

Voice Training Machine



6.111 Final Project

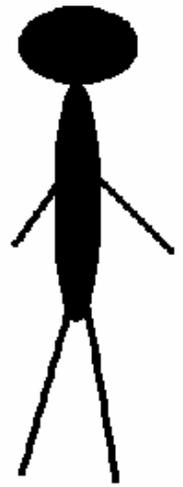
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Zhongying Zhou

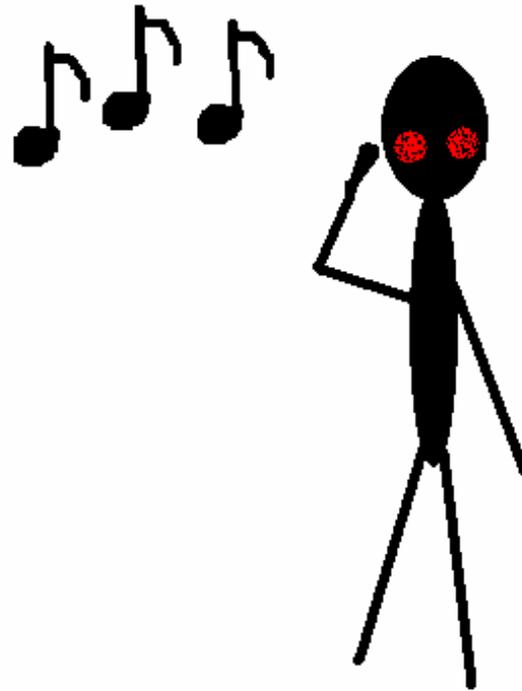
Introduction



Worst singer EVER!



Introduction



Problem

- Causes of singing off tune
 - Cannot hear 'own' voice
 - Shortness of breath
 - Faulty memory of tune due to background instrumentals
- Conventional solution
 - Practice with tune to commit to memory

Relies subjectively on singer's distinction of pitch

New Solution

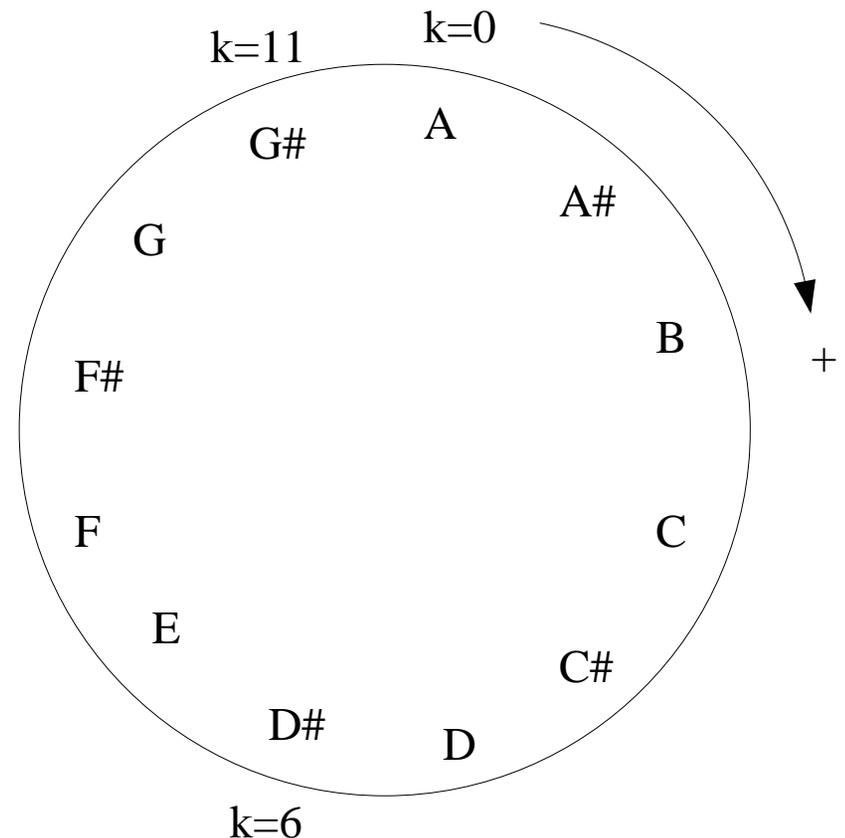
- Visual outputs quantifies degree the singer is off-key
- Audio outputs allow user to hear their voice with the synthesized note in real time
- Pause feature allows user to perfect singing note by note

