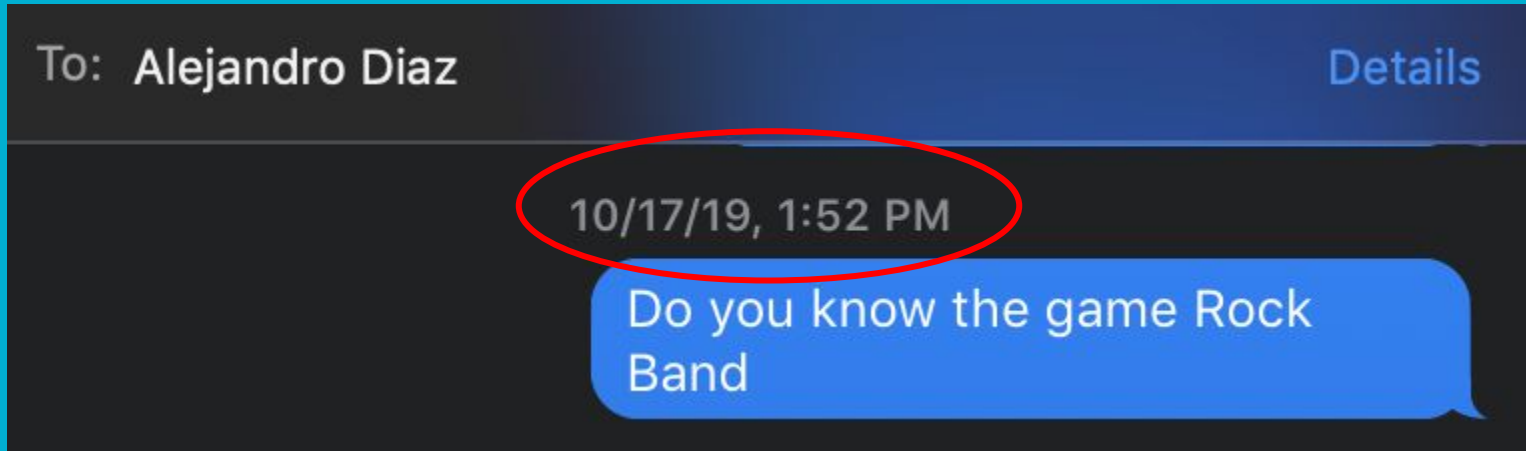


# FPGitAr Hero

Sarah Spector, Alejandro Diaz

# Proof of intellectual property

---



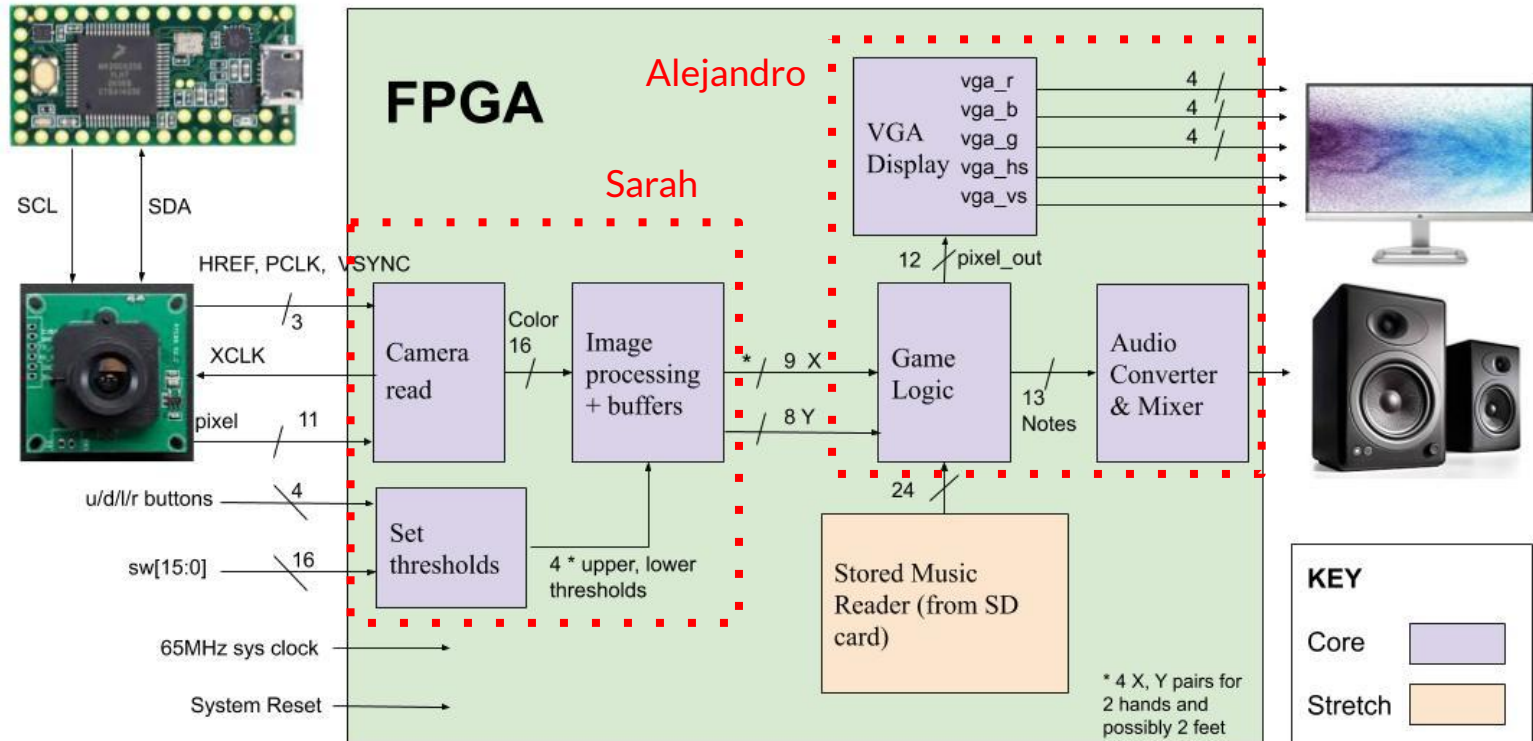
# What even is your game?

---

