Music Composition for Dummies
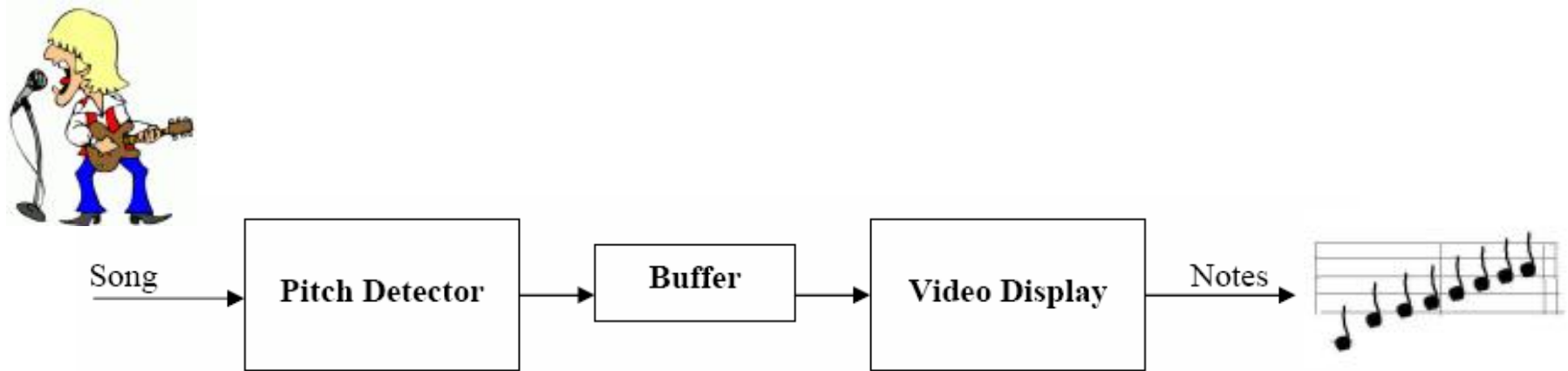
Shi Ling Seow

Yun Wu

OUR PROJECT
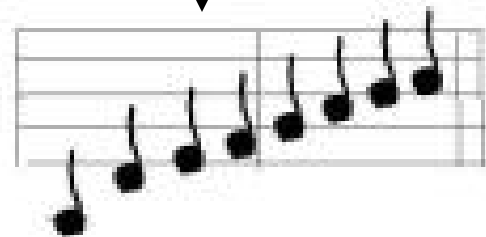
Block Diagram of Overall System

