

# Bass Hero

6.111 Final Project  
Alex Guzman  
Humberto Evans

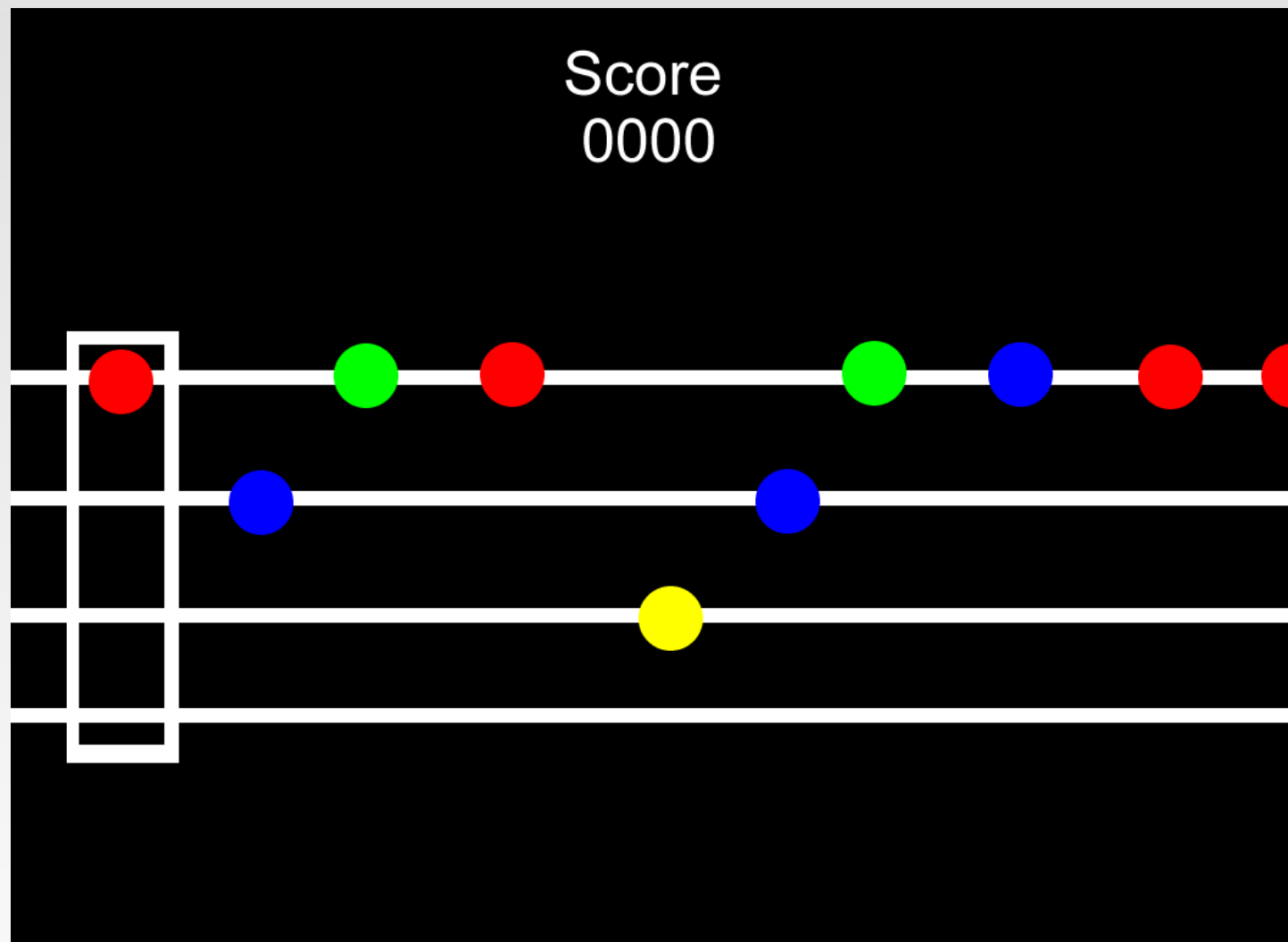
# Overview

- Bass Hero is a one player bass guitar simulation and skill game.
- To play the user will play on a real bass guitar that is interfaced with the lab kit