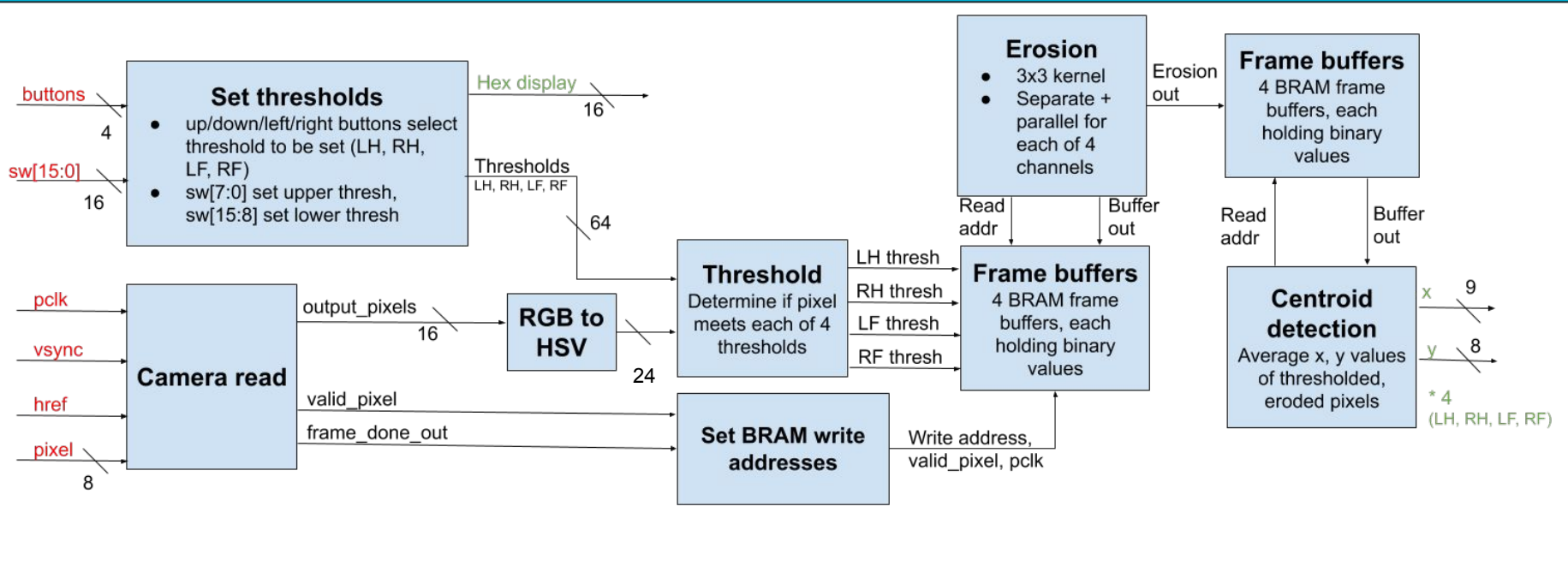
- Notes fall down from the top of the screen
- User moves their hands to hit notes (camera tracking of colored patches/LEDs, audio feedback)
- Lots of room for gameplay development



