Mini Synth Final Project Description and Hardware List

Originally I had submitted a project proposal that would be more along the lines of a synth with full octave capabilities, multiple effects that like chorus, reverb, delay, with a lot more lights and recording capabilities, but found that the concept was way beyond my current skill level. With the permission of Mr. Martin, I found myself to be able to create a more polished digital instrument that I am proud of.

The Mini Synth Station is a hands-on digital synthesizer that lets users play five musical notes (C–G) using physical buttons connected to an Arduino. Each button triggers a synthesized sound on the computer using Tone.js, while p5.js displays the name of the active note in green. Three LEDs provide feedback: a green LED lights up when a note is being played, a blue LED shows when the synth is idle, and a yellow LED illuminates when an effect is being toggled to shape the sound. The two effects buttons allow users to toggle reverb and have modulated delay effects via LFO. This project blends physical computing with interactive web audio and visuals to create a compact, expressive digital instrument.

YouTube Link for demonstration can be found here: https://youtu.be/PQttva2XVfc

Hardware List

Qty	***Component***	***Purpose***
1	*Arduino Uno R3*	*Microcontroller for input/output*
1	*USB cable*	*Arduino-to-computer connection*
1	*Breadboard*	*Prototyping space*

7	*Pushbuttons*	*5 note triggers (C–G), 1 for reverb toggle, 1 for delay through LFO modulation*
7	*10kΩ resistors*	*Pull-down resistors for buttons*
3	*LEDs (Green, Blue, Yellow)*	*Feedback: green = playing, blue = idle, yellow = effect active to sound*
3	*220Ω resistors*	*Current limiting for LEDs*
15+	*Jumper wires (M/M)*	*Wiring buttons, LEDs, power, and ground*
1	*Laptop/Desktop*	*Hosts p5.js and Tone.js environment*
1	*Arduino IDE*	*For writing/uploading Arduino sketch*
1	*Code editor (VS Code)*	*For writing/editing p5.js + Tone.js code*