Pitch Detection Methods

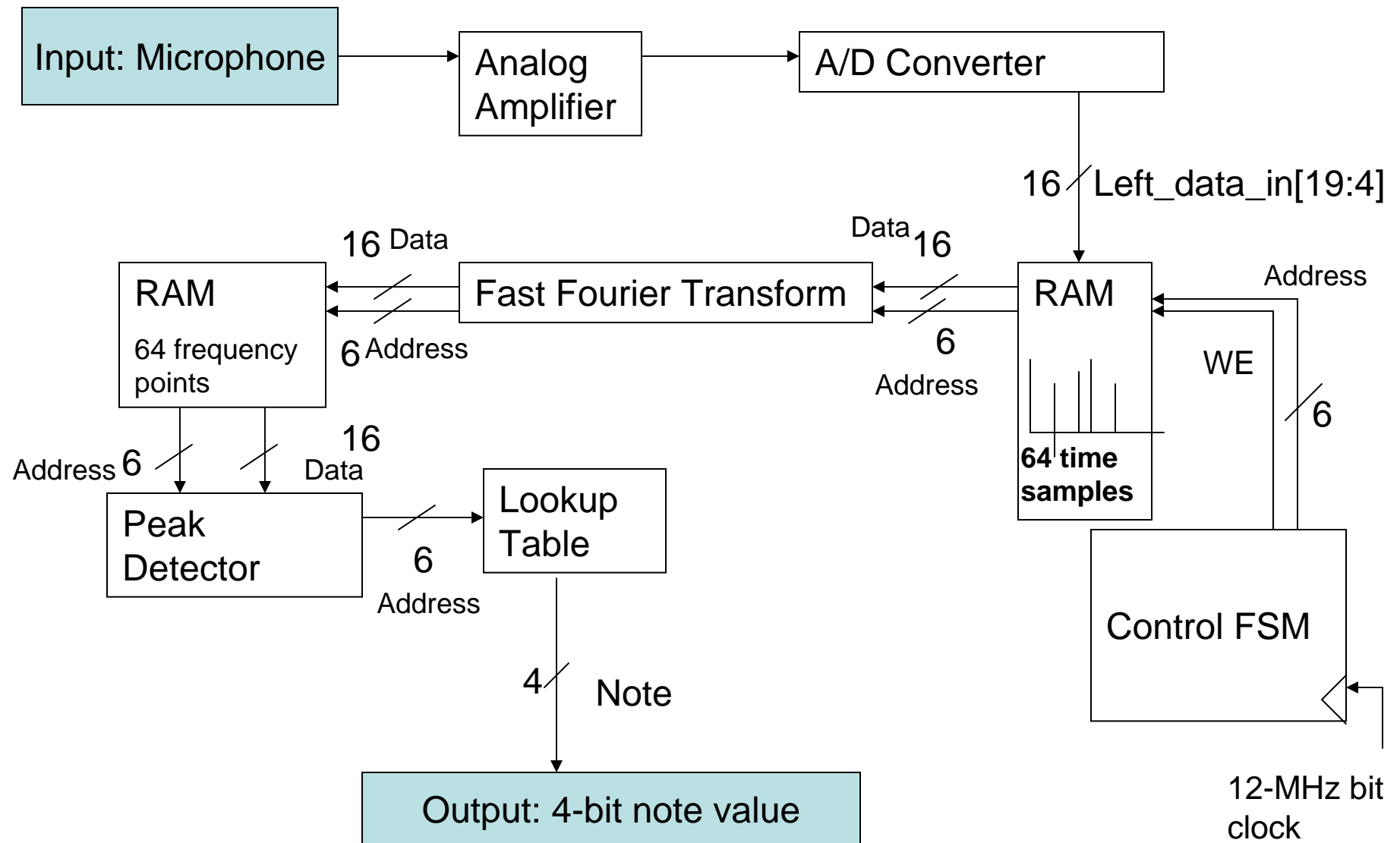