# Overview

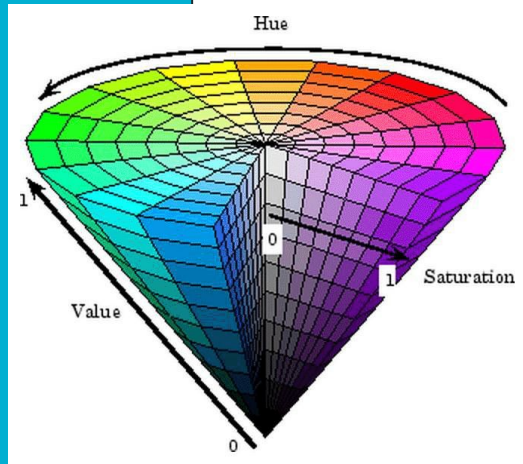
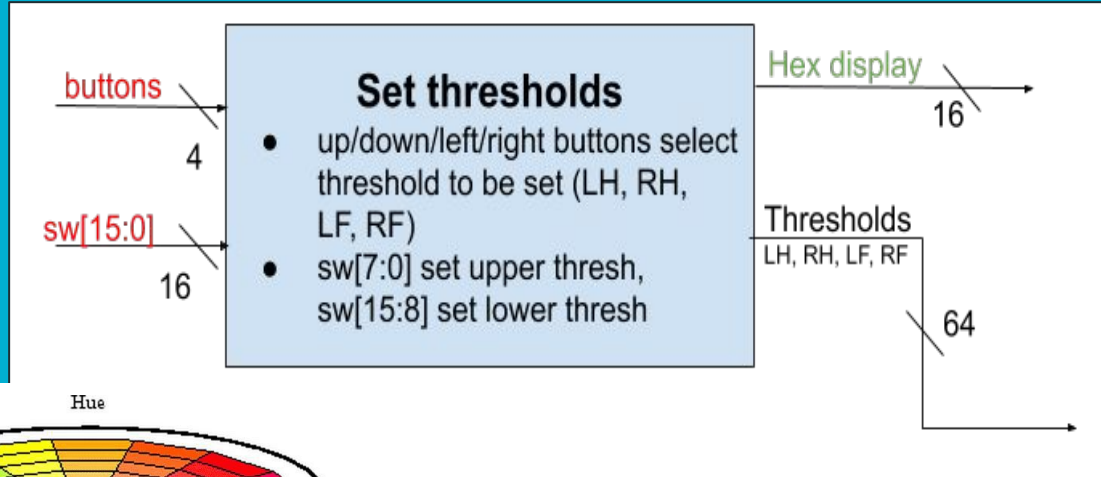


