

# Final Project: Modified Theremin

Emily O'Mahony

## Overview

The goal of this project will be to construct a modified theremin using distance sensors rather than antennae and an external speaker. The user will be able to use two hands to control the pitch and volume of the sound being emitted by moving the hands up and down over the sensors. If both hands are not within range, the theremin will not emit sound. The theremin will also include a display that visualizes the note being played.

## Peripherals

- 2 ultrasonic distance sensors
- audio jack (on board)
- external speaker
- external LCD Display

## Protocols

- I<sup>2</sup>S
- SPI

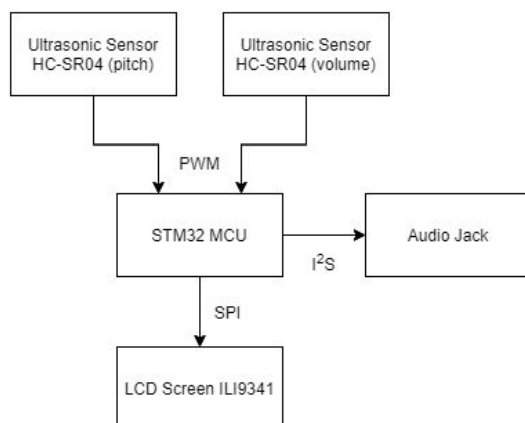
## Software Design

The sensors will constantly be getting queried for the distance to the user's hands using PWM which will involve timer interrupts. The distance will be converted to a frequency to be emitted. The audio data for this frequency will be sent to the jack using I<sup>2</sup>S communication. We will visualize the frequency being played on the instrument by displaying piano keys and a reference point on a small LCD display using SPI; the point will move left and right over the keys based on what frequency is being played.

## Website

<https://sites.google.com/view/theremin-project>

## Block Diagram



## Responsibilities

An ideal timeline would be as follows:

- Week 7: finalize proposal, order parts as necessary, start on the code
- Week 8: get sound out of the audio jack
- Week 9: incorporate the ultrasonic sensors and use distance to alter frequency & volume
- Week 10: incorporate the display