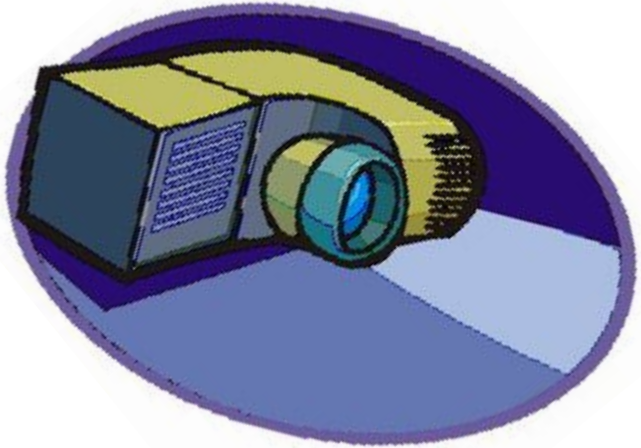
# Projected Floor Piano

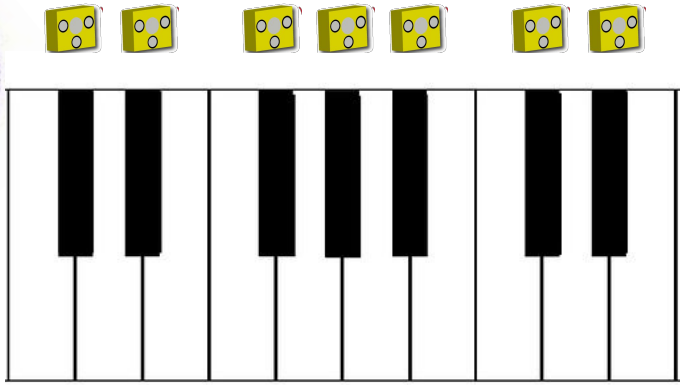
Liam Cohen, Sarah Flanagan, Zoe Klawans

# Overview

Visual Module



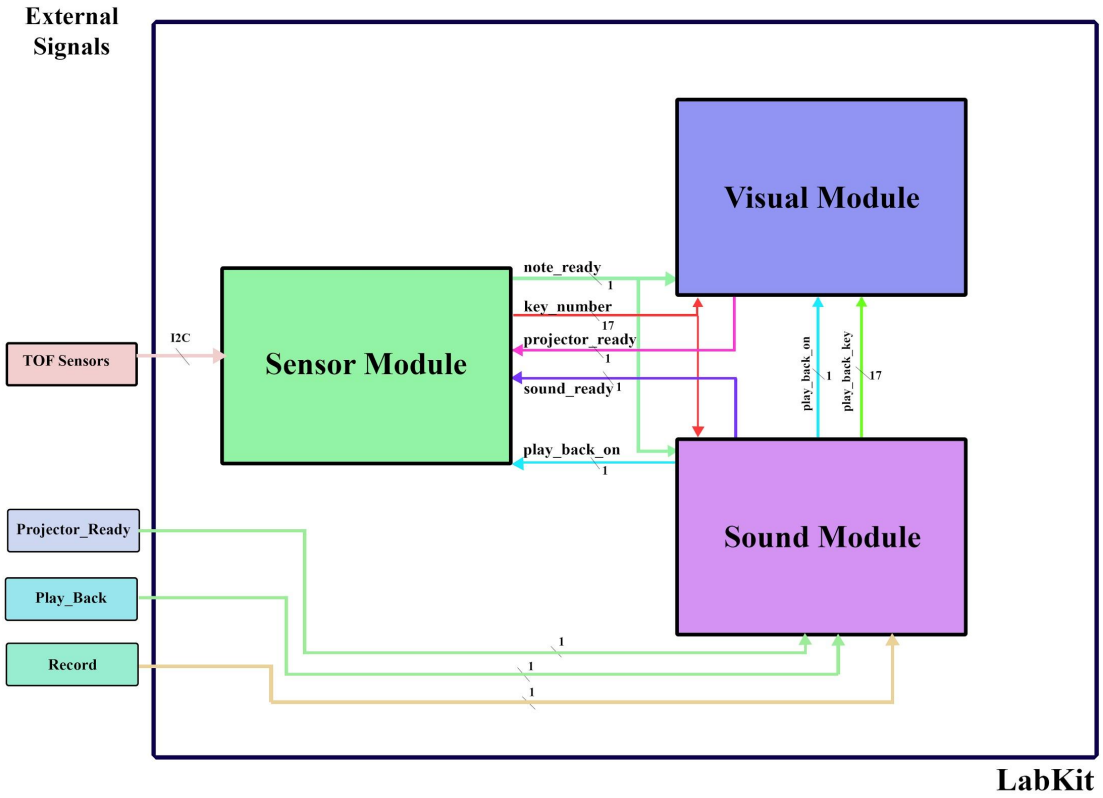
Sensor Module



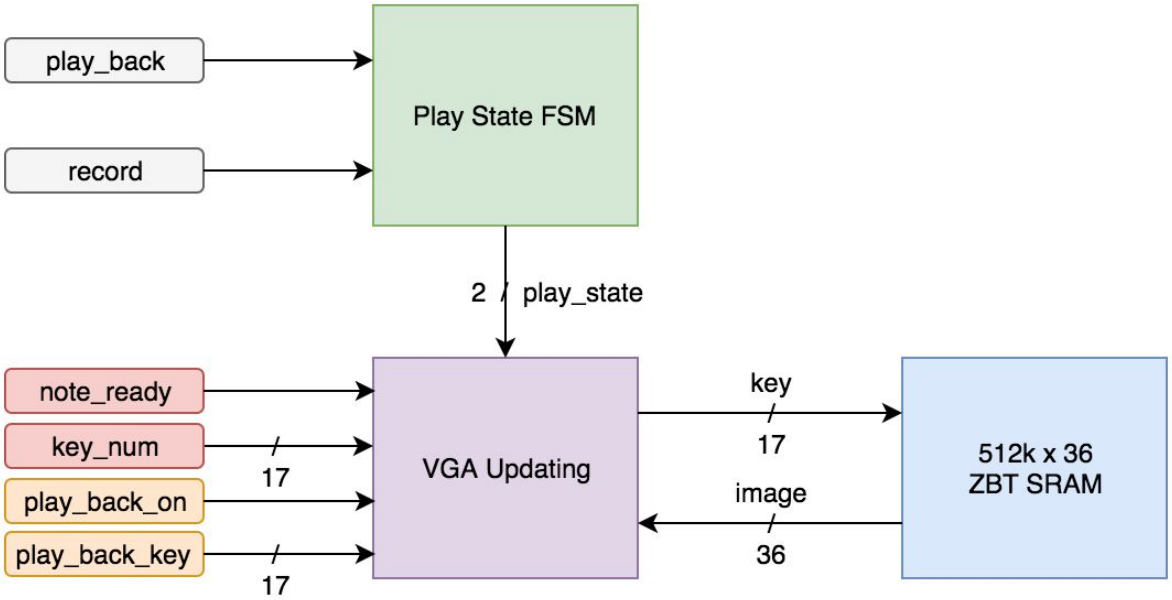
Sound Module

# Modes of Operation

- **User Mode**
  - The notes corresponding to the keys the user plays are played
- **Record Mode**
  - As keys are pressed they are stored into memory
- **Playback Mode**
  - Playback the keys that are stored in memory


External Signals
Visual Module
Sensor Module
Sound Module
TOF Sensors
I2C
note_ready
1
key_number
17
projector_ready
1
sound_ready
1
play_back_on
1
play_back_on
1
play_back_key
17
Projector_Ready
Play_Back
Record
1
1
1
LabKit