# Camera interface + image processing

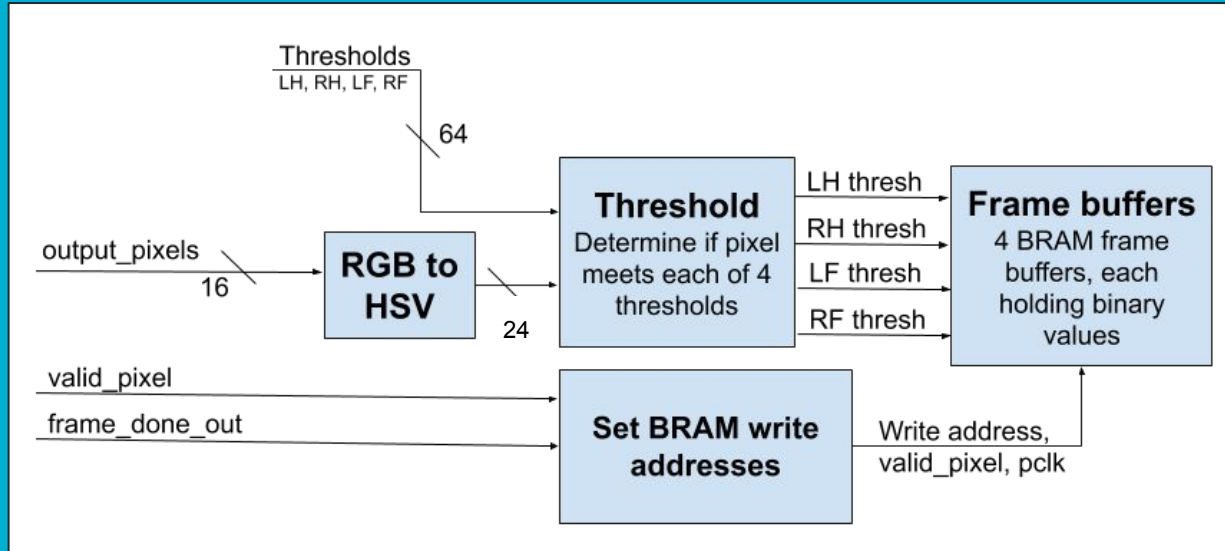


# Threshold control

- Hue (HSV) thresholding
- Set separate thresholds for each of 4 limbs
- Use buttons, switches to control



