



## The Idea

To create a modular note block system that is designed for use at all ages, though specifically aimed at a teaching adolescent's the foundations of music and musical theory. The blocks will be highly interactive with a list of functions catering towards musical experimentation.

Individually, the blocks will have the option to change both note pitch and note duration, giving the full range of a 12 octave scale in addition to 5 options for the duration. These changes are shown with a high resolution display.

As a collective, the note blocks can be stacked horizontally to create simply melodies. The blocks are designed such that when stacked horizontally each brick interlocks and communicates with each other.

Fore more advanced users, the Musical Blocks can play multiple notes at once by being stacked vertically. See Figure 2. This creates the opportunity for more advanced users to make chords similar to existing pieces or create their own original music pieces.

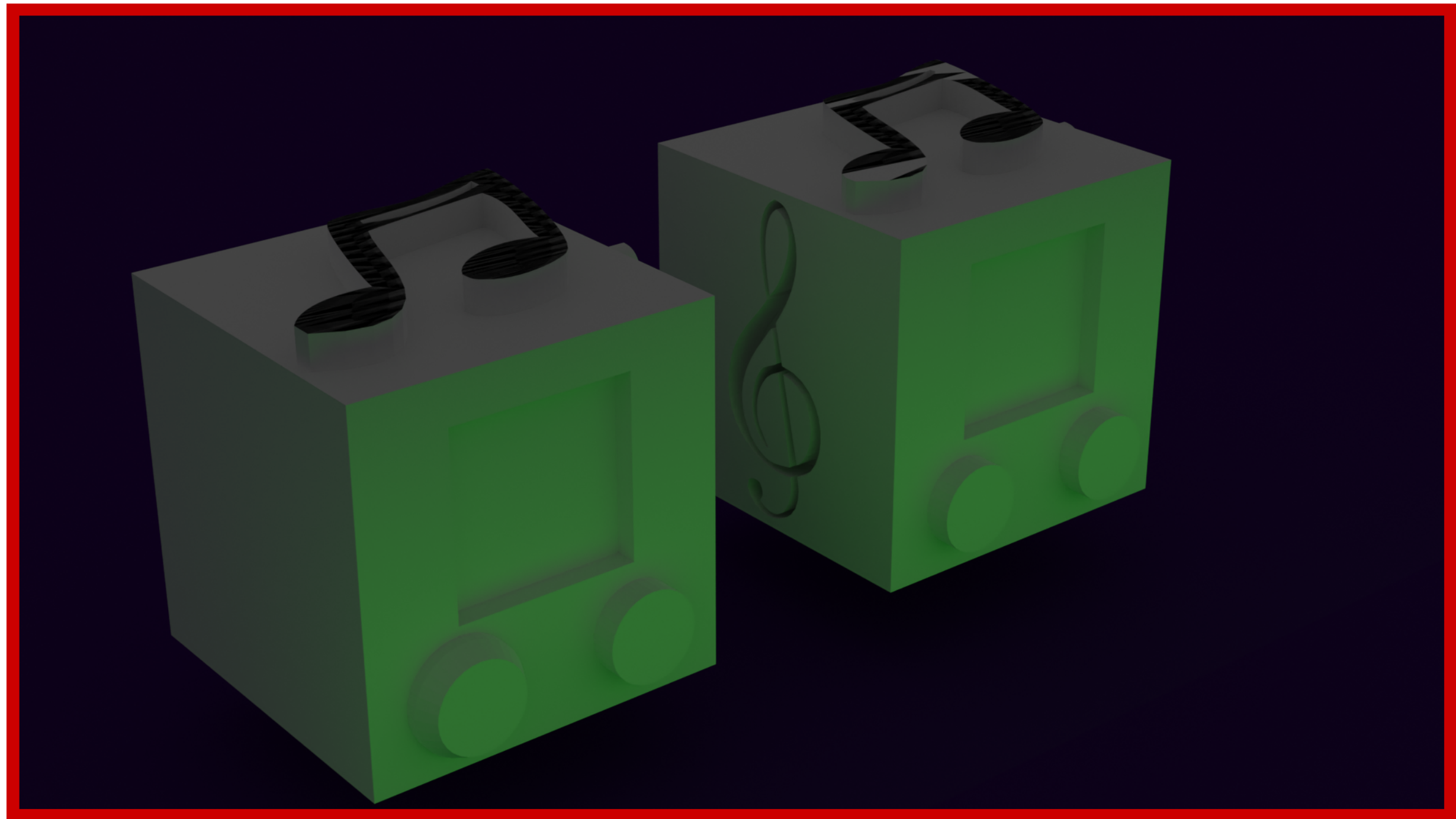


Figure 1. Sample 3D Render of a note block. The block itself will be roughly 12 centimeters on each side, though the screen and buttons as well as the connections are not to scale or finalized.

## The Start Block

The Start Block will provide power to the entire system, as well as set the Tempo of the music to be played. This starting block will have three external controls;

1. A dial that adjusts the Tempo between the ranges of 30 to 120 BPM
2. a button that toggles between continuous and single playback
3. A start button to start the sequence

The Starting Block will only have one connection side, facing to the right. This is to imitate how music is read off of a sheet of music. After the user decides on a tempo, the music is started via the start button. The start block then exchanges the tempo value to the every block in the sequence for interpretation.

