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## Speaker Project Documentation

**Reason for Project:**

I got a large speaker for free from an old school class. This speaker was simply a two-input audio speaker, but I had nothing I could use it for. I decided that I wanted to turn it into a Bluetooth speaker. I wanted to also be able to control this speaker as if it was just a normal commercial speaker. This would mean I would need some sort of Bluetooth controller that I could use for Audio + Button control.

**Goals:**

1. Successfully convert this broken speaker into a working Bluetooth speaker complete with media controls.
2. Make sure all important electrical components are protected from potential spills or other college setting accidents.
3. Ensure a sleek and modern look, comparable with other speakers in the market.

**Results of Design Process:**

After going through the design process, I decided on using a Bluetooth amplifier as my method for driving the speaker audio. My original idea of making this powered through a microcontroller was abandoned after I was unable to amplify an audio signal that was as clean as I was envisioning. I tried using a Class B audio amplifier from my courses, but there was a level of noise that I was unable to reduce to an acceptable level. This turned this speaker into being Bluetooth controlled using a microcontroller rather than both audio and control.

Additionally, I also decided that adding a mini display would make this project more unique from the commercial speakers. I originally wanted to make the speaker display the current song title and album cover, but after long investigation and error, I was out of flash memory space for my project. I ended up deciding that I would just like a simple image to be displayed on the display.

To ensure the sleek and modern look, I covered all the speaker cutouts (such as the display and buttons) with 3-D designed and printed covers. I feel that I accomplished this goal when looking at the front and top sides of the speaker. The back currently has the Bluetooth amplifier mounted to the back with the audio output lazily fed into the speaker input as well as an open hole where the power cord runs out. I did this as I ran out of time working at home before going back to school for the spring semester. I do plan to put the Bluetooth amplifier and all audio important cords internally within the speaker at some point in the future. This will ensure the cleanliness of the design.

**Results:**

Pictures of the results of the project can be found in the "Result Pictures" folder. The sound quality is something that I am proud of, I am looking forward to its many uses in the future.

**BoM:**

A bill of materials can be found within this folder named "Speaker BoM.xlsx". This contains every part that was used in this project as well as a link to the place of purchase.

**Code:**

All code used for this project (including archived code) can be found within the "Software" folder within the GitHub. Instructions for how to use the code can be found at the top of each code file itself.

**Skills Developed:**

1. C++ & Python Coding
2. Bluetooth Library Knowledge
3. Design Considerations
4. Material Selection Criteria and Process
5. CAD Modeling
6. Project Documentation