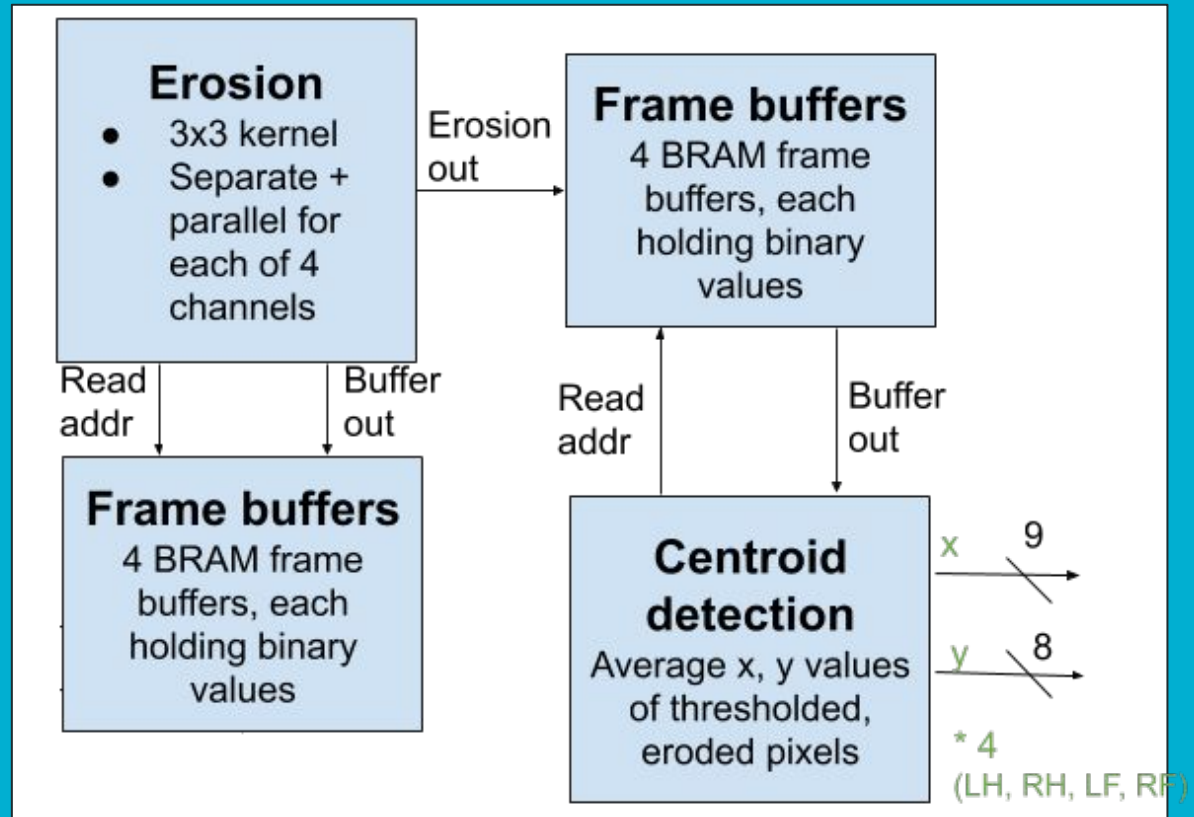
# Hue thresholding + buffering



- Fast RGB -> HSV (6-13 cycles)
- Threshold separately for each of 4 hue ranges
- Four BINARY frame buffers

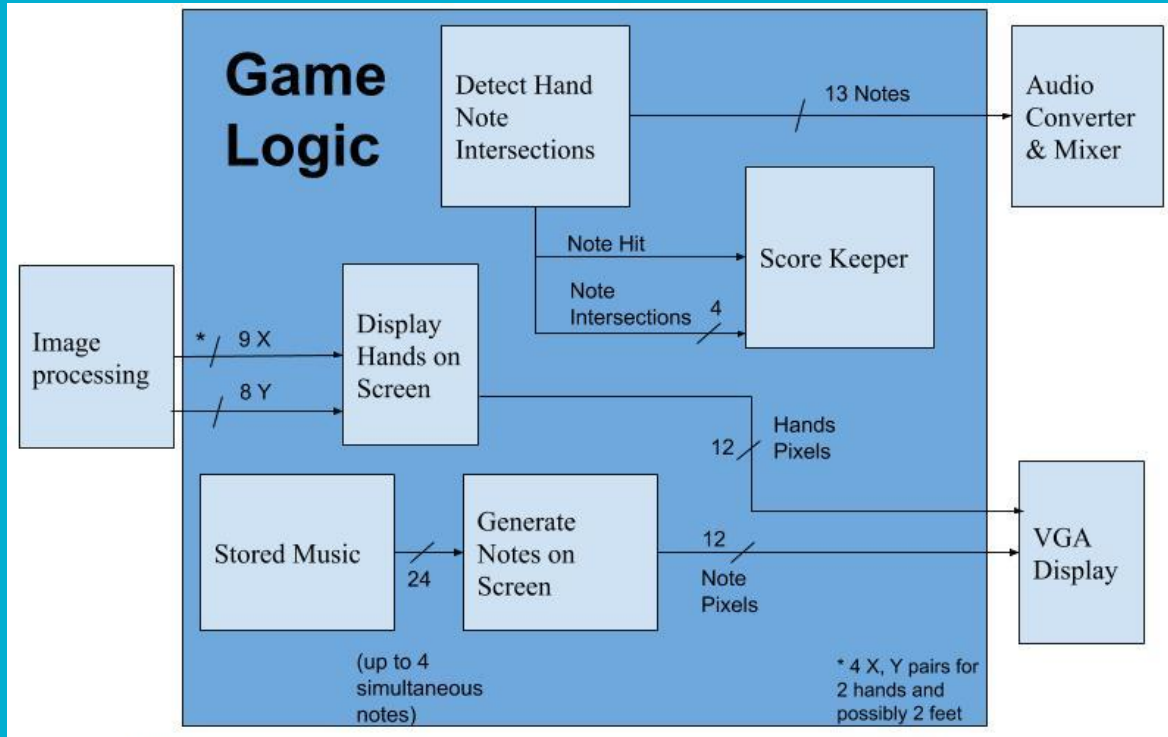
# Erosion + centroid detection

- Erode with 3x3 kernel
- Binary buffers
- Avg x, y val of resultant pixels
- Separate + parallel image processing for each of 4 channels