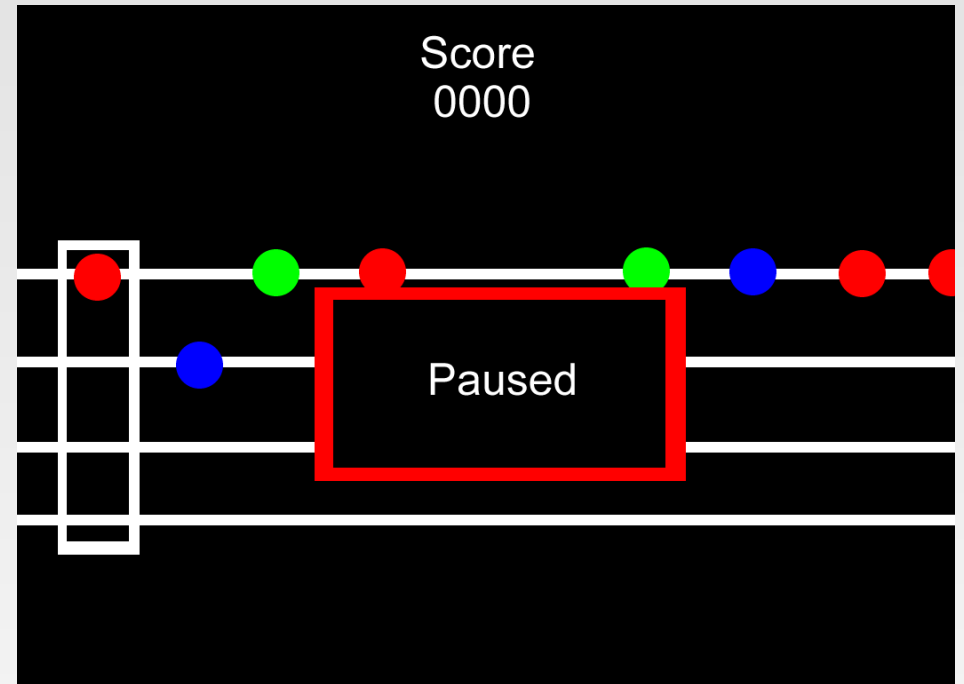
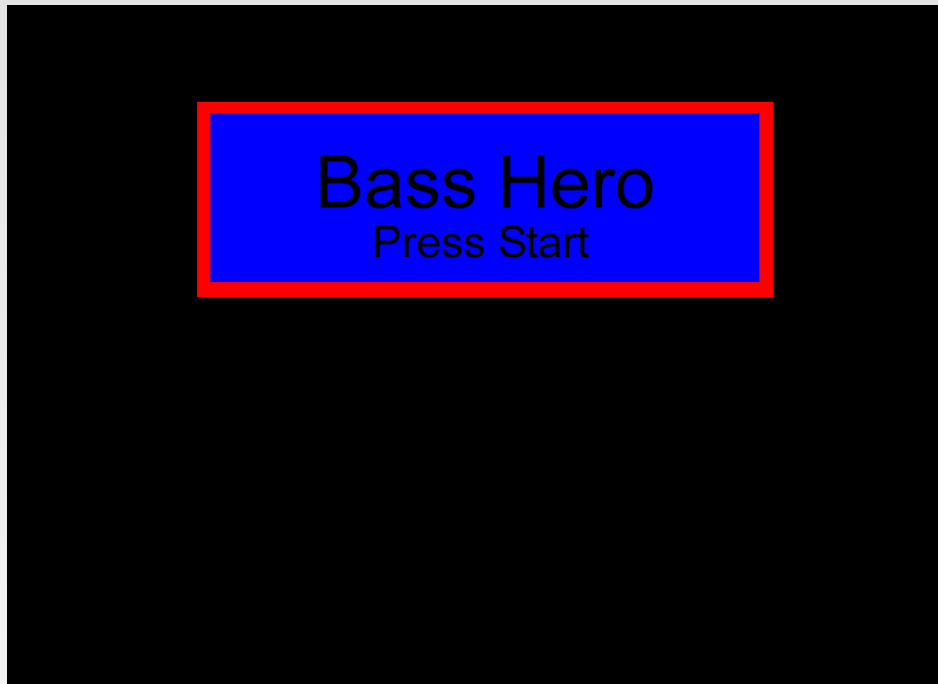
# Overview cont.