# Visual Module - Block Diagram



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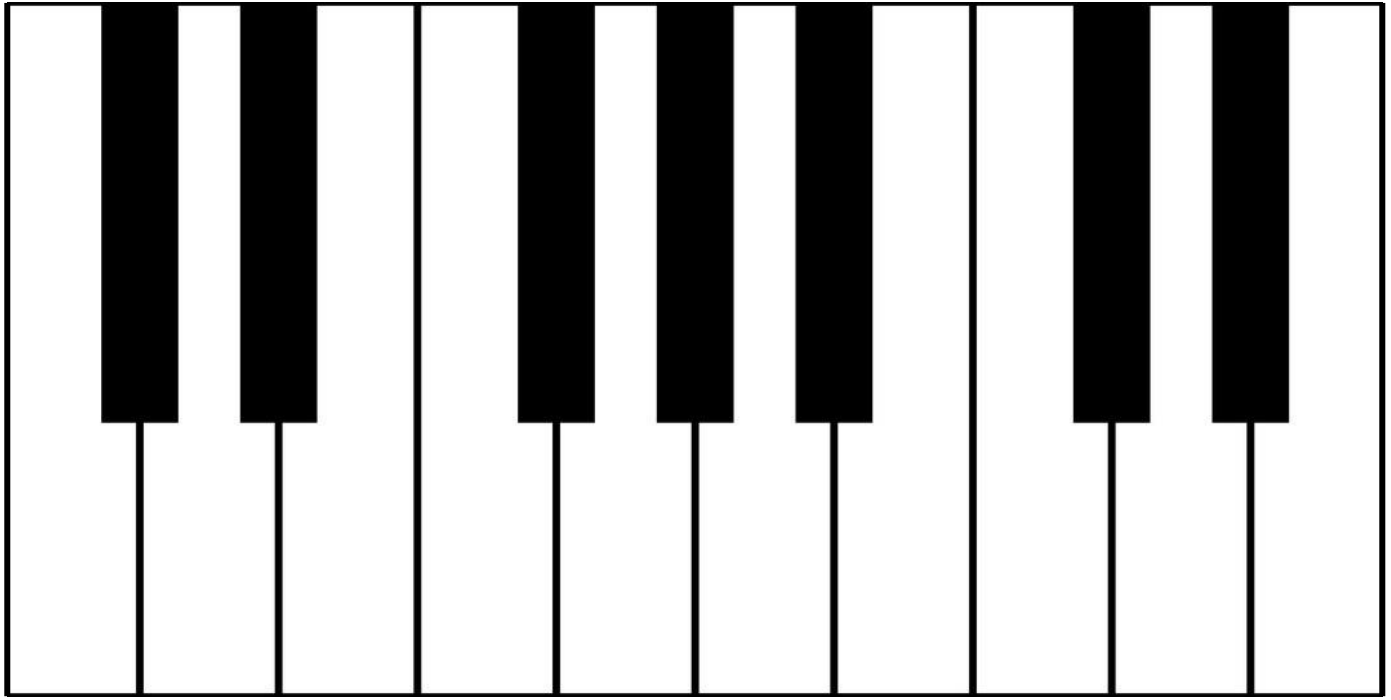
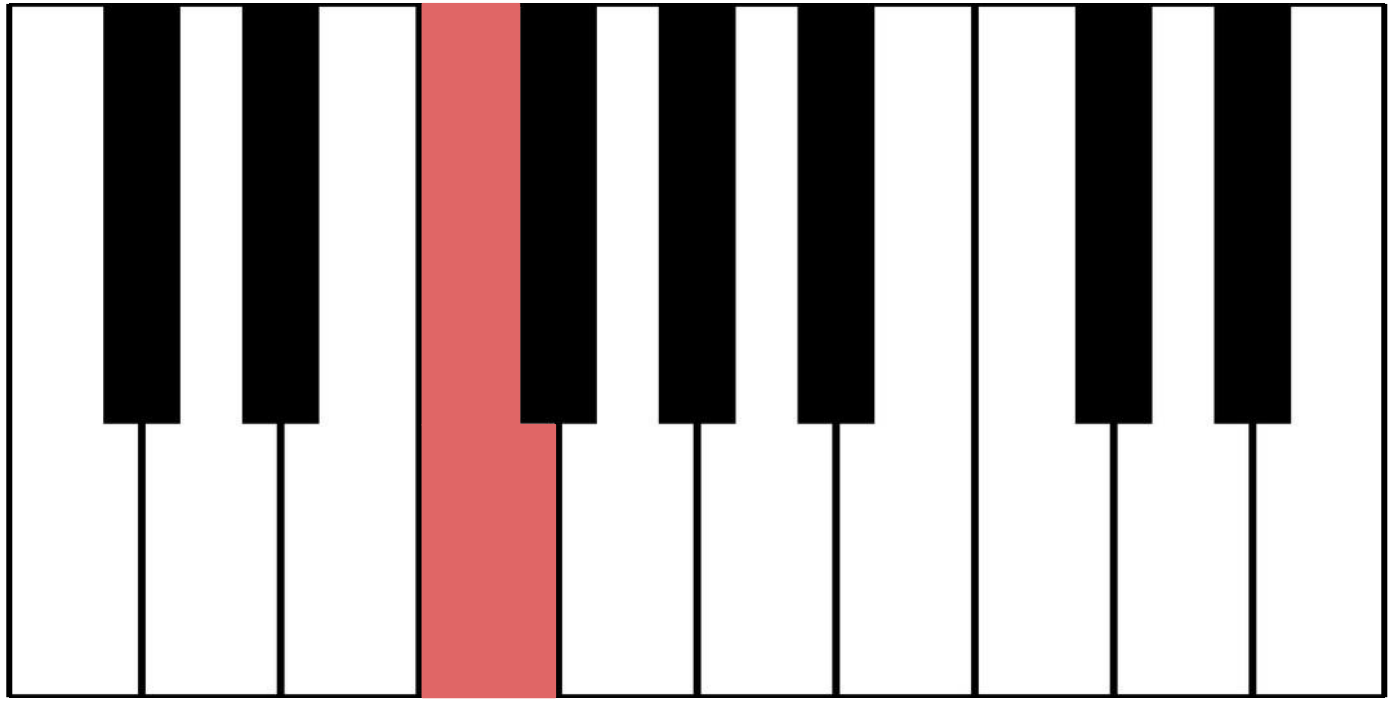
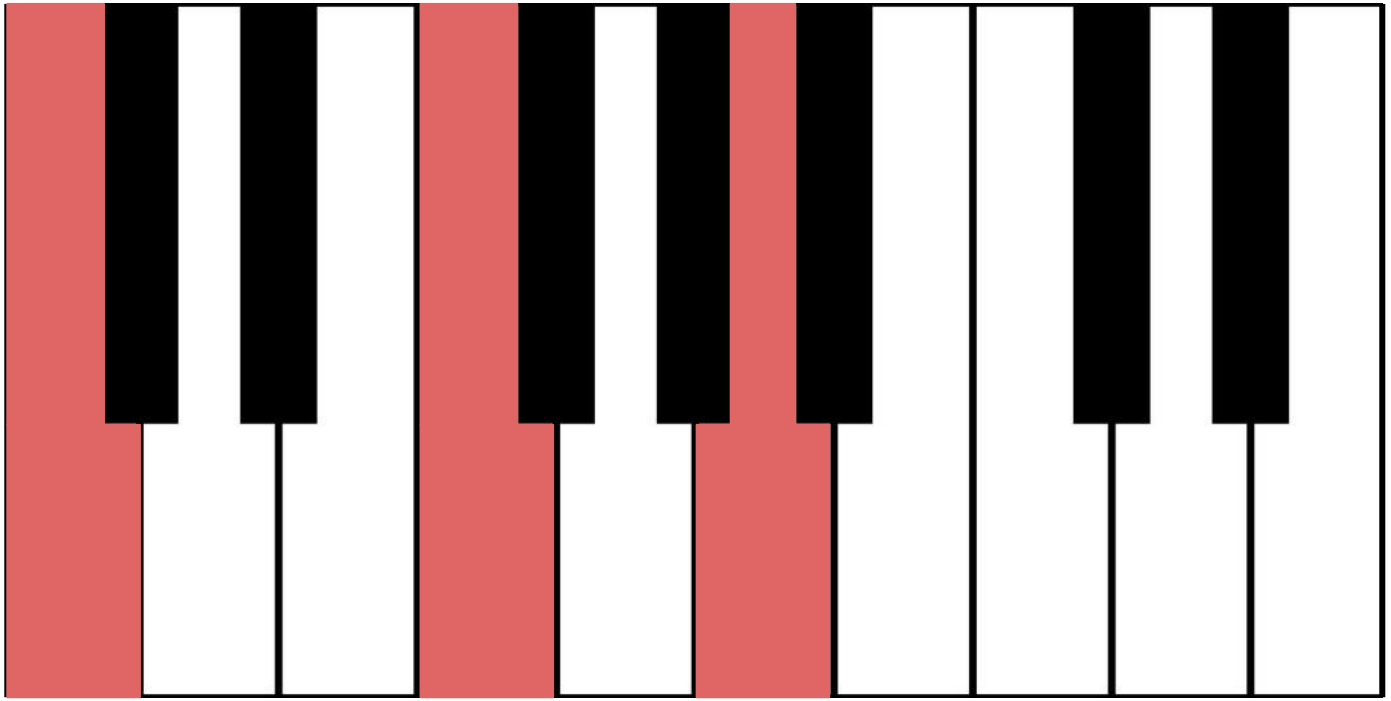