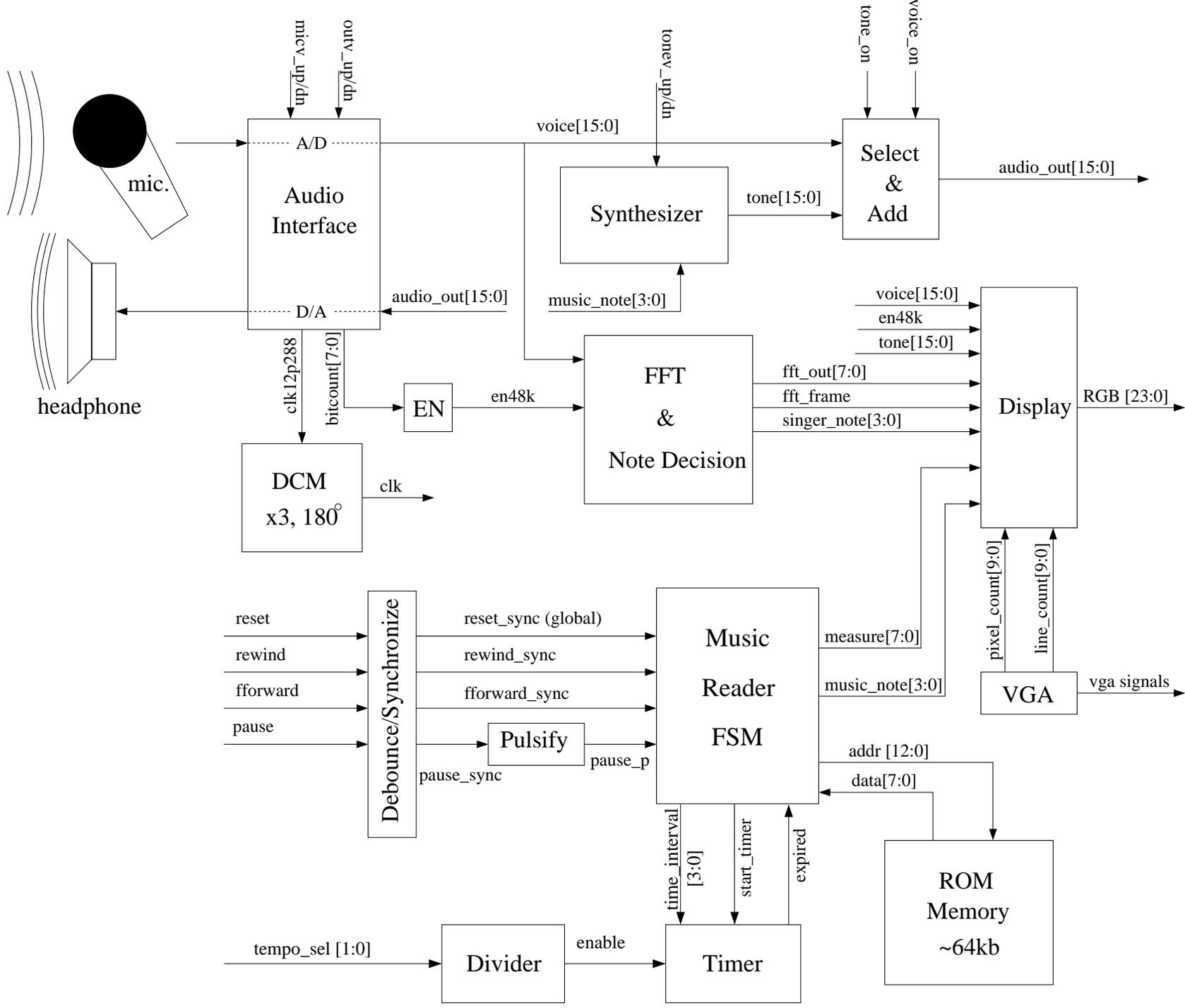
Project Description: Notes

$$f_{A4} = 440\text{Hz}$$

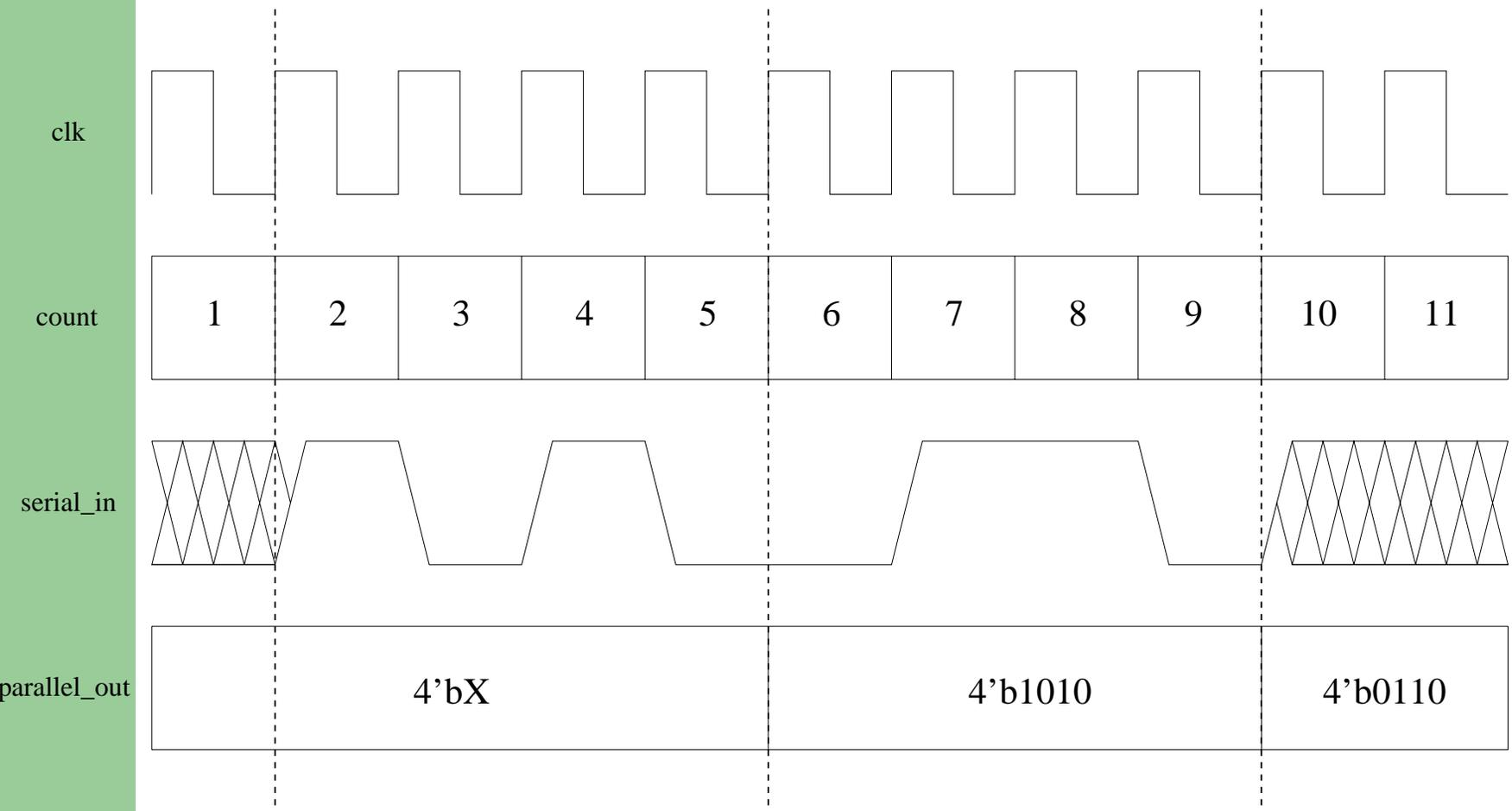
