Lab 4: Music Synthesizer Project

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Assignment: ECE474 Lab 4.1

Introduction:
Our idea for the project is to implement a 4-measure music synthesizer that can generate notes based on user input. Our goal is to allow the user to use the number pad to generate certain tones to play on the speaker. We expect this to be feasibly done by prompting the user for the frequency they want to hear and allowing them to input this using the numbers on the pad. These notes will then be displayed as musical notes on the LCD display, allowing us to use a range of octaves. We hope to be able to implement this across 2 total speakers at once.

We expect each of the following criteria to be met like so:

1. Perform reliable time and digital I/O functions: We will be implementing a 4-bar music synthesizer that will run in the scope of seconds, with each measure having a maximum time of 4 seconds with the tempo we will be using, allowing this to run in feasible time.
2. Operate with high speed and high CPU load: We will achieve this by routinely testing and using sample Arduino code for the remote online so that we can effectively implement features.
3. Interface at least one device to the Arduino Mega board which we have not used in prior labs: We are using the LCD screen and number pad for this lab.
4. Make a measurement or control an actuator (or do both) in a way that (at least conceptually) solves a defined problem: Our project allows users to test and sample music without hearing it played on an instrument, just a small breadboard device, allowing them to test a variety of sounds before writing/playing on their own.
5. Have a user interface of some sort: We will be using the number pad as a user interface.
6. Demonstrate understanding of how to use FreeRTOS features whenever appropriate or needed by your system: We are using RTOS as the scheduler, and since we have 3+ tasks running simultaneously with 2 speakers, we will need to use RTOS for this.