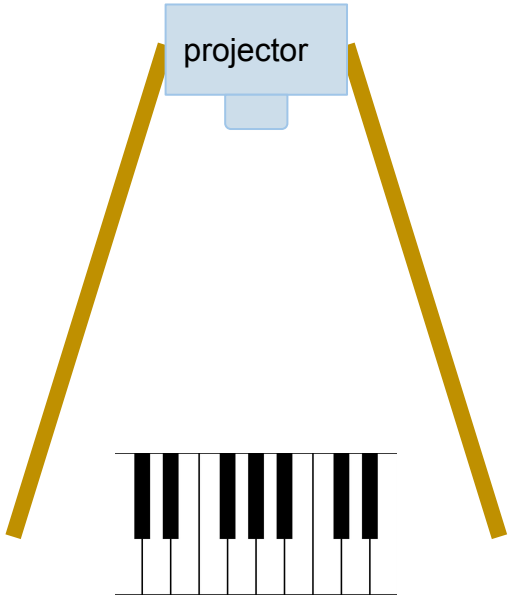
# Visual Module - F

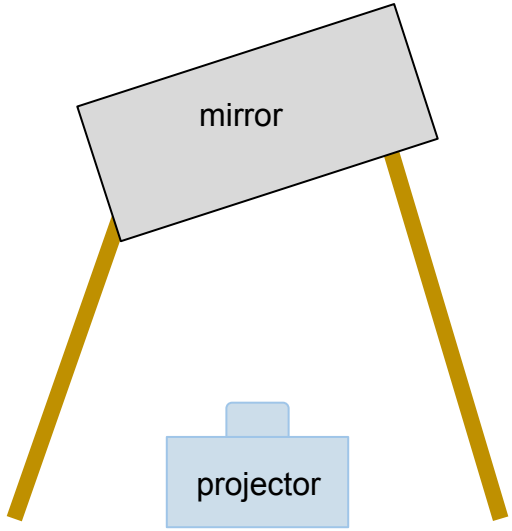


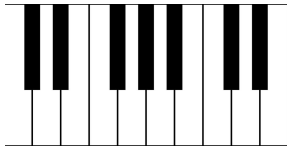
# Visual Module - Chord



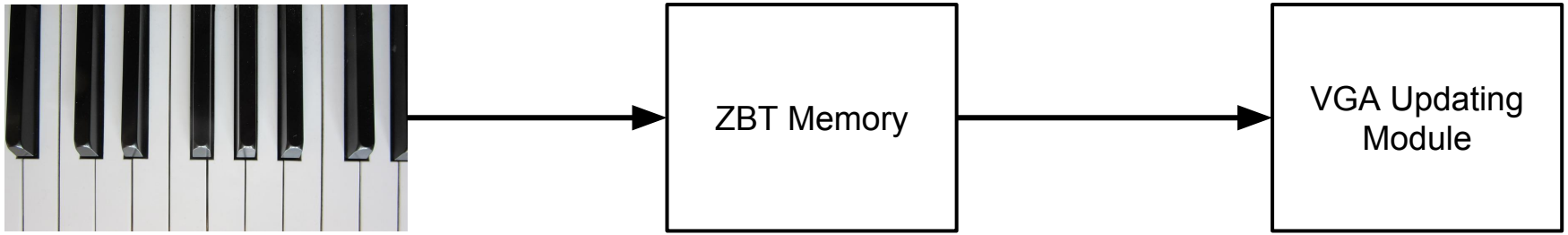