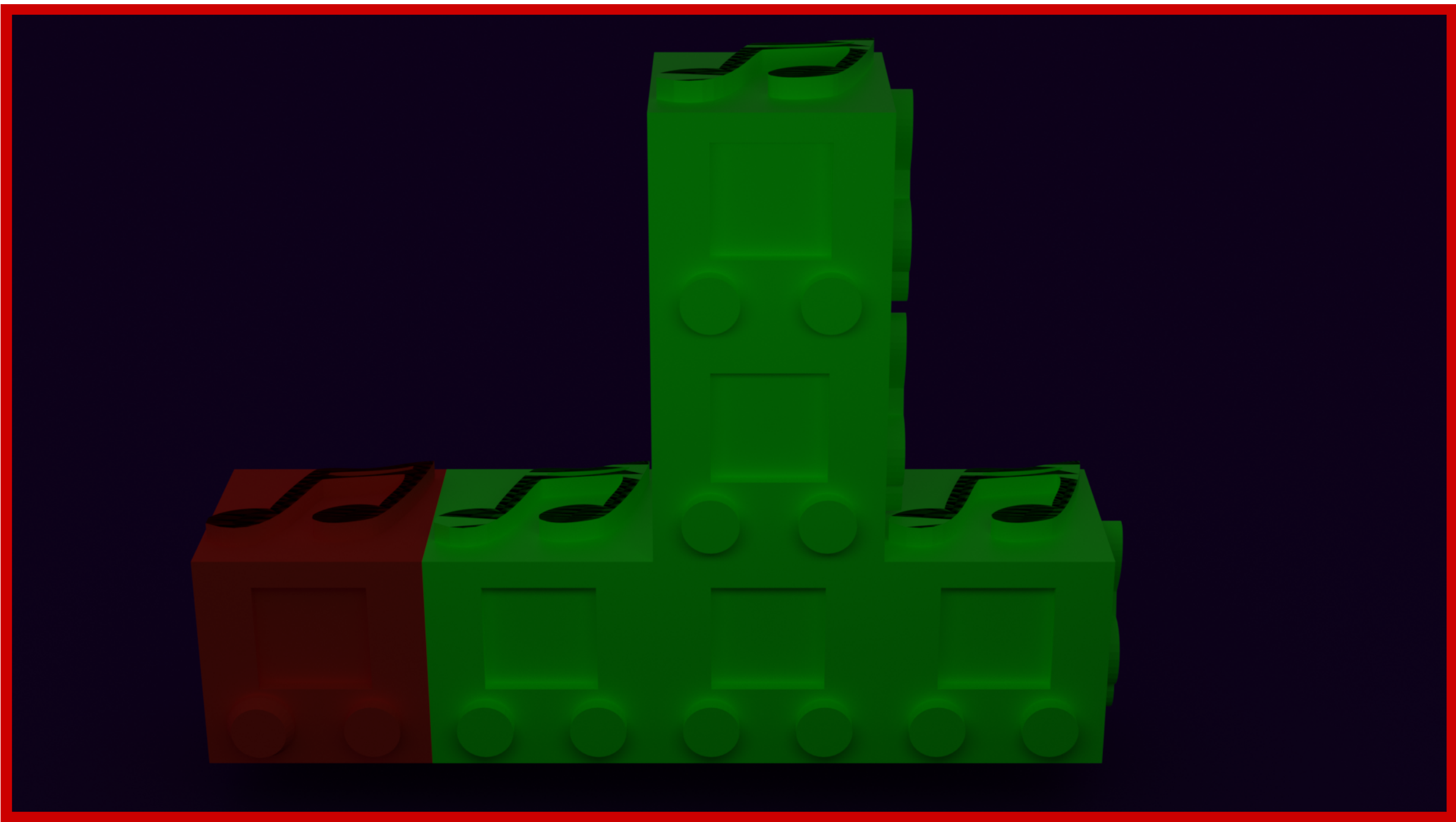


Figure 2. Sample 3D Render of a Start Block and proposed note blocks. One side will be used for the power plug (left), the other for the interface (right).

## Features

List of expected features. Some features are additional ideas that may not be completed, these features are marked with an “\*”

- **Instructional:** Teaches basic concepts of music, such as note, duration, and tempo. As well as how to read sheet music.
- **Customizable:** Can choose from a full octave scale of notes, ranges of tempos, and note durations to create limitless musical pieces.
- **Modular:** The Music Blocks can function independently, in any order.
- **Lighting Affects\*:**When a note is played, the Musical Blocks will glow temporally.
- **Musically Themed:** The sides of the block will have different indented music symbols.
- **Adjustable Tempo:** A starting block will provide the tempo/BPM of the musical pieces.
- **Repeat Function\*:** The musics can toggle between continuous playback and single playback.
- **Internal memory:** The musics blocks remembers previous selections, shorting the selection process.

## Supplementary Information

- The final presentation for this project will be held on April 19
- The proof of concept cubes shown in figure 3 are available in B203

## The Note Blocks

Each Note Block will be entirely modular, meaning that any note block can perform all tasks except the ones that are specifically left for the Start Block. This also means that the note blocks can be placed in any order without sacrificing functionality. As a result of each of the note blocks being modular, every block requires its own independent interface. For the music block, the interface consists of two buttons along with a screen to display the current settings. Each music block controls the pitch of the note and the duration of the note. The screen will update to represent the change in note pitch and duration.

Each Block will have an internal memory that can retain the previously assigned value of the note pitch and duration upon power cycling. These internal memory slots can be changed to the desired pitch or duration by the press of a button. When a button is held, the block cycle through the options at a faster pace. These two pieces of information dictate the length and frequency of the sound that gets played upon receiving the play command. As well, in slave mode (vertically stacked) these pieces of information will be used to help construct a chord when multiple notes being played simultaneously are necessary.

## The Physical Design

Each of the Musical Blocks will be a cube, with 5 of 6 sides being used for connection/user interface. The main face will hold the user interface, the LCD screen along with the 2 buttons for cycling through the different notes and durations options. The left and right faces, relative to the main face, will be used for the main sequence of connections that will be used to create the musical chain. While the top and bottom will be used by advanced users for the creation musical chords.

The connection interface between each block will be comprised of a unique musically shaped key that will prevent the user from connecting the blocks improperly. The blocks will be held together by a magnet to further strengthen the physical coupling of the musical blocks.