- While playing the user will hear a song and play along with the bass line as directed by the game on the VGA screen.
- The screen will show the user which string and which fret to play.
- With precision timing and raw skill you too can jam your way to the top.

# Screen Diagram

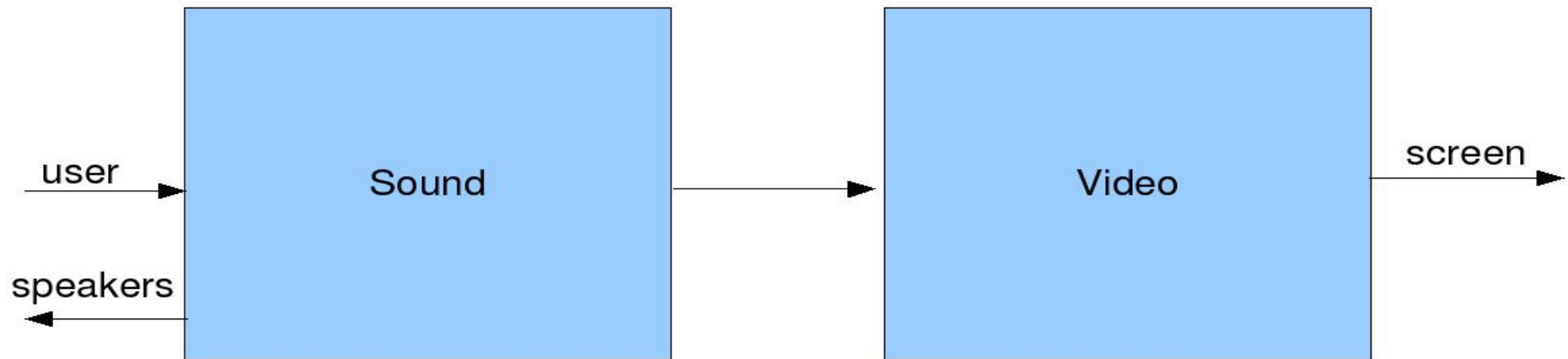


# Start and Pause Screen



# Block Diagram – High Level

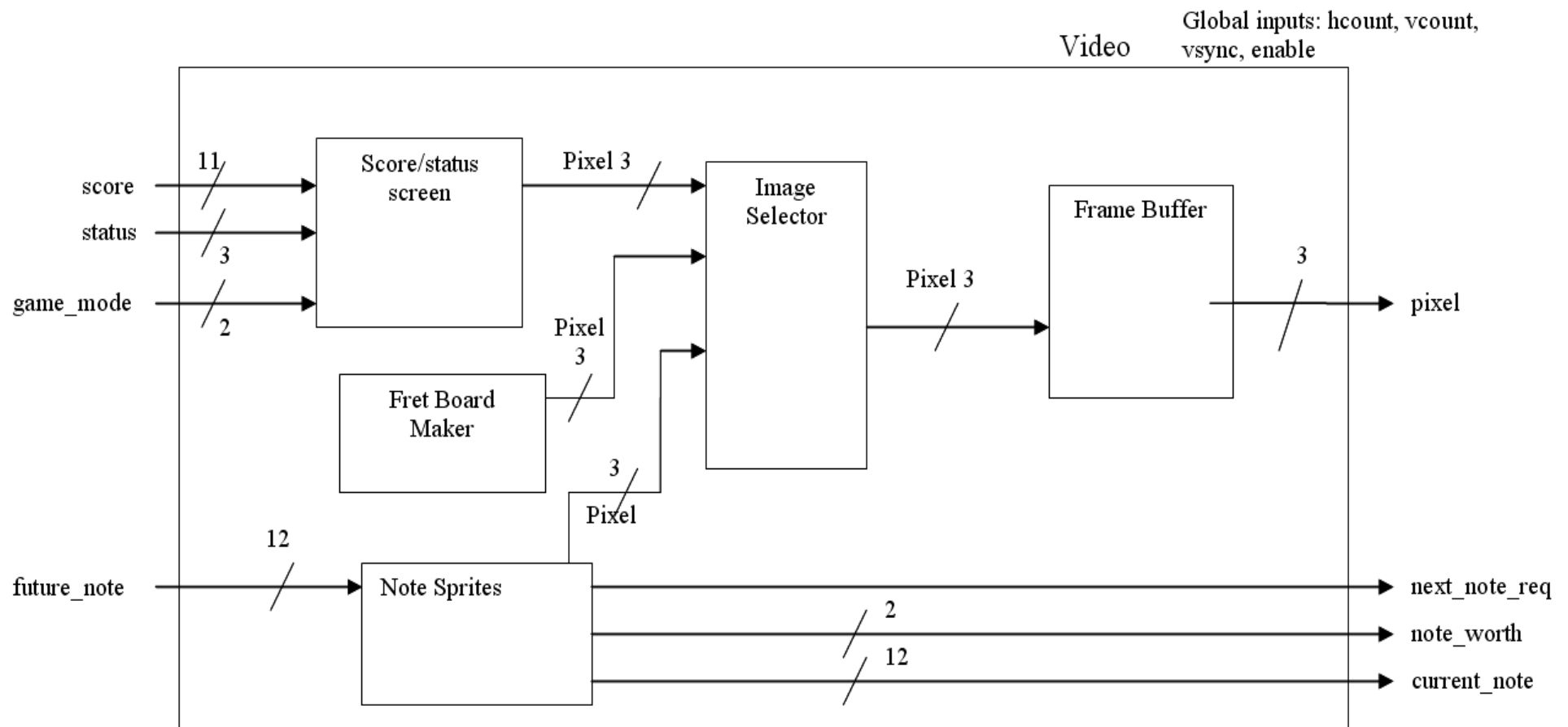
## Bass Hero



# Description

- Video
  - The video module dictates the timing of the game as well as the VGA display.
  - It takes information from the template about the future notes to be played and scrolls them across the screen for the user to see.
  - It decides which note the user should be playing and outputs that value to the game logic module along with a point value for hitting that note.