# Projector Hardware



# Visual Module - Real Piano Image



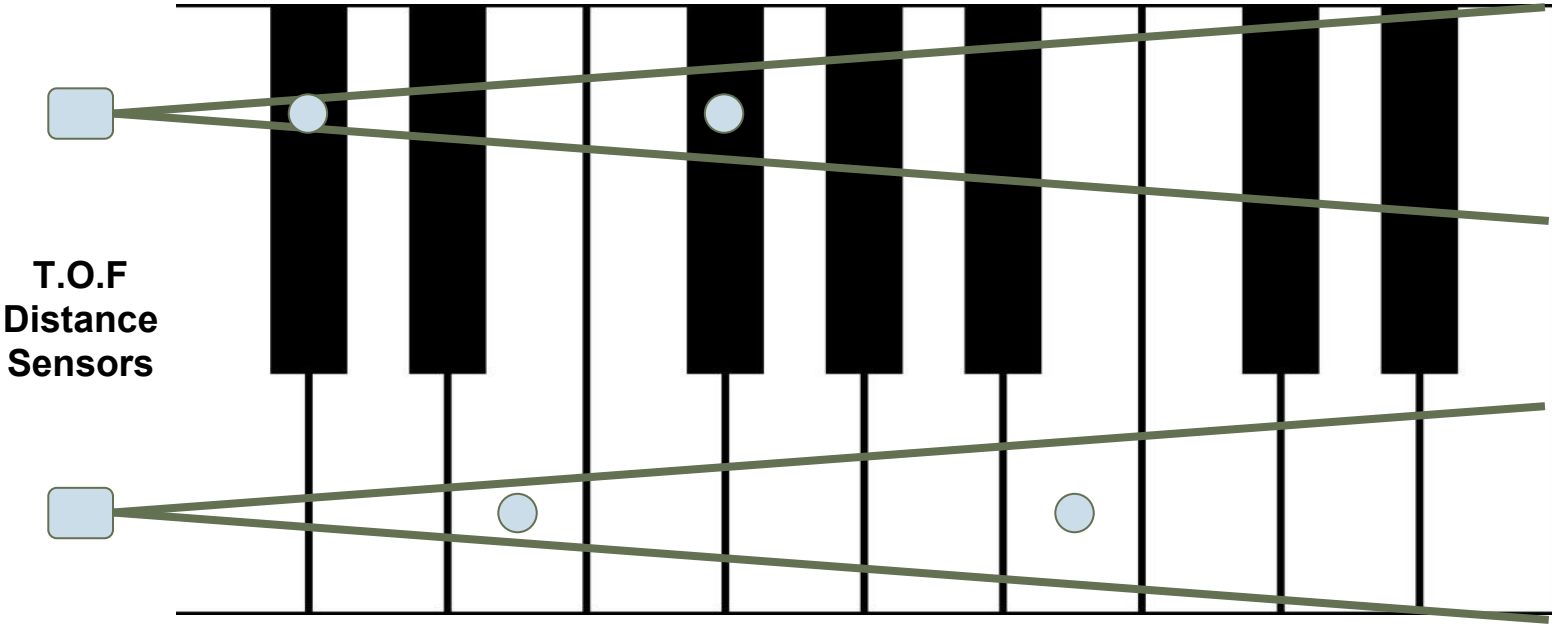
# Visual Module - Challenges

Correcting image for angled projector

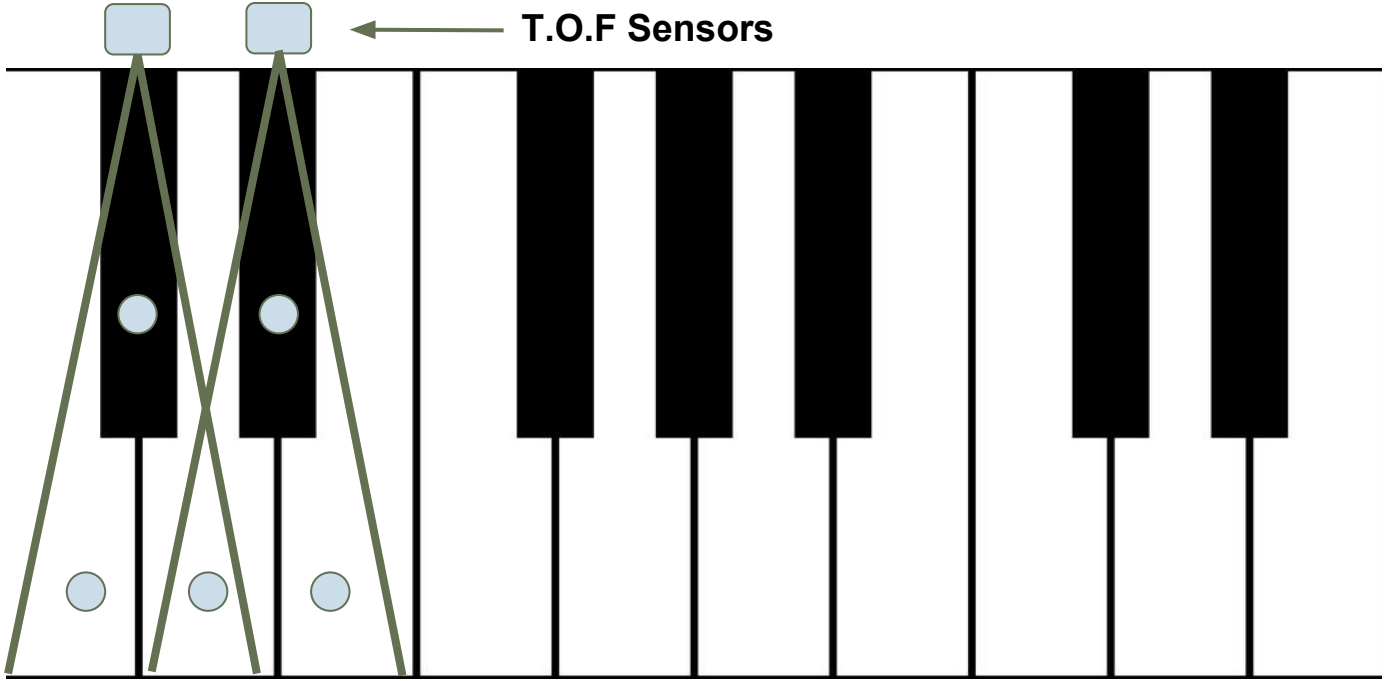
Using images of real piano -- can’t store 2^17 combinations of key presses

