imperfect audio extraction from aux gives rise to white noise and static.

## 6 Itemized Bill

The approximate estimate of the cost of all the electronic and other components required for our project is listed in the following table.

Table 1: Bill of Materials

Model	Description	Each <i>INR</i>	Quantity	Total <i>INR</i>
TEA5767	FM-Stereo Module	669	1	669
LM386	Audio Amplifier	108	1	108
	3W Speaker	157	2	314
MH-M28	Bluetooth Audio Module	278	1	278
	Wrapping printed paper	100	1	100
			Total	1469

**Thank You!**