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Project Checklist

Commitment:

The minimum that we hope to achieve; shows an adequate understanding of digital systems and Verilog. Complexity typically twice the complexity of the car alarm lab. Project grades are typical 10-19 out of a max of 35.

- Reading song data from an SD card
- Being able to output audio at the correct sampling rate
- Implementing the following modules that influence song playback:
  - Play/Pause
  - Volume Control: increasing or decreasing the current volume
  - Song Scrolling: skipping to the next/previous song
  - Song Fast Forward/Rewind: Changing the time
- Correctly differentiating all outlined gestures below:
  - Interpreting difference between hand raising vs. hand lowering
  - Interpreting different between swiping left vs. right
  - Interpreting pure rotation about the wrist for song selection
- Using accelerometer and gyroscope data taken only when BTNC on FPGA is pressed
- Adhering to all known constraints when system is running:
  - Forwarding and rewinding don't happen at the same time
  - Song select and forwarding shouldn't happen at the same time

Goal:

A fully functioning project meeting all the checklist items in this section. Demonstrates a superior understanding to digital systems and implementing complex systems - perhaps with multiple time domains, interface to external devices, flash memory, audio, etc. The implementation goes beyond what was in the labs. The project grades range from 20-29.

- Adding visual feedback on the display monitor such as the name and length of song, the current progress of the song, and whether the song is playing or not
- Integrating the system with the bluetooth module to additionally stream music from Spotify

- ○ This would support the following action modules: Volume Control, Play/Pause, Song Scrolling
- Being able to pick up small gestures meant to be one of the compatible gestures (small change in rotation or acceleration should still be recognizable as a valid gesture).
- Having as little delay between gesture recognition and monitor/audio response as possible

Stretch goal:

A top notch project that really stands out with complexity, innovation and risk.

- Implementing bass/treble boosting through FIR/IIR filters
- Integration with the Spotify API
  - ○ Using a ESP32 to make GET/POST requests
  - ○ Would use this to include further features like:
    - ■ Fast Forward and Rewind functionality when streaming music
    - ■ Displaying all songs in playlist on monitor
      - Highlighting which song is currently playing