- Overlaying 2 images
- Drawing sprites over real image

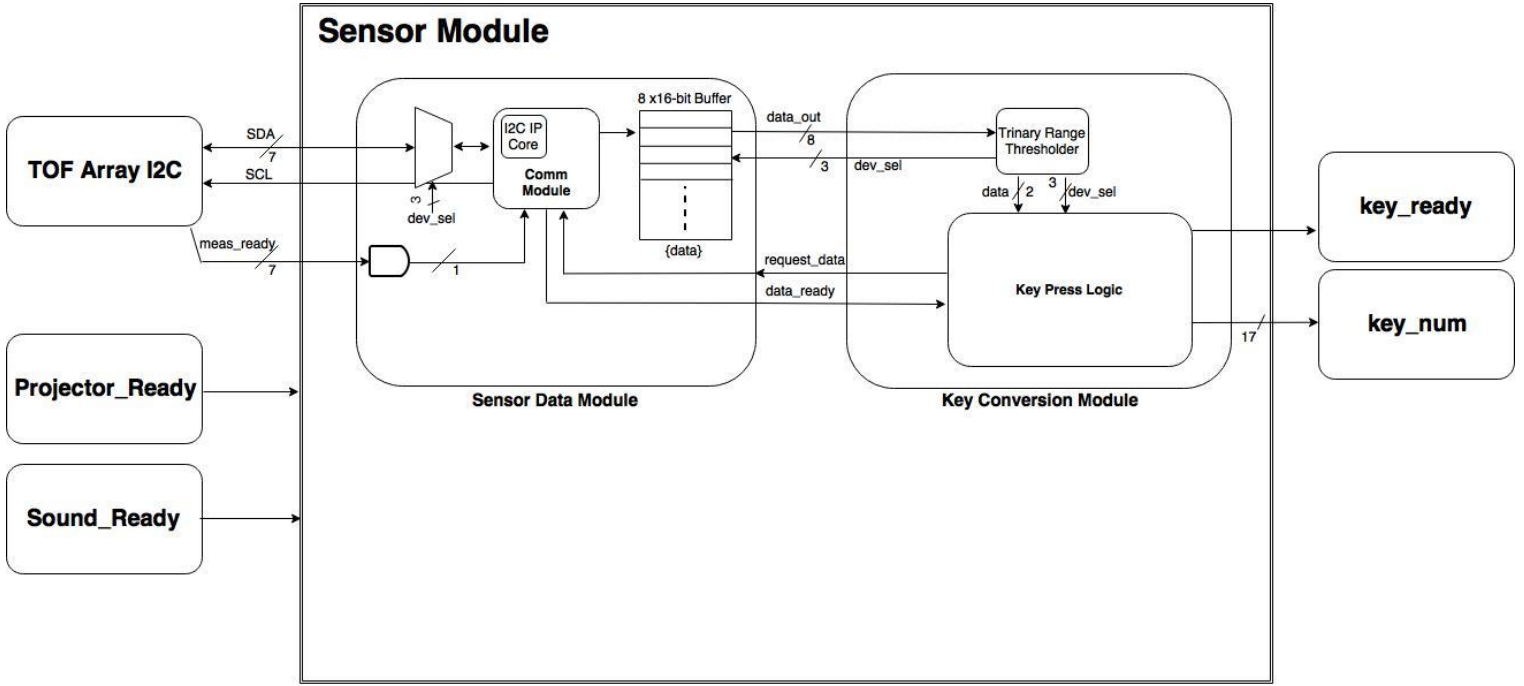
# Sensor Module: Base Hardware Setup



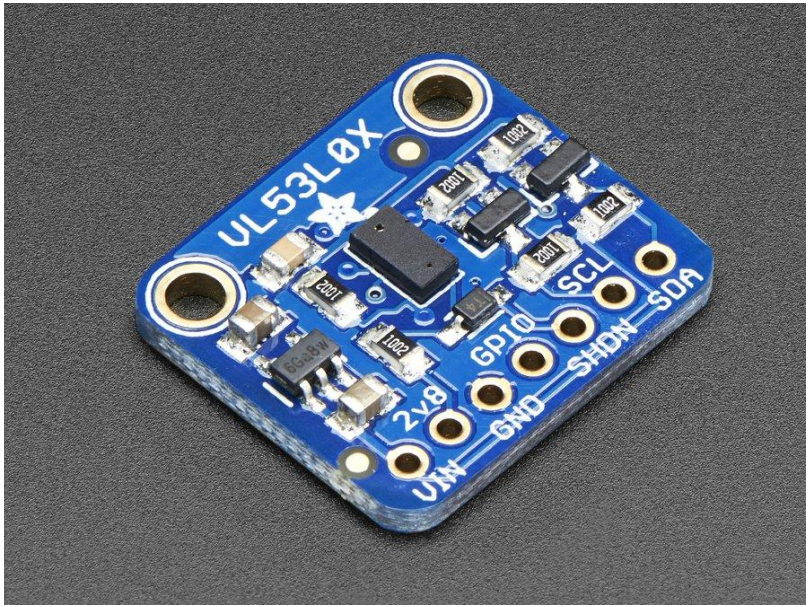
# Sensor Module: Reach Hardware Setup



# Sensor Module - System Design

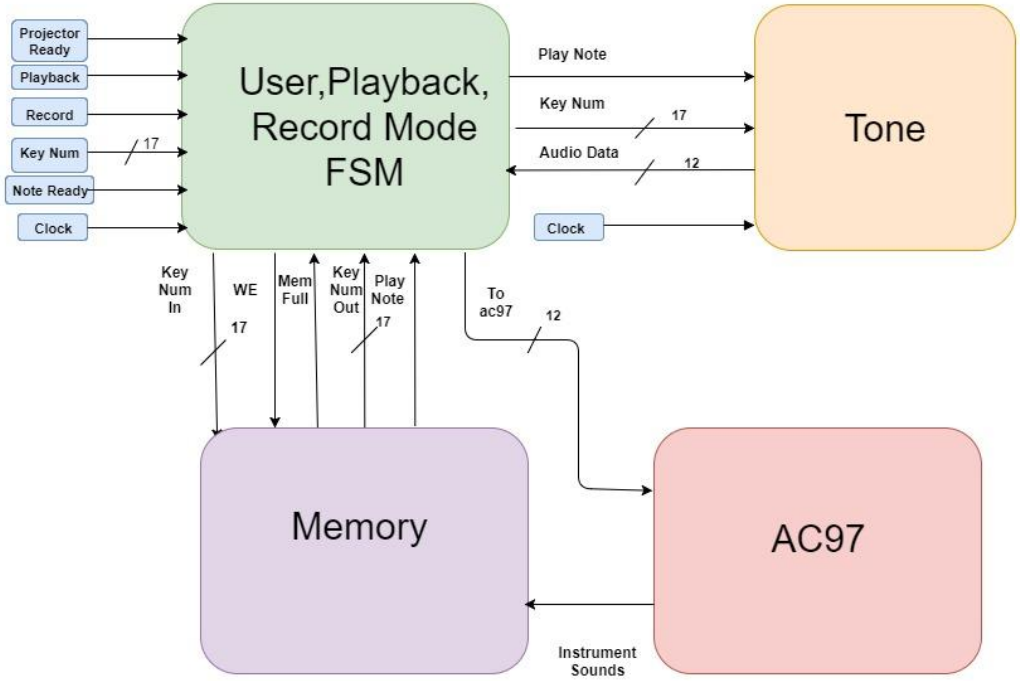


# Sensor Module: Challenges




- Time of Flight sensor
  Communicates over I2C
