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## INTRODUCTION

The IR Theremin is a project utilizing the H08R60 module. The modules were combined into a network topology and programmed to interact with each other. Each H08R60 module is assigned different sounds using serial communication. The functionality is programmed into the master and slave modules. The corresponding sound is created when a sensor detects objects within the threshold distance.

## SOFTWARE DEVELOPMENT ENVIRONMENT

- Keil uVision for firmware design
- Programming Language: C
- Processing IDE for CLI design, serial communication, sound processing
- Programming Language: Java
- STM32 Flash loader demonstrator to update & install firmware (.hex file type)
- Putty as a terminal software

## ABOUT H08R60 MODULE

- 1 dimensional LIDAR sensor capable of accurately measuring the distance to an object less than 2 meters away.
- Infrared time-of-flight ranging sensor module based on ST VL53L0X sensor and STM32F0 MCU (32-bit ARM Cortex)
- Firmware designed in C code
- Six array ports and six power ports

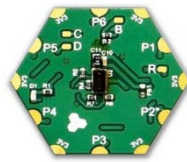


Figure 1: H08R60 MODULE

## ABOUT IR THEREMIN

No physical contact to play the music  
Uses H08R60 sensor modules  
Uses serial communication  
Uses PC to play the sound assigned to each module  
Custom sound and physical setup environment

## RESULT

- Sound sample matched with the assigned modules
- When the same sound is triggered before finishing the previous instance, it stops and restarts quickly (i.e. replay technique)
- When a different sound is triggered before finishing the previous instance of sound, the two sound samples overlay (i.e. overlay technique)
- Distance threshold varies according to physical setup and user learning curve
- Streaming samples at a 50ms period (a.k.a. 20Hz)



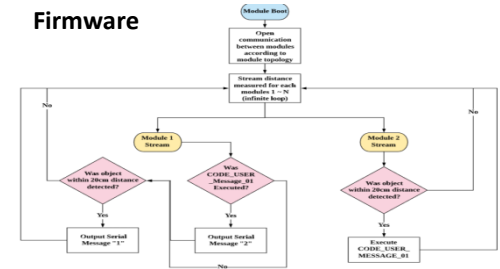
Figure 2: Streaming in 50ms period, 20Hz

## FUTURE WORK

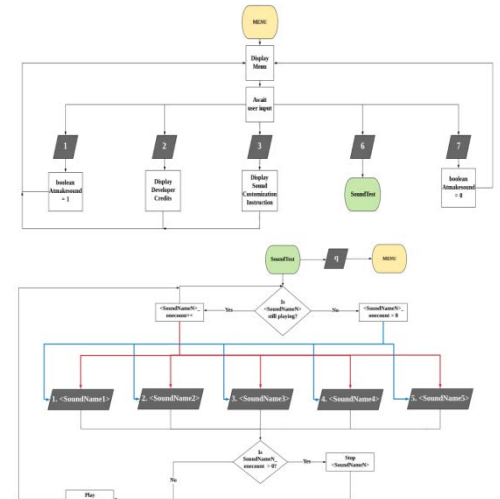
Potential future work includes programming a sound synthesizer to create effects (e.g. vibrato), and designing a real-time visual display of sound (waterfall & waveform display)

## DESIGN

### Firmware



### Processing: Menu, Sound Processing



## ACKNOWLEDGEMENTS

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