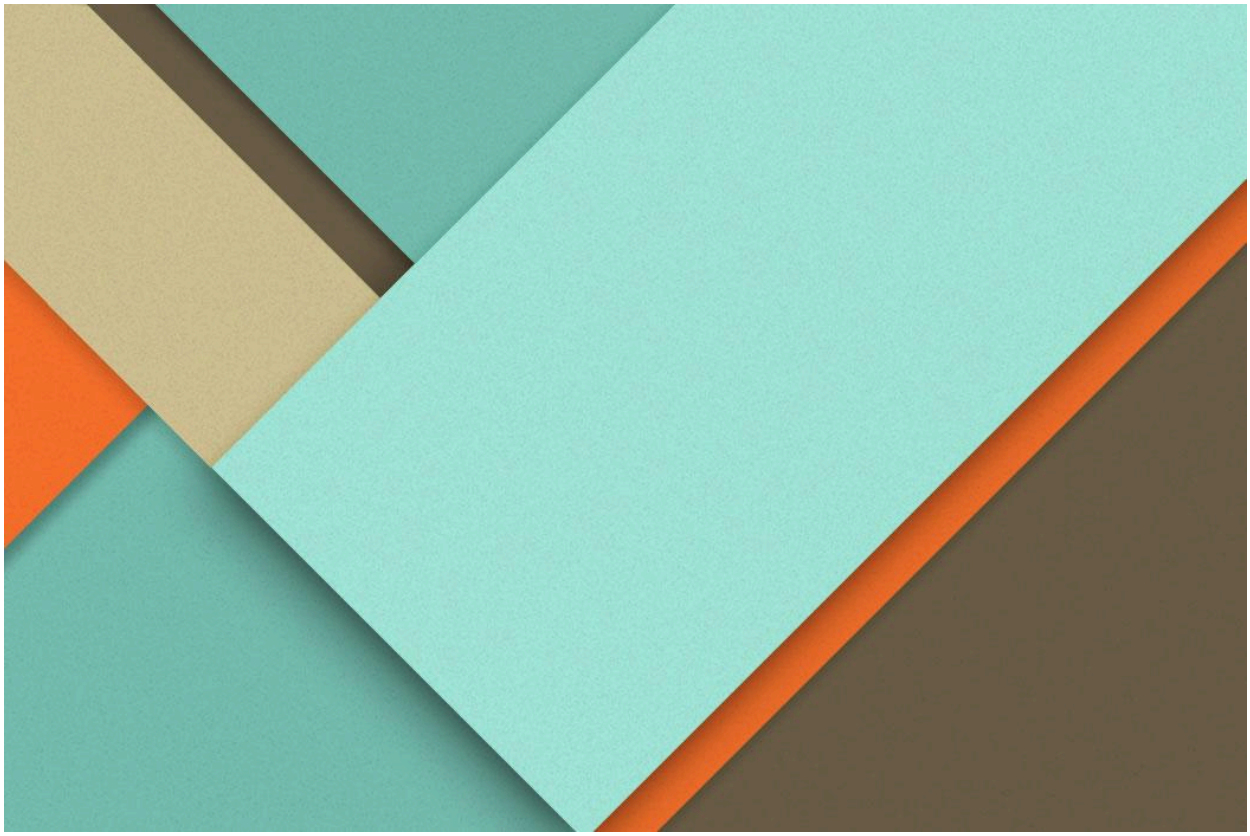

DSP Simulator

17.03.2024

Wednesday Batch

Animesh Behera

Anirudh

Anirudh Mittal

Overview

Our project in the course - “ES116: Principles and Applications of Electrical Engineering” involves creating a Digital Signal Processing (DSP) Simulator, which is based on the Arduino platform and aims to help learners understand the complex field of DSP. This project results from our dedication to combining theoretical understanding with practical application, enabling learners to directly explore and experiment with DSP algorithms. Learners will thoroughly understand filters, echoes, and Fourier transforms, among other concepts, by tinkering with real-time audio signals. We aim to provide a fully immersive learning experience where these essential DSP concepts are understandable and engaging. With this project, we strive to improve further the instructional environment in the field of electrical engineering.

Components

- Arduino Uno
- Microphone Module (MAX4466)
- Speaker (8Ω)
- Breadboards
- Jumper Wires (Assorted)
- Resistors & Capacitors (Assorted)
- LM386 Amplifier Module
- SD Card Module
- Push Buttons
- 10kΩ Pull-down Resistors

Methodology

In our DSP Simulator project, we assemble key components—Arduino Uno, microphone amplifier, speaker, and buttons—on a breadboard, creating a circuit capable of real-time audio processing. Programming the Arduino involves coding DSP algorithms (filters, echoes) and integrating button inputs for dynamic algorithm selection. This setup allows users to interactively experiment with audio signals, directly observing the effects of different DSP techniques. Through hands-on experimentation, learners gain a nuanced understanding of digital signal processing, bridging theoretical knowledge with practical application.