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AUDIO SPECTRUM VISUALIZER

Analog communication
systems(BECE304L)

PRESENTED TO
Dr. Arthi G

PRESENTED BY
Anusha Parashar(21BML0056)
Aditya Sahu(21BML0090)
Hemadri Sekhar bag(21BML0099)
Chetan Kumar Verma(21BEC0079)



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AIM

**This project is for making a 32-band audio frequency spectrum visualizer using
Arduino Nano R3**

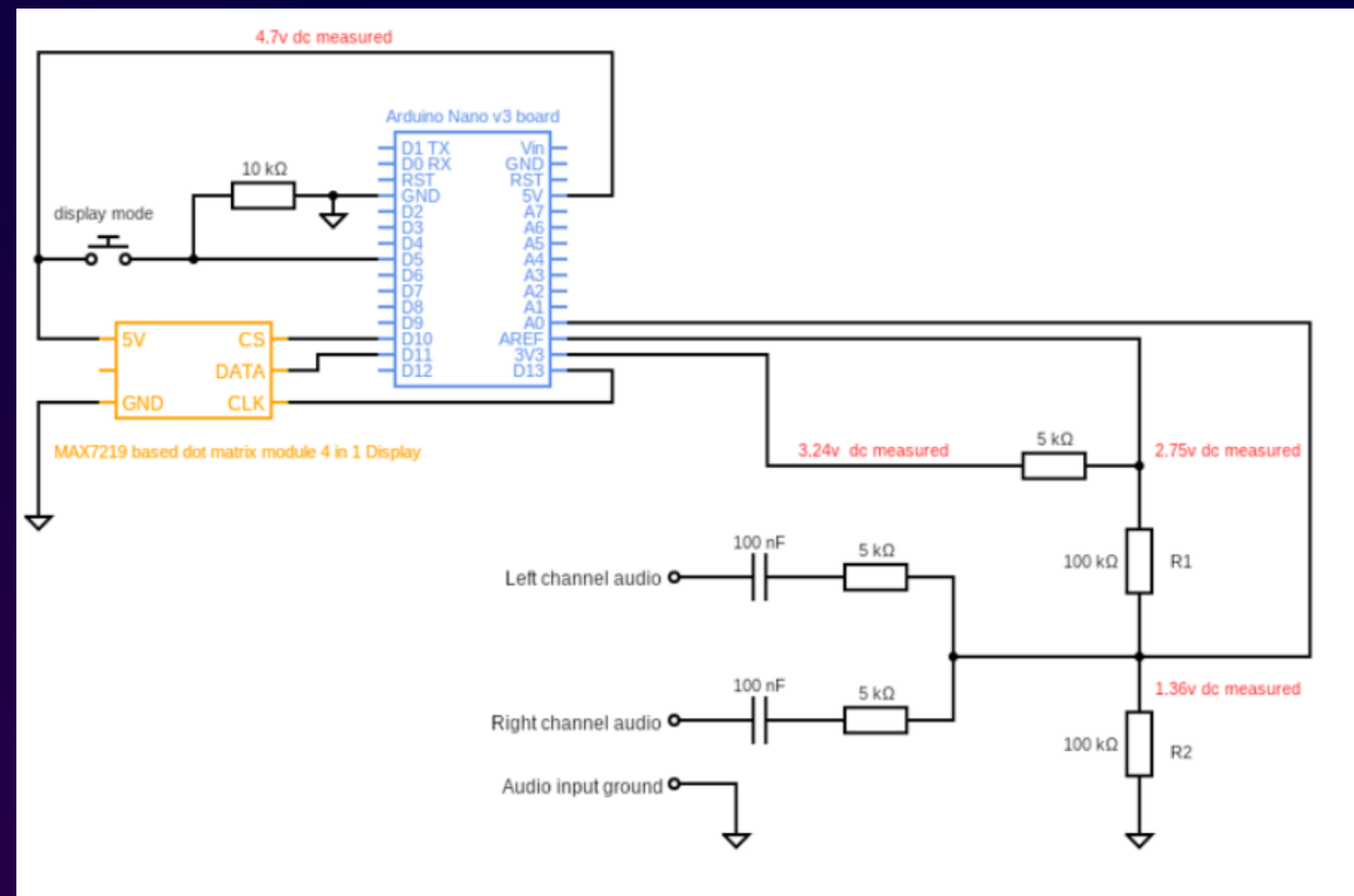
INTRODUCTION

- Measures the magnitude of an input signal versus frequency.
- A fast Fourier transform (FFT) is an algorithm that computes the discrete Fourier transform (DFT) of a sequence, or its inverse (IDFT)
- Fourier analysis converts a signal from time domain to a representation in the frequency domain and vice versa.

FEATURES OF OUR PROJECT:

- Arduino libraries used: arduinoFFT and MD_MAX72xx
- The display has five different modes that can be selected using a push button
- The audio signal that we get is mixed from both left and right channels to ensure that no beats are missed.
- The display that we use can be conveniently changed according to the needs

CIRCUIT DIAGRAM:





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METHODOLOGY AND DEMONSTRATION

- Simulation of the project on Wokwi

RESULT AND DISCUSSION:

- This project is aimed at creating and replicating the technologies associated with the functioning of the spectrum analyser
- A large effect in the decorative and music industry
- This project is a preliminary stage work and has great potential to deviate into different types of small appliances and systems.

FUTURE WORK:

- Integrated with speakers and can be turned into a functional music system
- Integrated with a usb system and separated to form a standalone home theatre
- Replace LED system with other, more fluid display types and can also add to the visual appeal of the device

References:

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| 1 | Signals and systems by Alan V. Oppenheim (For topics regarding Fast Fourier transform (FFT)) |
| 2 | https://www.tutorialspoint.com/arduino/index.htm (For coding in Arduino c language for Arduino Nano r3 board) |
| 3 | https://www.arduino.cc/reference/en/libraries/arduinofft/ (For Arduino FFT library) |
| 4 | https://github.com/MajicDesigns/MD_MAX72XX (for LED Display Matrix display) |



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Thank you!