6.111 Project Checklist and Deliverables

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Minimum Deliverables (The Commitment):

A basic implementation of a Digital Audio Workstation (DAW) on the 6.111 Labkit will be one that records at least one sample of audio, stores the sample in ZBT memory, and applies one effect on the output audio during playback. The graphics output on the screen will consist of the frequency spectrum of the recorded audio being displayed on the screen. This will be accompanied with a Heads-Up Display indicating elapsed time, dominant frequency, maximum amplitude, selected effect, and selected playing sample.
Here is a basic checklist of the tasks we think our implementation should be able to do to meet the minimum commitments for the project.

- ❏ Basic FSM with two states - record and playback (All)
- ❏ Record Mode - write one song to ZBT Memory (Michelle)
- ❏ Playback mode from ZBT Memory (Michelle)
- ❏ Playback mode - Ability to choose to apply one sound effect during playback (Germain)
- ❏ Display FFT spectrum, on VGA (Gerzain)
- ❏ Calculate (Germain) and display (Gerzain) running statistics: running time, max amplitude, dominant frequency, effect applied.

The Goal:

The team's goal is to have a full implementation of a Digital Audio Workstation on the 6.111 Labkit. We want to be able to do the following with our digital system. First, we want to record multiple samples of audio and store them in ZBT memory. On playback, we want to select one of these samples and apply multiple effects to the recording in real-time. While all of this is happening, the frequency spectrum is displayed on the monitor along with the same Heads-Up display that we described in the Minimum Deliverables section.
Here's a list of the tasks we think our implementation should be able to do in order to meet our goal.

- ❏ Multiple recorded samples can be saved and chosen in playback (Michelle)
- ❏ Display FFT max value for each second for each bin. (Gerzain)
- ❏ Display each column of the frequency spectrum as a gradient. The bottom will be 100 percent one color and gradually change to another color at the top of the column. This will be done for each column in proportion to its height on the screen. (Gerzain)
- ❏ Ability to pause playback. (Michelle)

- ❏ Display more running statistics: current song bank playing (Gerzain)
- ❏ Ability to apply more than one effect to the output sounds on playback (Germain)
- ❏ Implement the following effects in real-time (Germain):
    - ❏ Compression
    - ❏ Limiter
    - ❏ Distortion
    - ❏ Echo
    - ❏ Speed-up Sound
    - ❏ Slow-down Sound

The Stretch Goal:

Our team's stretch goal is to expand upon the full Digital Audio Workstation on the 6.111 Labkit. Our system should allow playback of multiple samples along with a wider selection of sound effects and expanded memory usage. The FFT display will have either an average or maximum shadow that mimics what the FFT spectrum was in the recent past.
Here is a list of the extra tasks our implementation should accomplish to meet our stretch goal.

- ❏ Flash Memory write/playback (Gerzain)
- ❏ Playback of multiple samples at the same time. (Michelle)
- ❏ Implement Speed-up and Slow-down of audio without residual frequency shifting effects (Germain)
- ❏ Implement Chorus effect (multiple delayed signals added together to mimic the sound of multiple voices) (Germain)
- ❏ Advanced FSM with multiple states for playback and recording to flash memory or to ZBT memory (All)