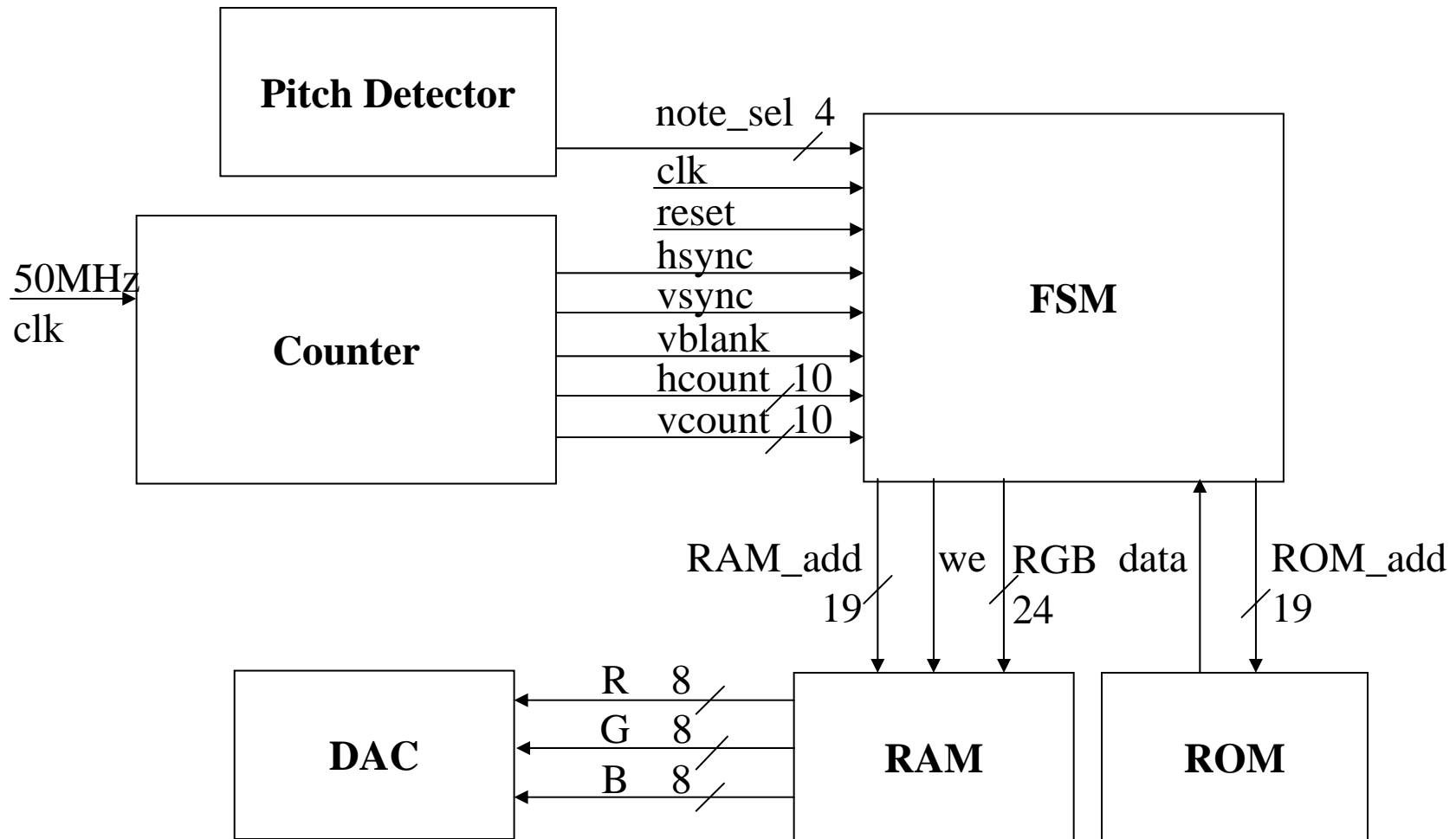| "LAAAAAAAA"	→	Pitch Detector	→	That's 440Hz !!! Note: A