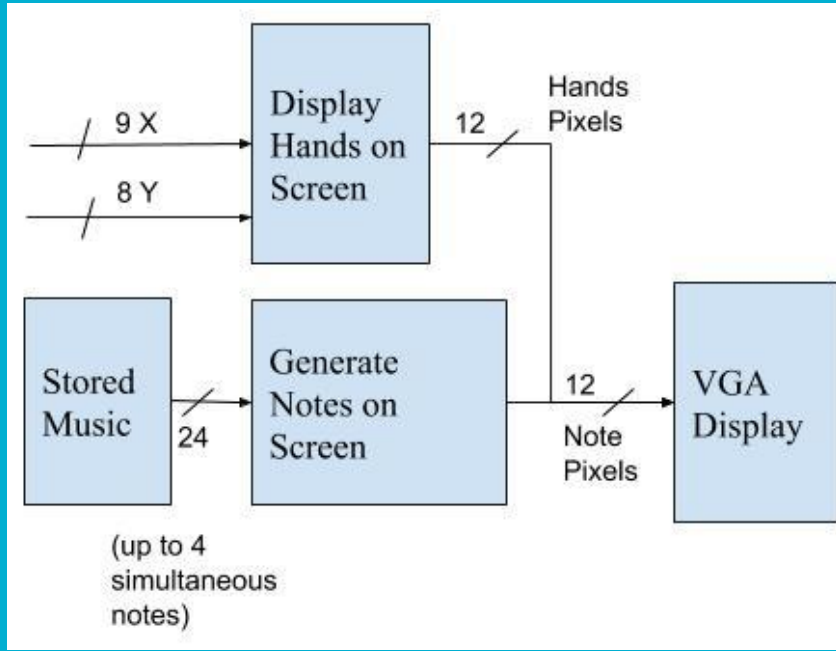


# Gameplay Logic Module



# Display on Monitor

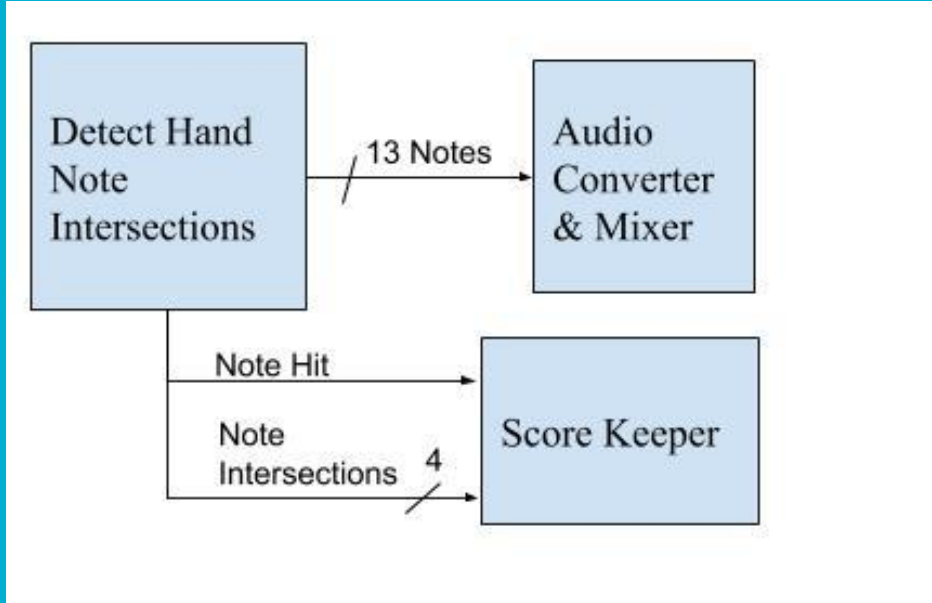
---



- Have to create all note blobs from the start
- BPM, Timbre, Pitch, Note Length
- Note = 4 bits for pitch and 2 for length
- Falling speed depends on BPM

