**Team Name:**

The C-Team

**Team Members:**

Cole Wilson, Dow Cox, Austin DuCrest, Nolan Magee, Bernie Friesel

**Class Number and Name:**

ECE 3130-001 Microcomputer Systems

**Submission Date:**

4-30-2025

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**Introduction**

We will be implementing a soundboard, i.e. a synthesizer. This will be accomplished by using the on-board buzzer and assigning each button to an associated frequency, each frequency has an associated sound, and we can use those sounds to make songs. We will record the playback of these songs to be played later. We can also have preset songs to play on the board. We can use the keypad to type in certain frequencies or pitches. We can likewise use the switches to control certain modes of operations and such.

**Specifications and Description**

A screen shot of a graph

AI-generated content may be incorrect.

**Detailed Implementation**

**Interface Design**

The LCD provides a human machine interface (HMI) to tell the user what the keypad and switches do.

The keypad and switches are a bunch of pushbuttons, and these are used by the user the generate notes as if they were playing an instrument.

**Microcontroller Resource Utilization**

**Software**

We implemented the code using Keil uVision and VS Code coding environments and programmed primarily in C-language.

**Hardware**

We used a STM32-NUCLEO-L476RG microcontroller connected to an EDUBASE-L452 1173-H2.

**Analysis**

**Testing**

Testing the functionality of the buzzer to play notes was relatively easy, since we could tell by listening to it if it made a good sound or if it was something random.

**Public Safety**

This system utilizes a low voltage board without much physical danger to the user in terms of being electrocuted or shocked. However, frequencies under 20 Hz and above 20 kHz are beyond the human range of hearing and can be dangerous to listen to. Accordingly, we implemented a simple function to prevent the user from inputting any frequencies that exceed the human range of hearing. Likewise, this simple check helps prevent users from entering wrongful inputs the program cannot interpret.

**Global/Economic Factors**

Music remains one of the great innovations of mankind, and every culture around the world has some form of music. Music has become synonymous with Tennessee through Nashville and great country music stars, and people have made great economic profit in music industry. This is made possible by innovative technologies for recording and distributing. Our board is a relatively simple implementation of these technologies but serves as a good demonstration of what can be accomplished by engineers in a short amount of time.

**Teamwork Experience**

**Collaboration and Inclusivity**

Our team shares many classes together, so we brainstormed ideas among ourselves for about a week until having a meeting to finalize our plan and get an idea of where we needed to start.

We maintained a co-learning environment where if one of us did not understand something the others would explain why or how we needed to do something.

**Leadership, Goals, and Planning**

Dow took the lead with the project. He created the GitHub for the project. He and Cole helped the other team members get familiar with using it. Dow has the most experience with coding and he took the lead on the project with writing the software.

Austin and Bernie have the most music experience. Austin knows how to play the piano and Bernie is an audio engineer, so they contributed a lot to knowing the different music notes and how to accomplish the makings of the songs.

Cole and Nolan primarily worked on writing the project report to communicate the work done by the team.