- **Zero Crossings with noise filter**
  - Simple Implementation
  - Extremely sensitive to noise

- **Autocorrelation**
  - Extremely computationally intensive

- **Fast Fourier Transform**
  - Moderately computationally intensive
 - Robust

Block Diagram of Pitch Detector

Input: Microphone → Analog Amplifier → A/D Converter

16 / Left_data_in[19:4]

Data 16 → RAM (64 time samples)

Address

WE

6

Data 16 → Fast Fourier Transform

6 Address

16 Data → RAM (64 frequency points)

6 Address

Address 6

16 Data

Peak Detector → 6 Address → Lookup Table

4 / Note

Control FSM

12-MHz bit clock

Output: 4-bit note value

BLOCK DIAGRAM OF VIDEO COMPONENT

Pitch Detector

note_sel 4

clk

reset

Counter

50MHz
clk

hsync

vsync

vblank

hcount 10

vcount 10

FSM

RAM_add 19

we RGB data 24

ROM_add 19

DAC

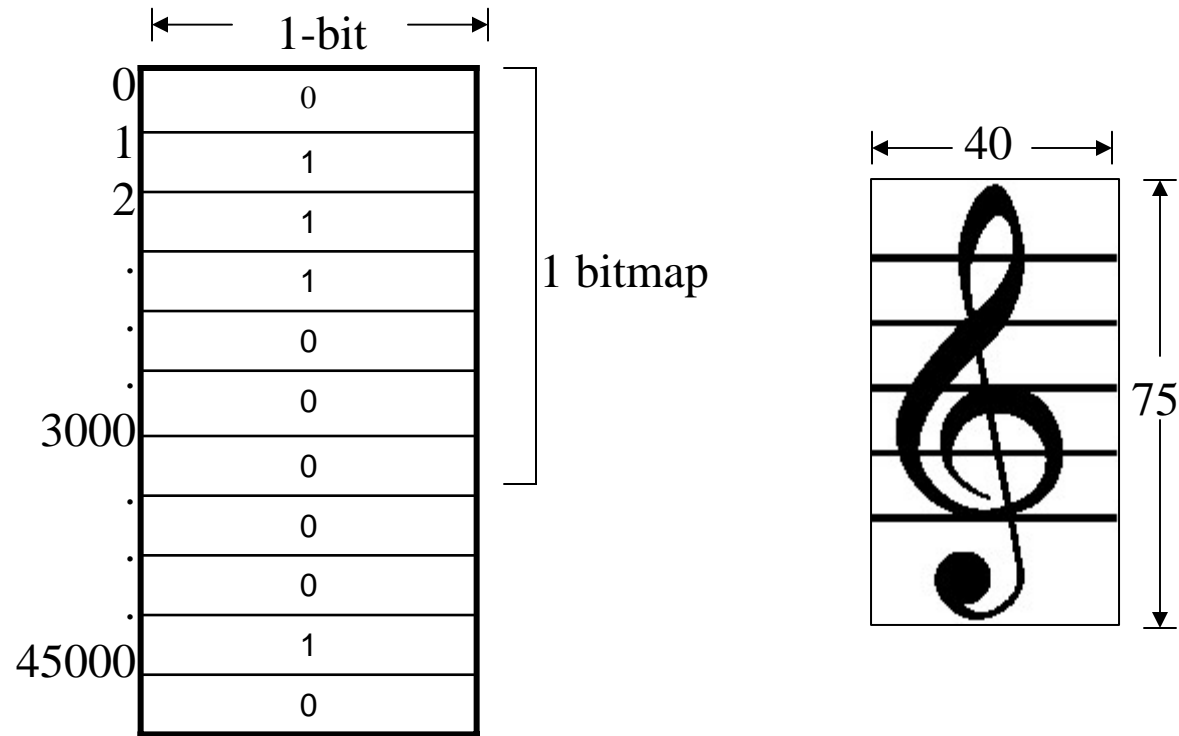R 8

G 8

B 8

RAM

ROM

- •FSM contains minor FSMs which are controlled by a major FSM
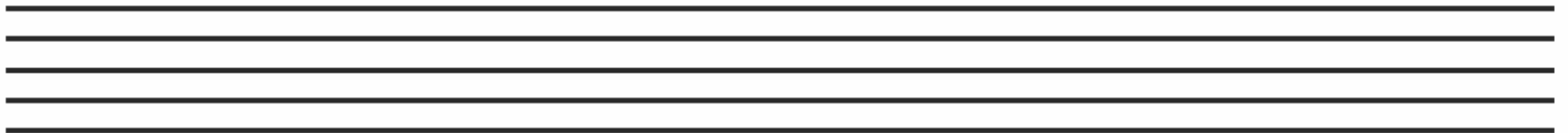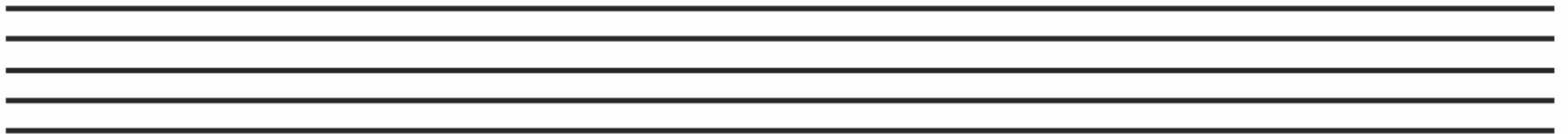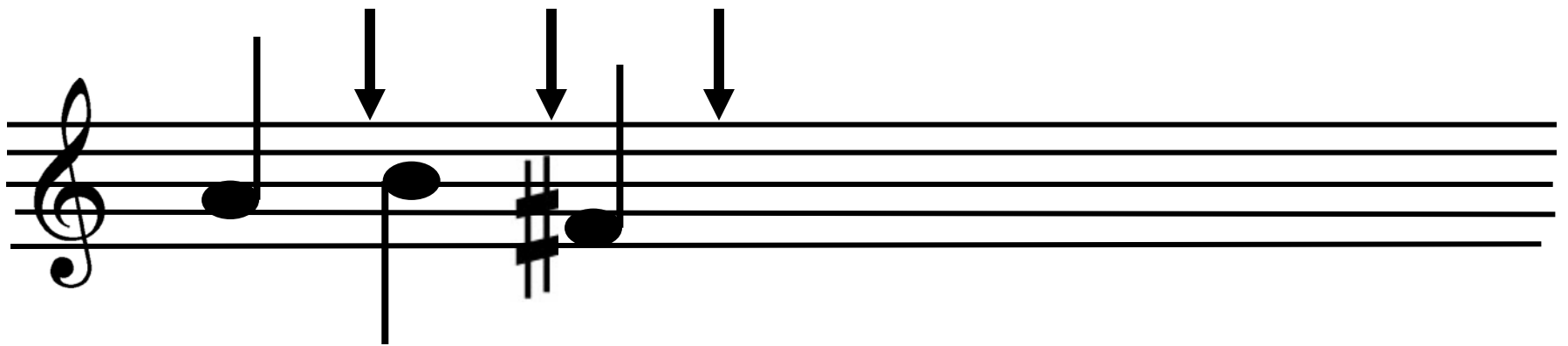- •800 x 600 display, 72Hz

