Checkoff Checklist: Guitar Hero: Fast Fourier Edition

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1 Commitment

Modules:

- Note recognition - Mitchell
  - XADC module for digitizing guitar pickup input
  - Oversampling module
  - XFFT module
  - Spectral histogram module
  - Spectral histogram video output
  - Basic note recognition module
- Serializer/Deserilalizer between Nexys 4's (or the entire project on one Nexys 4) - Mitchell
- Scoring Functionality - Ryan
  - Note-matching (determine if a note should've been played and when)
  - Score tallying
- Song loading - Ryan
  - Proper supplying/buffering of the metadata of a very basic hardcoded song
- Video Output - Ryan
  - VGA output (basic game UI):
    - Strings
    - Some notes to be played
    - Some arbitrary score

2 Goal

Modules:

- Note recognition - Mitchell
  - Reasonably accurate note recognition
- Serializer/Deserializer - Mitchell
- Scoring Functionality - Ryan
  - Note-matching with actual note data from Note Recognition
  - Fret mapping
- Song loading - Ryan
  - SD Card loading module for a song's metadata
  - SD Card loading module for a song's audio track
  - Proper datapathing/integration for the metadata to be supplied to other modules
  - PWM audio output of a song's audio track
- Video Output - Ryan
  - VGA output (full game UI):
    - Displaying correct notes to be played from metadata

- - - Score calculated by scoring module and updated in real time
    - Matching (greying out) of notes that should be played and are played.
    - Pause menu function

3 Stretch goal

- Note recognition - Mitchell
  - Advanced note recognition (Probably using harmonic product spectrum or autocorrelation methods) that will recognize harmonics
  - Calibration of note's pitch or no note being played spectrum
- Guitar effects on the audio processing Nexys 4 - Mitchell
  - Perhaps distortion or reverb, output to PWM audio
- Scoring Functionality - Ryan
  - Calculation of "Note Streaks"
  - Song Grades (Failing out of a song?)
  - "Rockstar Mode" like in RockBand/Guitar Hero
- Song loading - Ryan
  - Song selection
  - Song speed selection
- Video Output - Ryan
  - Full-flair UI:
    - Cheering sounds
    - Crowd background
    - Effects/colors