

## **Music Box Generation from MIDIs**

6.S079 Project Proposal

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### Problem and Motivation

The problem we wish to tackle with our final project is allowing users to generate custom music boxes by simply uploading a MIDI music file containing the melody. Our overall goals are to decrease the cost to the user of creating a custom music box and to make it easier to generate boxes by allowing a user to upload the desired song instead of having to manually input each note and the rhythms while still maintaining good sound quality. The custom 3D-printed music box was suggested in class; however, the fully 3D-printed music box does not sound very good due to the plastic's thin sound, so we wish to integrate a steel comb in order to make the custom boxes sound like traditional music boxes.

### Background and Tools

Music boxes have been around since the 18th century, and their core design has not changed much. In order to generate these boxes, we must understand both how the boxes are designed as well as the music theory. A simple hand-cranked music box is made up of four parts: the bed plate, which is the foundation that holds the whole mechanism, the cylinder, which has pins that pluck the notes, the comb, which the pins on the cylinder pluck to produce sound, and the ratchet lever, which the user turns to play the song.

We will generate the 3D-printed parts with OpenSCAD, applying the skills learned from assignment 2.

### Proposed Technical Method

There are two components to our technical method: computational generation and fabrication of the music boxes. The generation component will take the form of a web application, written in Javascript, that will take in the two parameters from the user, the MIDI file and the portion of the song they wish to encode, and it will output the OBJ or STL file for the music box and an SVG or DXF for laser cutting the comb. We will parse the notes from the MIDI file and use them as input to the generation code, using the OpenJSCAD library (<http://openjscad.org/>) to generate the model. The fabrication component involves actually creating the physical music box. We will 3D print the bed plate, cylinder, and lever in ABS or PLA, and we will laser cut the comb in thin stainless steel.

### Expected Results

The finished project should consist of a web application that allows users to generate their own custom music boxes, and we hope to create and assemble a few music boxes of our own using the web app, for demonstration.