ZBT RAM
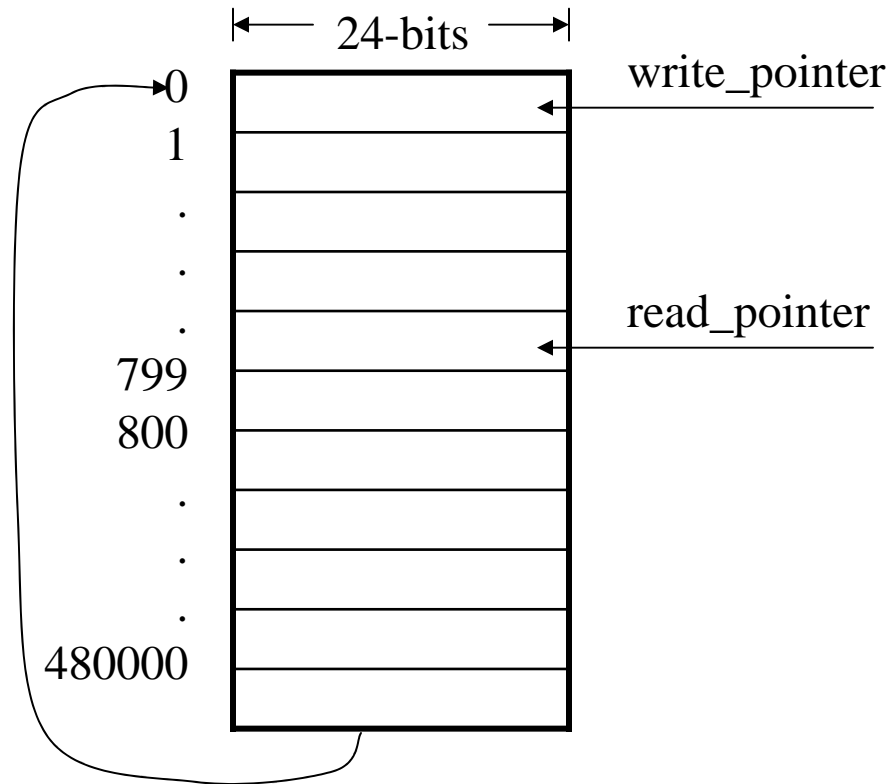
- Stores 480000, 24-bit data points (800 x 600 pixels)
- 24-bit to represent pixel colors (8 bits each for Red, Green, and Blue)
- Circular buffer

ROM

- Contains 15 bitmaps (treble clef, notes, barline)
- Pixels represented by zeros and ones (background and foreground)

DEMONSTRATION

PROJECT TIMELINE

- Get the pitch detector and video component working   April 29

- Merge both components using a buffer   May 5

- Test, debug and add more features (hopefully)   May 8