

Preliminary Project Proposal

1. Project Outline

1.1 Background and Motivation

The project focuses on planar magnetic drivers, specifically their application in high-quality sound reproduction. While the use of dynamic drivers have been discussed and implemented ad nauseam, usually due to cost-effectiveness, they are often limited in their ability to produce the highest levels of audio fidelity. This project aims to reproduce high-quality sound, which is why planar magnetic drivers were chosen over traditional dynamic drivers.

The basis to good sound quality lies in how accurately a diaphragm responds to electrical signals. The diaphragm in planar magnetic drivers is fully suspended between two magnetic fields, ensuring an even distribution of force along its entire surface. This uniform movement minimizes distortion and enhances the precision of sound reproduction. Dynamic drivers attach the diaphragm to a voice coil at a single point, which can lead to uneven movement and introduce distortion, especially at higher volumes.

1.2 Scope and Objectives

The scope of this project is to design and build a pair of planar magnetic headphones with the following key features:

1. **Planar Magnetic Drivers:** Implement planar magnetic drivers to achieve high-quality sound reproduction with low distortion and detailed audio.
2. **Magnetic Driver Enclosure:** Fabricate a 3D-printed magnetic driver enclosure.
3. **Bluetooth Audio Receiver:** Integrate a Bluetooth module to enable wireless audio transmission.
4. **Rechargeable Li-Po Battery:** Incorporate a rechargeable Li-Po battery to provide power to the Bluetooth receiver and drivers.
5. **Push-Button Controls:** Devise a push-button interface for functions such as power control and Bluetooth pairing.

This project will focus on successfully integrating these features to create a functional and high-performing headphone system.

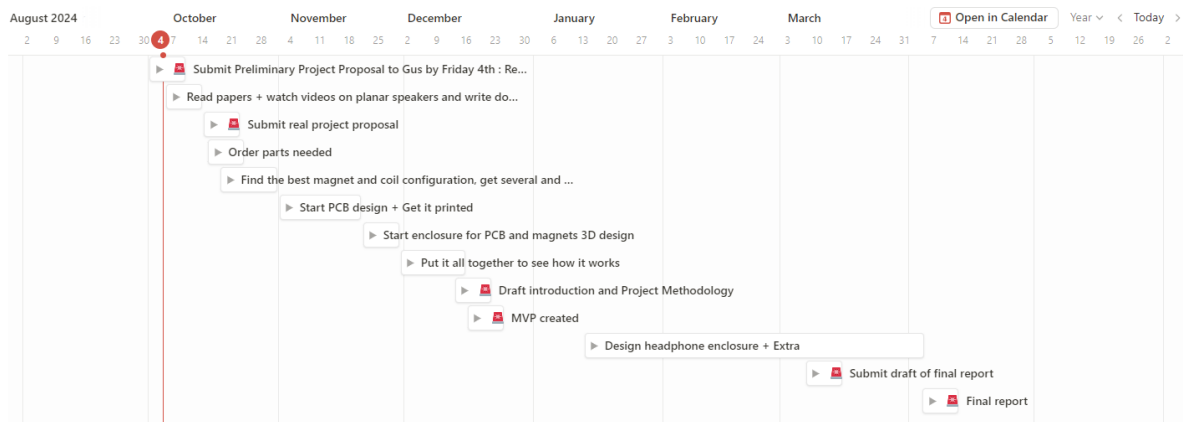
Deliverables

- Find the best magnet configuration to produce a strong magnetic field
- Design flexible PCB
- Create speaker units, with 3D printed enclosure

- Drive speaker units with test signal
- Implement Bluetooth receiver to drive speaker

2. Project Plan

2.1 Planned Timeline (Gantt Chart)



2.2 Description of Major Tasks

Finding best Magnet and coil configurations: Research will be required to find the magnet configuration which will produce the strongest magnetic field close to its surface.

PCB design: Using Altium to design a flexible PCB which will act as the diaphragm of the system.

PCB and magnet enclosure: Using SolidWorks to design a 3D enclosure for the magnets and PCB.

2.3 Risks and Strategies

- The time allocated for completing the project may be insufficient, for the completion of the project
 - Mitigation: I have limited the scope, and aim to deliver an MVP by Christmas with the technical aspects completed. The remaining task will be the 3D design of the casing which is not essential to the successful completion of the project.

3. Health & Safety Risk Assessment

- Overheating of components, particularly the amplifier and battery, during extended use, which could affect performance and safety.
 - Mitigation: Implement effective heat management strategies, such as proper ventilation or heat sinks, within the design and use a well-designed battery management system (BMS) and follow strict charging protocols.