$$f_n = f_{A4} \cdot 2^{n/12}$$

$$k = n \bmod 12$$

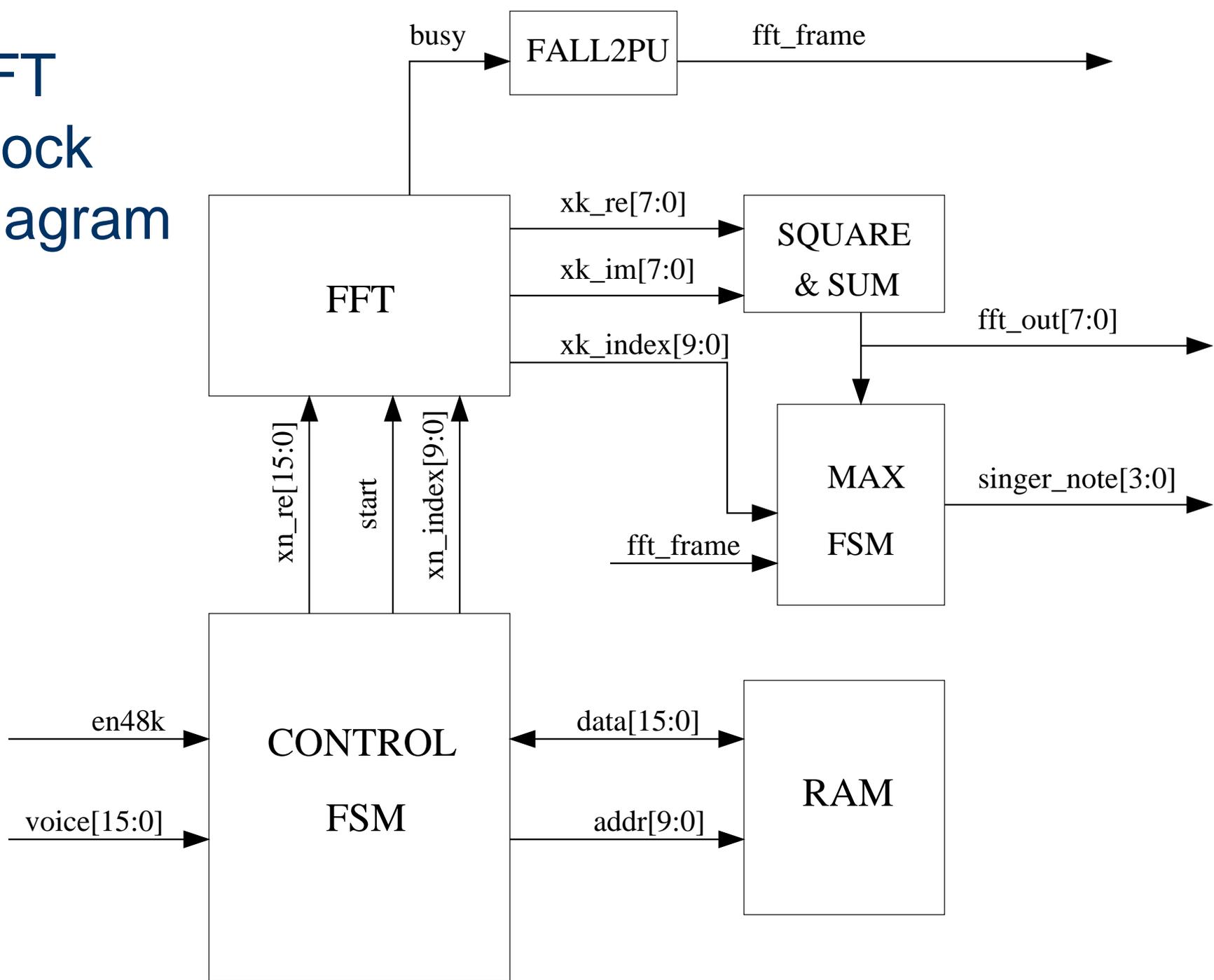