# Block Diagram – Video

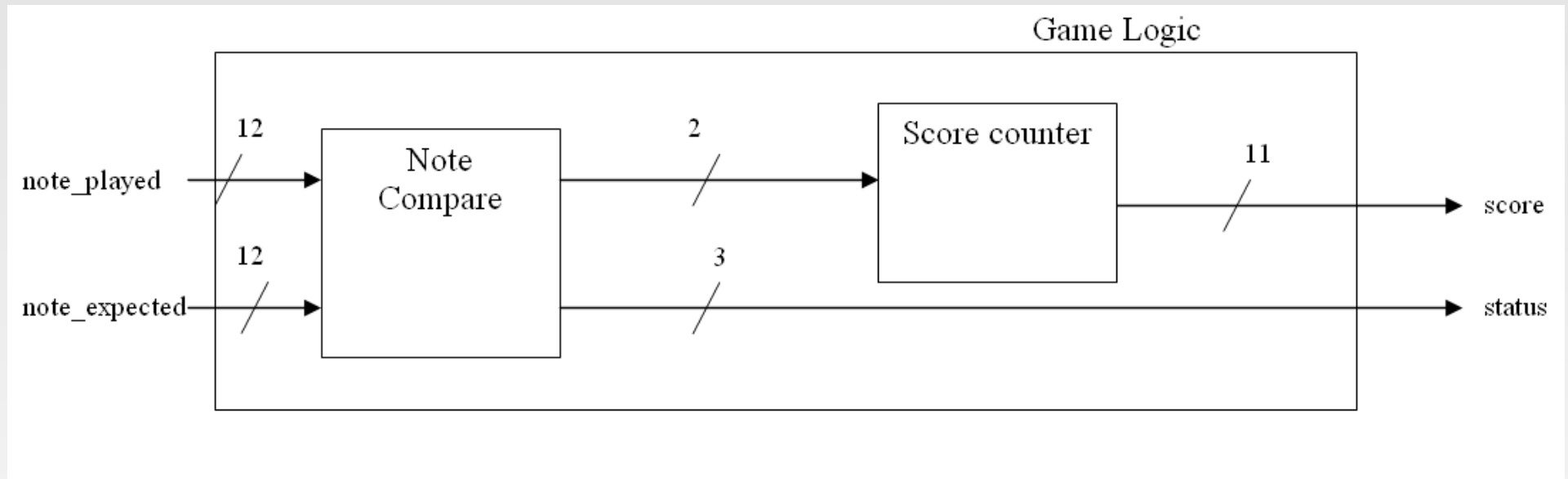




# Description cont.

- Game Logic
  - The game logic module is responsible for keeping score in the game.
  - It reads from the video module which note it expects the user to be playing, and compares that to what the user is playing given by the sound module. If the note was played correctly, the module adds the score given to it by the video module and sends the total score to the video module.







# Block Diagram – Game Logic



# Description cont.

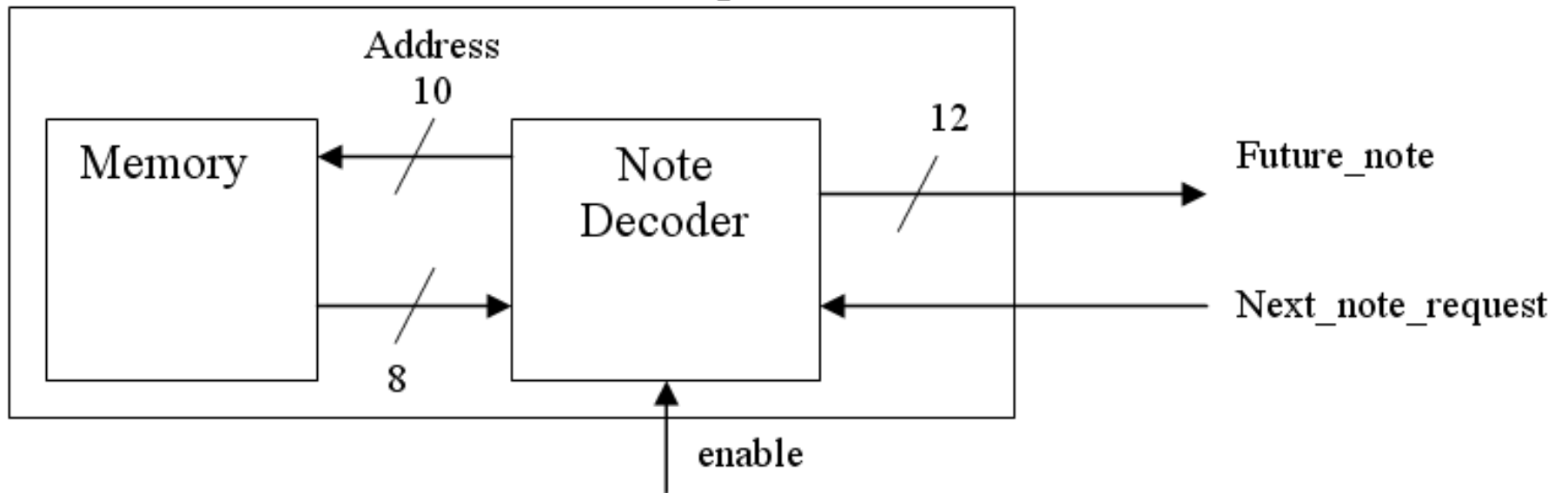
- Template
  - Stores the note data that we expect the user to play
  - Memory holds an 8 bit number. First 5 bits encode the note, the rest encode the duration.