- Requires comple startup sequence with many register writes
- Complexity may act as a failure mode
- Backup plan: use simpler range sensor methodology like sonar.

# Sound Module



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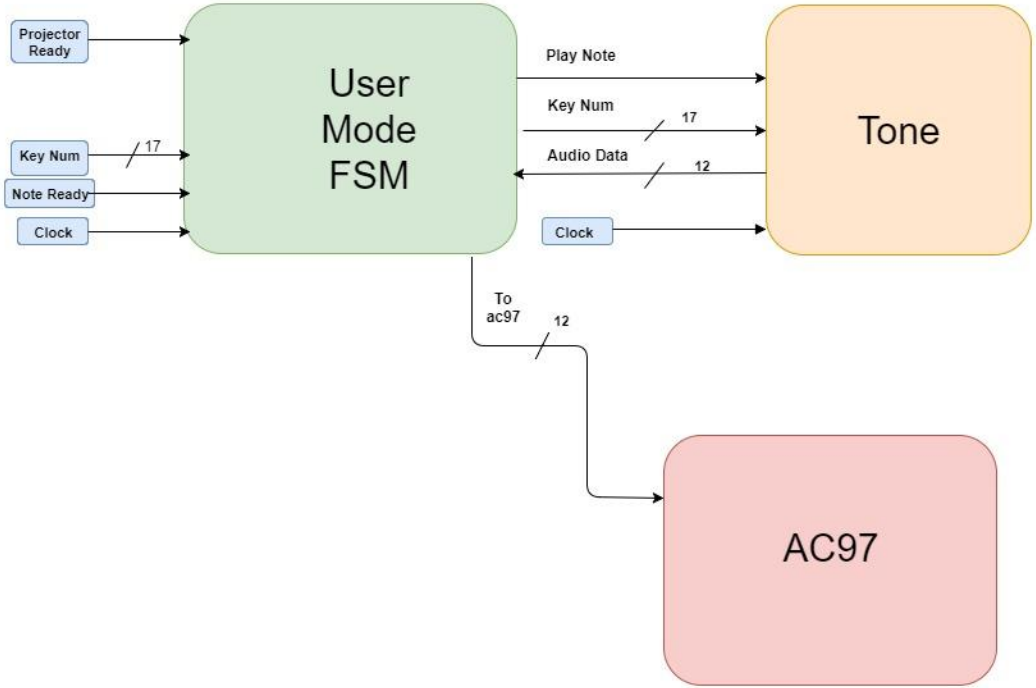

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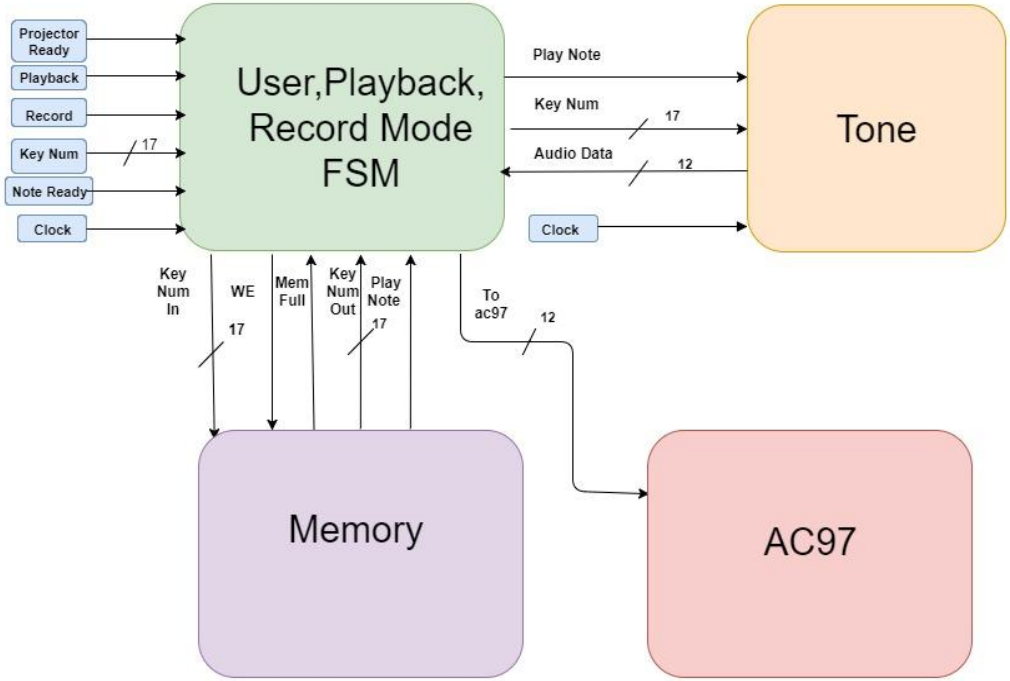