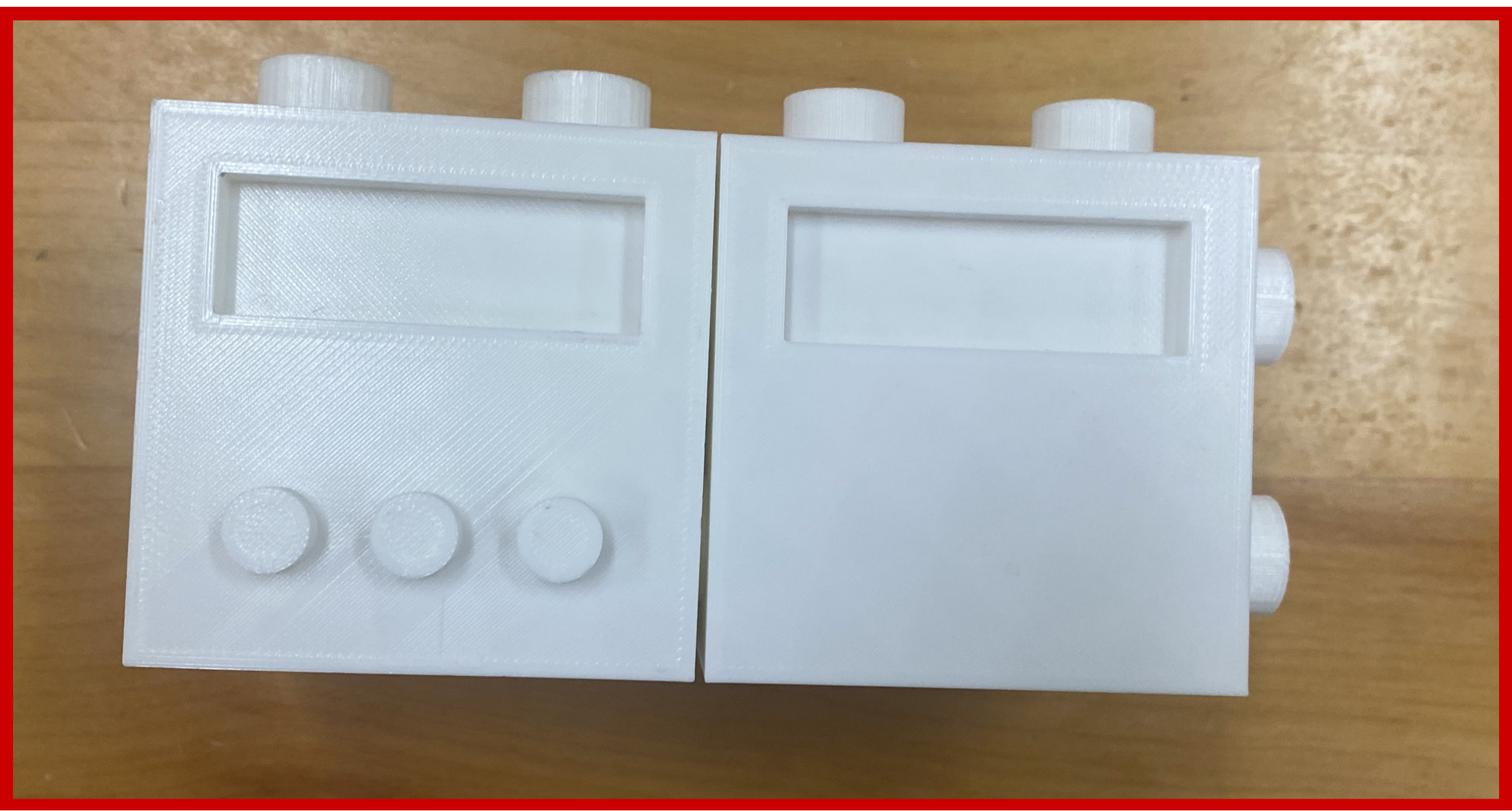


Figure 3. Sample 3D Print of the first and second rendition of the Note Block.