	Rest	Open	Fret 1	Fret 2	Fret 3	Fret 4
E String	11111	00000	00001	00010	00011	00100
A String	11111	00101	00110	00111	01000	01001
D String	11111	01010	01011	01100	01101	01110
G String	11111	01111	10000	10001	10010	10011

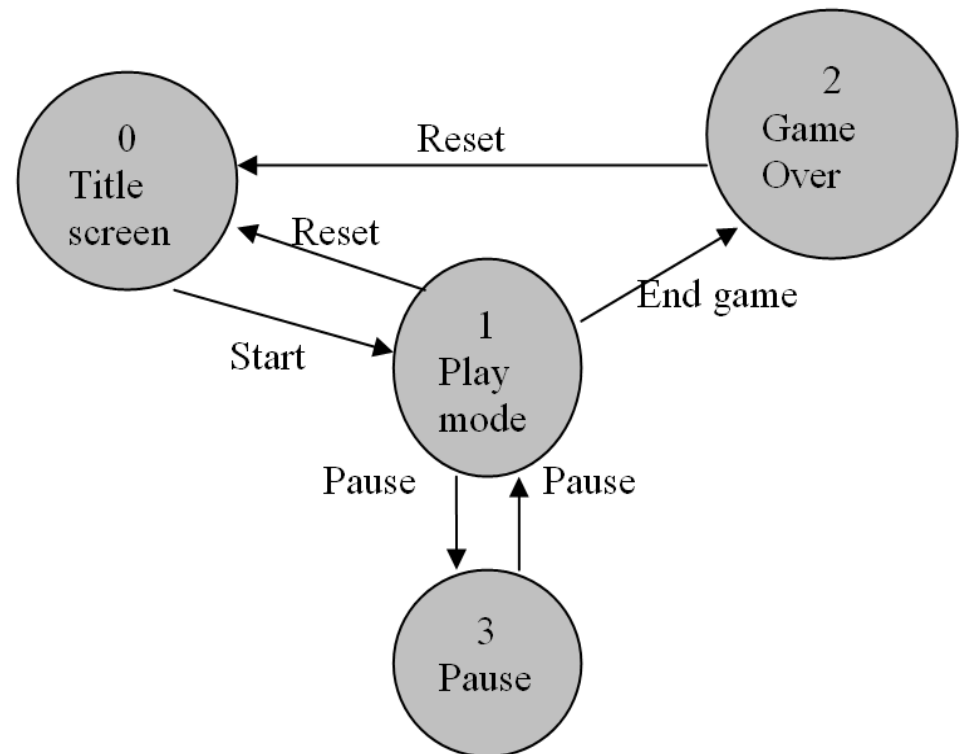
	000
	001
	010
	011
	100
	101

# Block Diagram - Template

Template



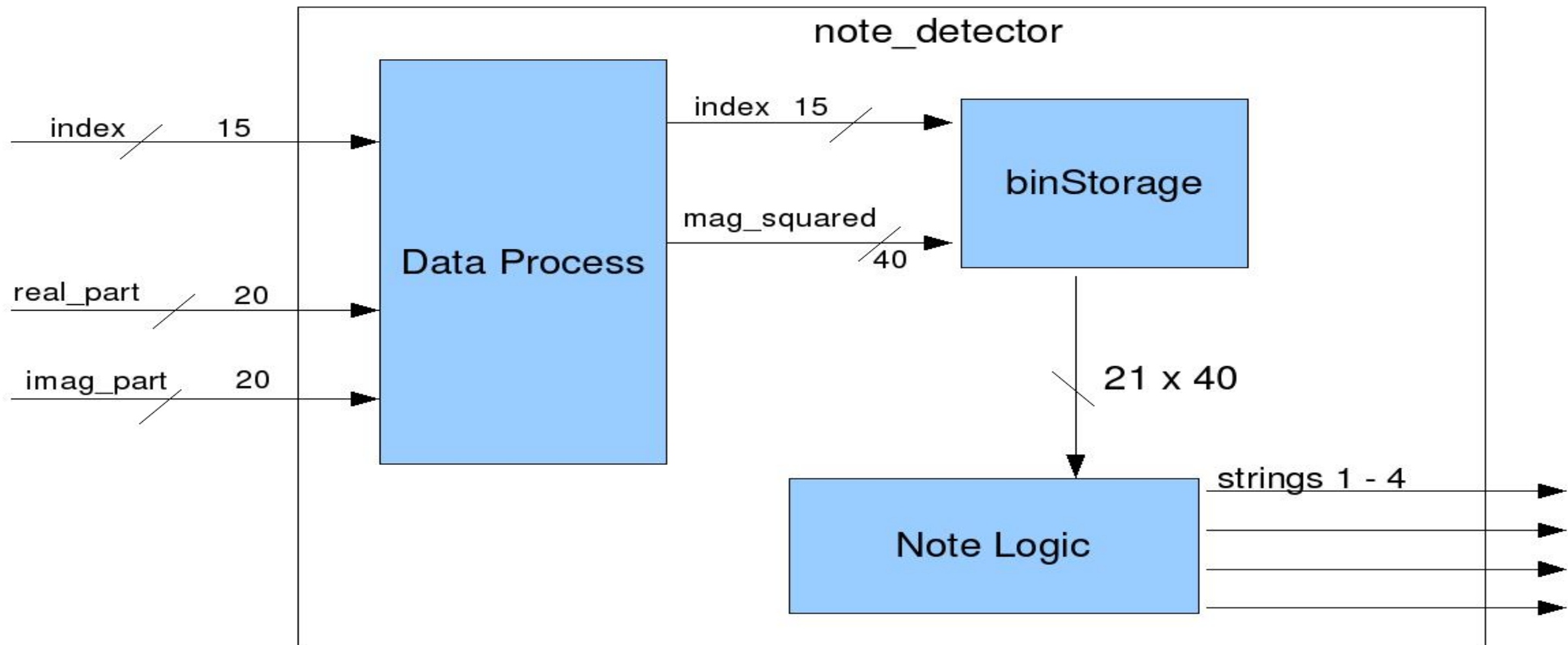
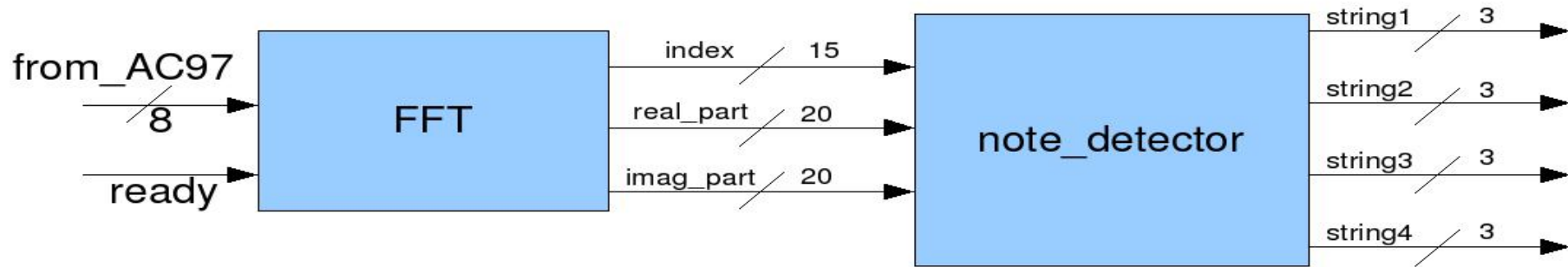
- Song Data
  - Stores the audio the user will listen to
- FSM
  - Switches between start up, play, pause and game over screen



# Description cont.

- Sound
  - The sound module is the interface to the user
  - An FFT module takes the data from the AC97 chip, and outputs the real and imaginary parts of each FFT bin.
  - It processes only those bins that are of interest to us, i.e. the bins that correspond to the notes we expect the user to play
  - It registers the magnitude squared of each bin, logic is then used to determine which fret on which string the user is playing.

# Block Diagram - Sound



# Tricky Bits...

- In the lower frequencies, note values are really closer together. Low notes fall into adjacent bins even with a 32,768 bin FFT.
- Scoring. Since the user can't be expected to be accurate down to a single clock cycle some leeway must be allowed.
- Storing a song on the lab kit.



# Time-Line

- Note Detection – Nov 25
- Song Template – Nov 25
- Song Storage – Dec 2
- Note Display – Dec 4
- Game Logic – Dec 2
- Integration – the rest