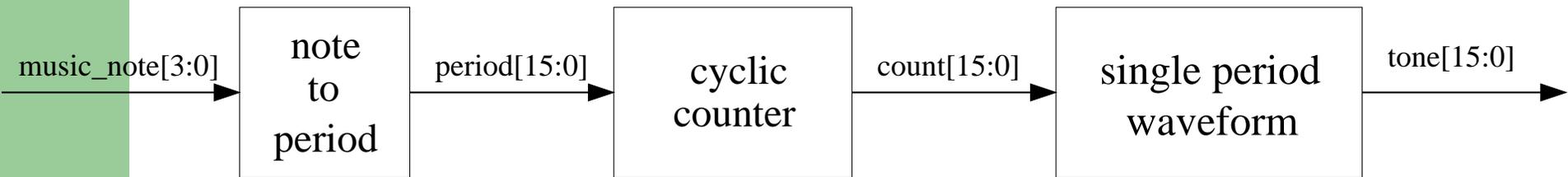
AC97: A/D, D/A, 48kHz



FFT Block Diagram

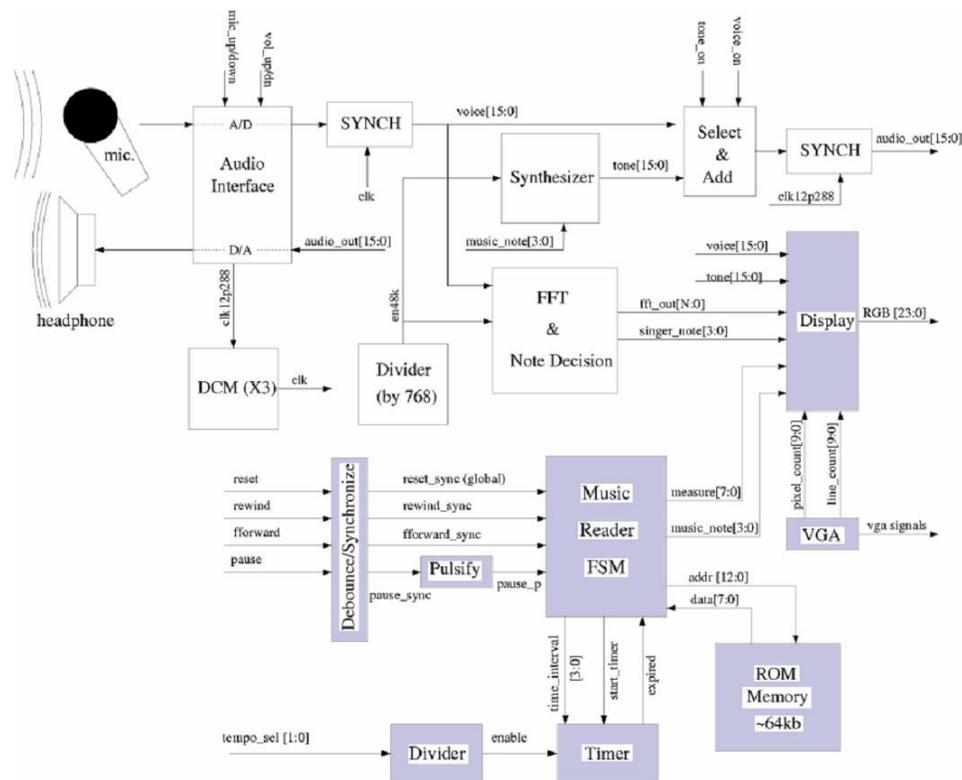


Synthesizer



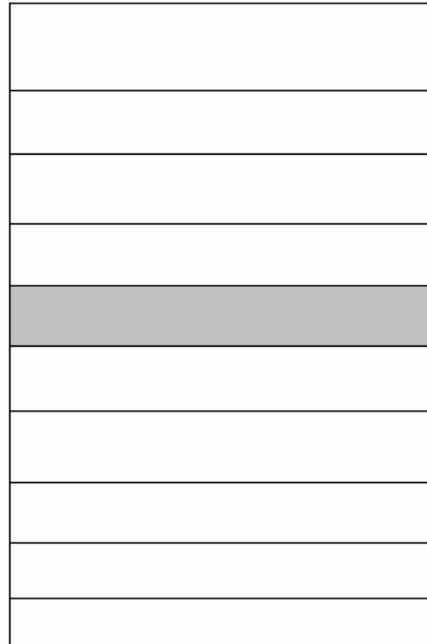
- Explore different waveforms
- Possible filtering
- Avoid 3rd harmonic