# Note Hand Interactions

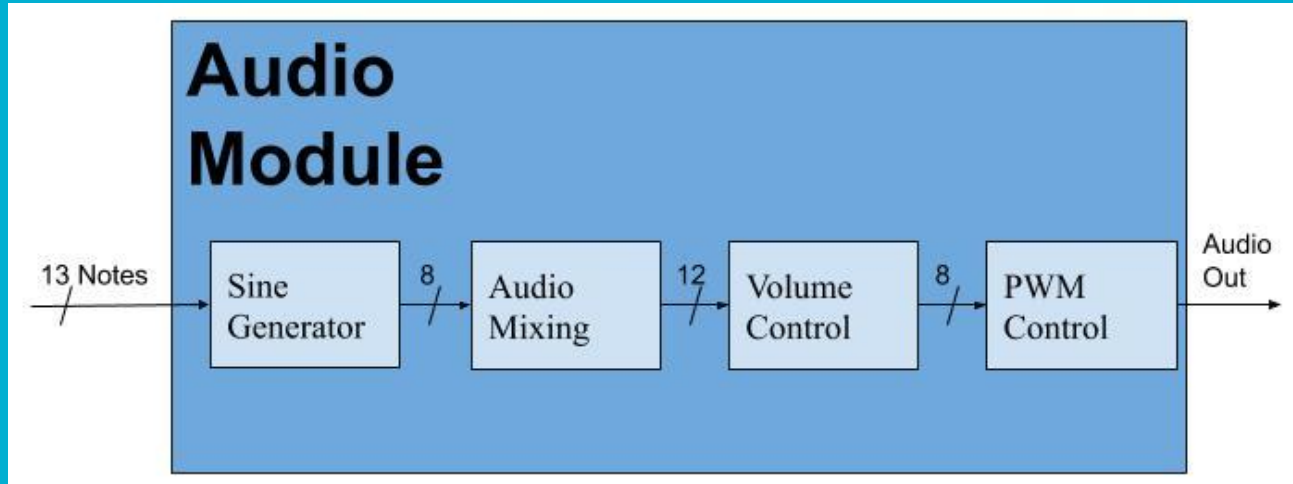
---



- Pixel overlap on a frame by frame basis to detect Intersections
- Detect note hit by intersection of a hand and the front end of a note and x, y position
- Note Intersections on a frame by frame basis along a horizontal axis
- Score is a function of its inputs (initially on hex display)

# Audio Player and Mixer Module

---



- Naive Audio mixing is just adding and dividing by n
- 13 channels feed into Audio Mixing

# Minimum viable product

---

- Accurate x, y tracking of at least 1 colored patch/light (hand)
- Notes streaming down screen based on a stored song
- Notes play on intersection with hands (audio output)
- Score displayed



# Stretch goals

---

- Menu settings selection
- Tracking hands AND feet
- More sophisticated image processing-  
no colors?
- Hand y-coordinate to control volume
- Variable gameplay speed
- Gameplay add-ons: visual effects  
streaks, multipliers, multiplayer, levels,  
gestures, etc.
- Load a song from SD card (if needed)



# Timeline

---

Due date	Alejandro	Sarah
11/11	Implementation of music storage, notes falling and playing when hit by cursors moved by buttons, multiple notes playing	Camera interface complete, HSV conversion and thresholding
11/18	More complicated songs playing with perhaps some extra gameplay features/graphics	Erosion/dilation, tracking of 1 patch
11/25	Done with all essential features for basic gameplay- basic song playing with according notes playing	Accurate tracking of 2-4 patches
12/2	Addons and extra features to be added	Addons/improvement of tracking algorithm

Questions?