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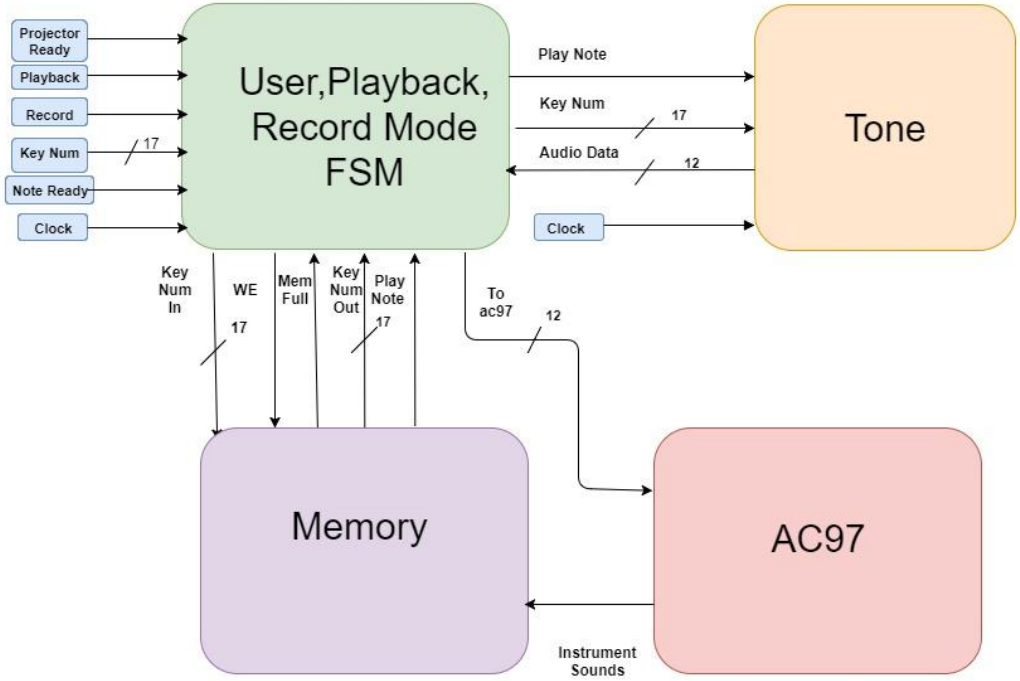


# Timeline

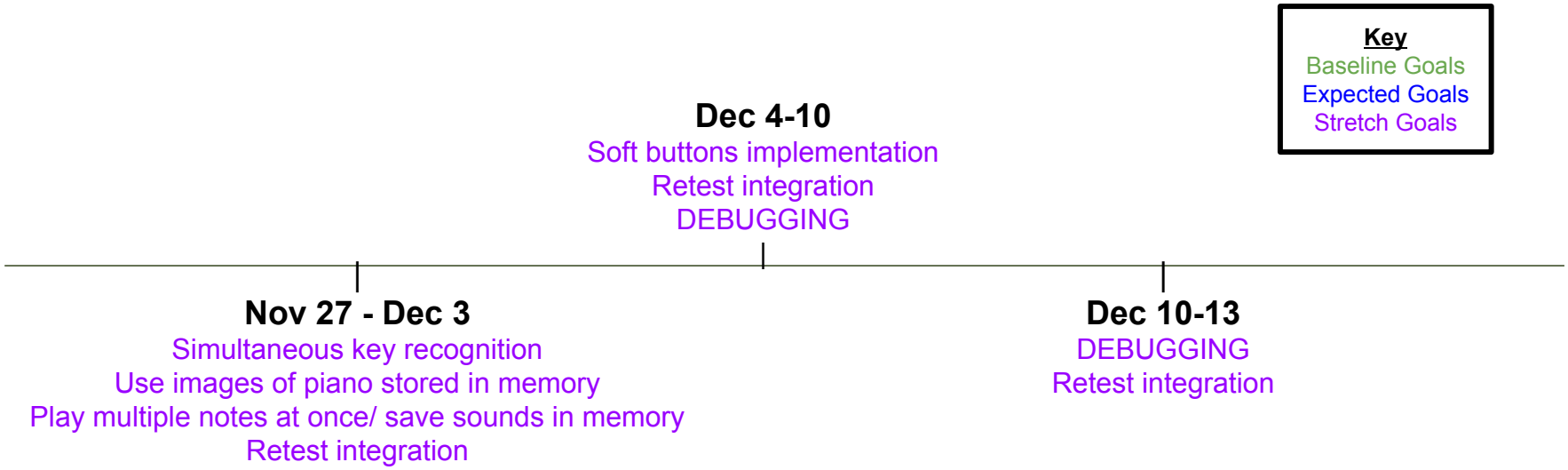
**Key**
Baseline Goals
Expected Goals
Stretch Goals

**Nov 5-12**
Start projector hardware
FPGA read out single shot distance from single TOF sensor
Non-interactive piano on monitor
Make different 8 bit tones based on key numbers

**Nov 13-19**
Finish projector hardware
Sensor data module coded and tested
Keys dynamically change color with note changes
Store most recent keys in memory

**Nov 20-26**
Key conversion module coded and tested
Interface with projector
Playback keys from memory
Ambitious: test fully integrated system

# Timeline (cont.)



# Questions?