Music Reading / Display

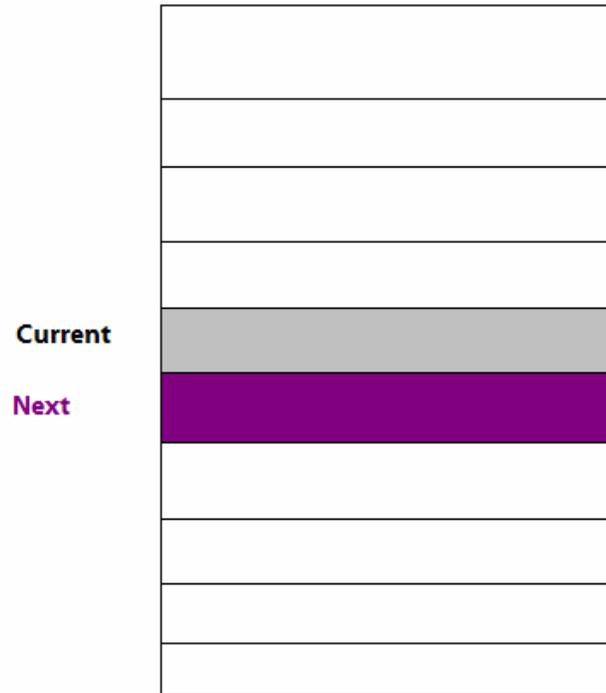


Memory

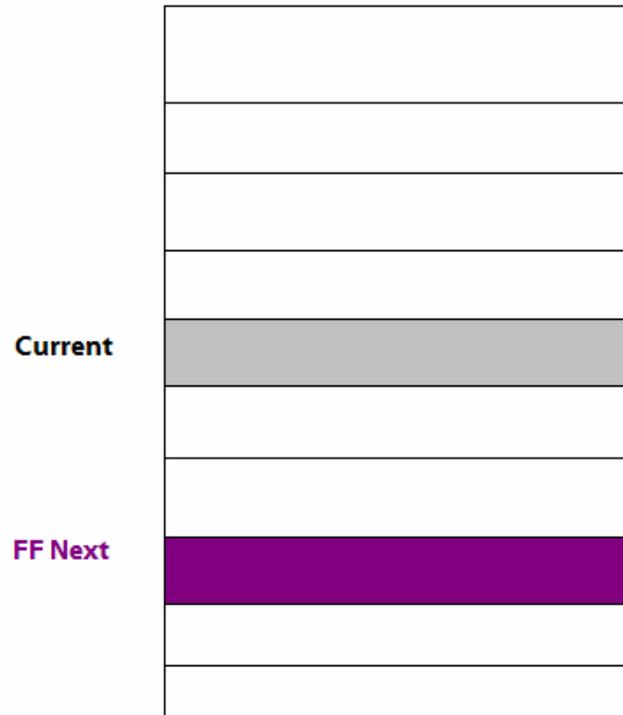
Current



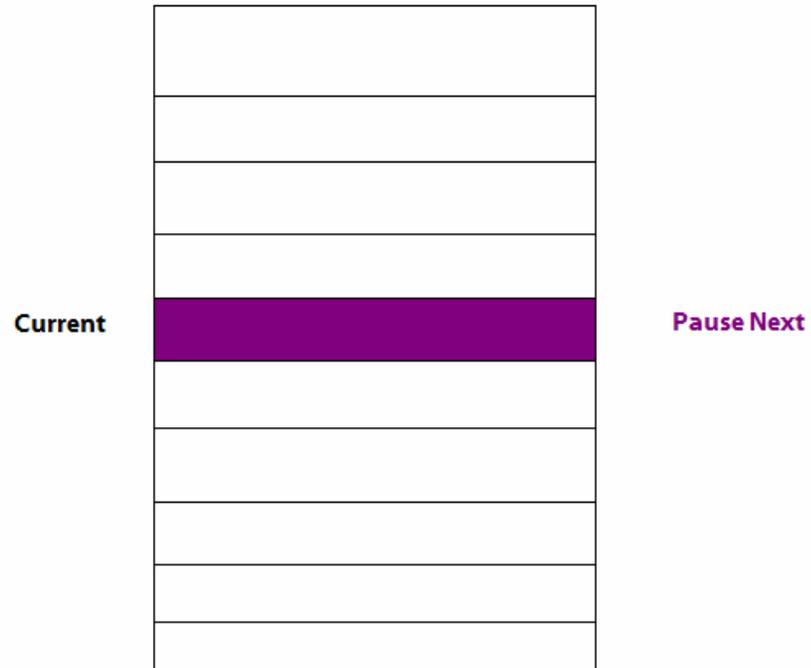
Memory – Play



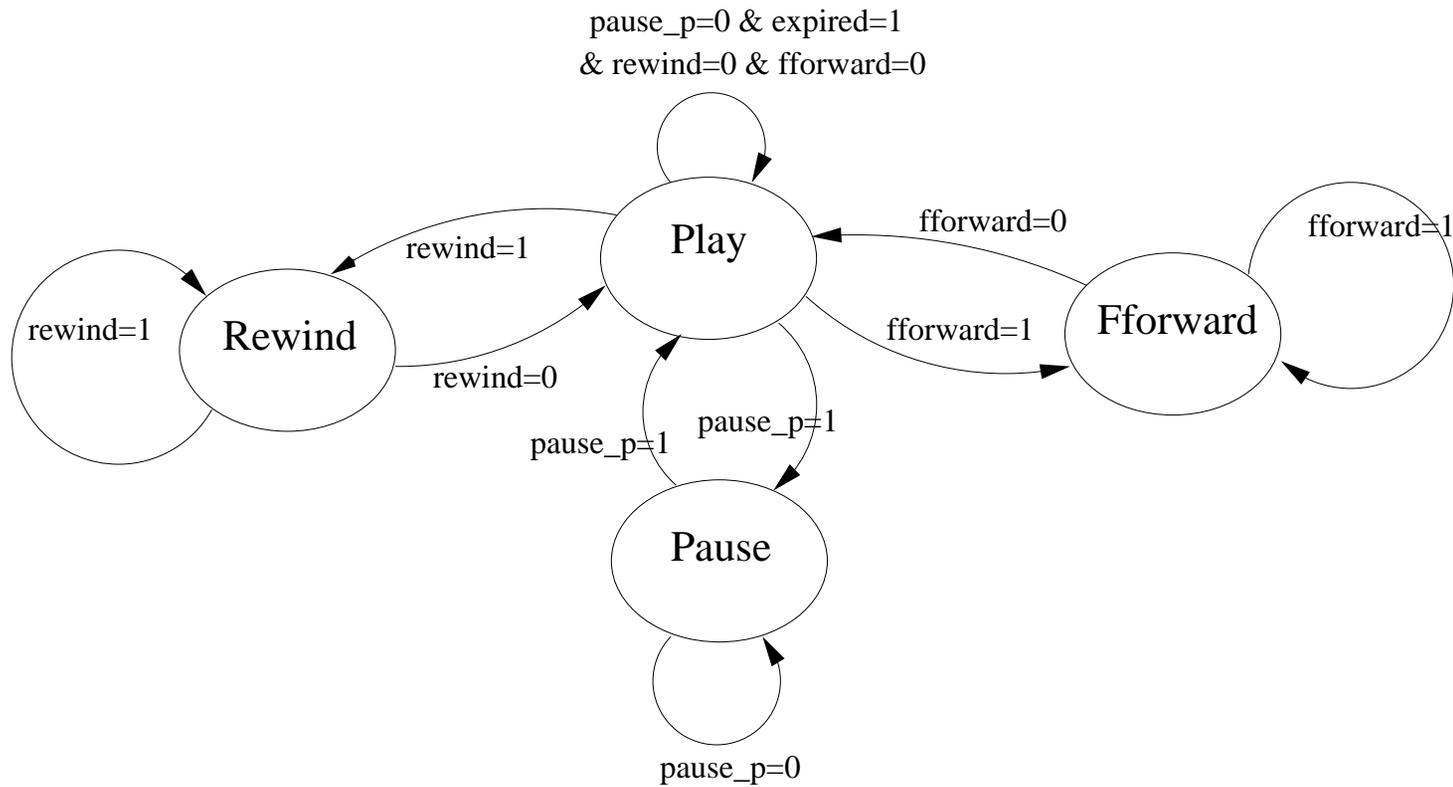
Memory – Fast Forward



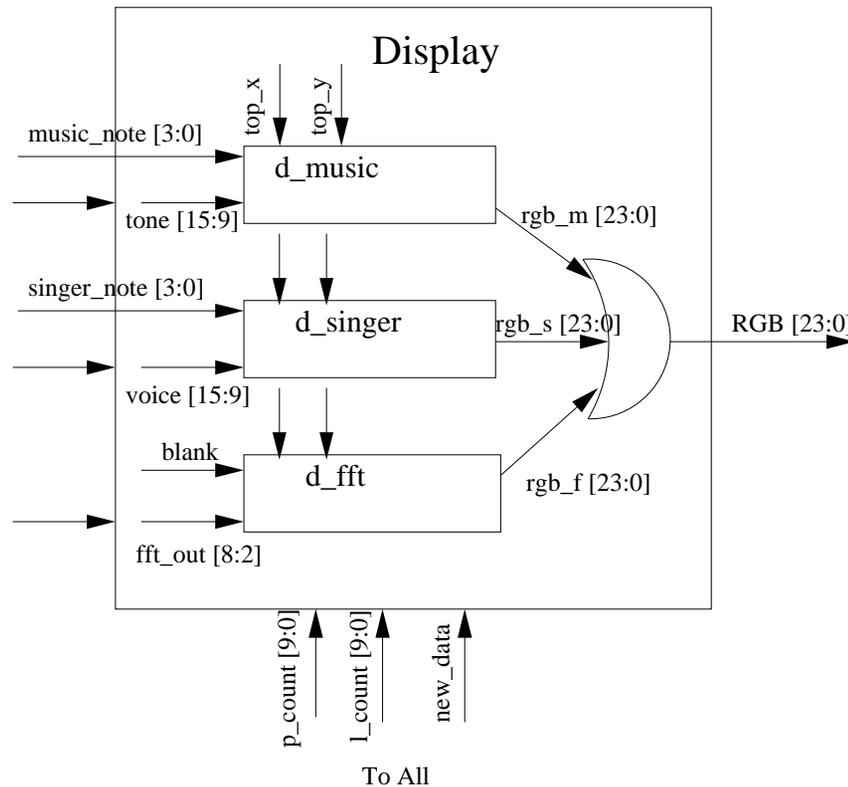
Memory – Pause



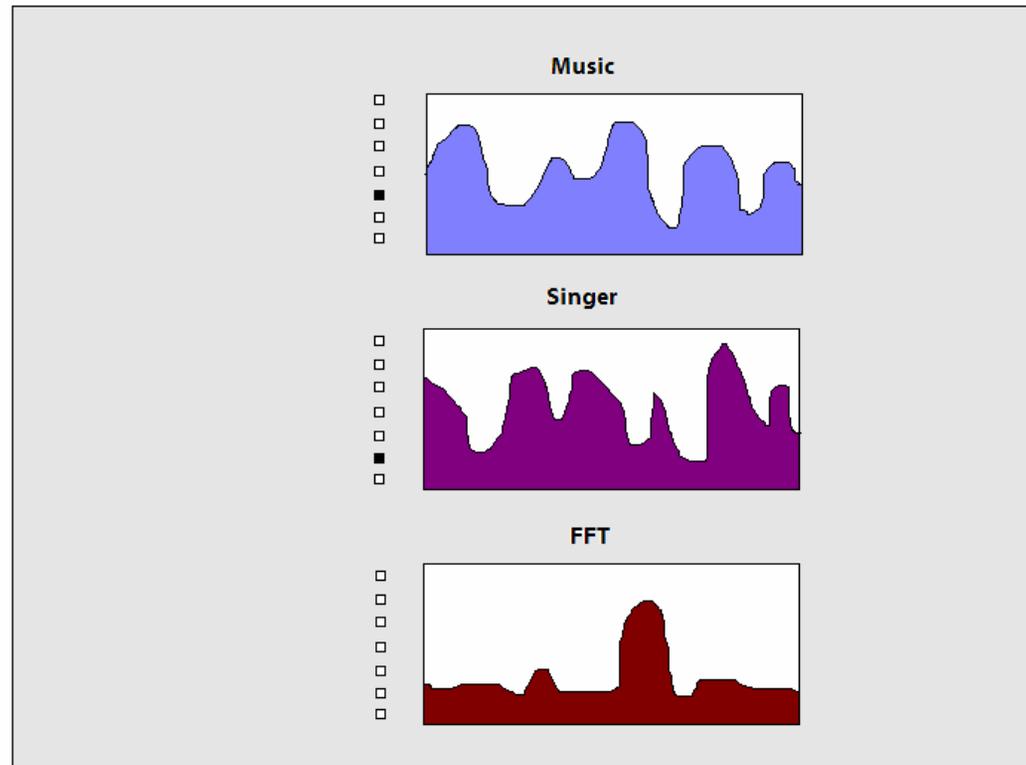
Music Reader



Display – Block Diagram



Display – Monitor



Conclusion

- We hope to achieve:
 - Less noise pollution
 - Provide authentic feedback to singer about his/her ability
 - Introduce a greater degree of objectivity in competitive singing