# **Engineering Goals**

## **Personal Guitar Amplifier Project — Summer 2025**

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This project aims to design and build a complete guitar amplifier, including both the preamp and power amp stages. The goal is to create a compact, versatile amplifier that delivers quality tone and functionality suitable for practice and small performances.

Ultimately I want to create this project because I want to use aspects of my career to fuel some of my hobbies and aspirations. I want to learn more about analog design and push myself to learn as much as I can from a personal design process

### **My Goals**

1. **Complete Amplifier Design**
   * Develop both the preamp and power amp stages to create a fully functional guitar amplifier.
   * Ensure smooth integration between stages for clean signal flow and tonal consistency.
2. **Power Flexibility**
   * Design the amplifier to operate on both battery power and external DC power supply, providing portability and convenience.
   * I see this as a good opportunity for me to learn more about power management and apply it to a common application in electronic devices
3. **Adjustable Output Controls**
   * Include adjustable controls at the output stage for tone shaping and volume to tailor the amplifier’s sound to different styles and environments.
   * Explore adding presence or brightness controls in the power amp stage to refine the final tone.
4. **Compact Size**
   * I want to aim for something smaller to act as a portable option for me when moving around my guitars or traveling.
5. **Versatile Tone and Gain Control**
   * Provide adjustable gain and tone controls in the preamp stage to allow a range of sounds from clean to overdriven.
   * Use a combination of gain stages, tone stacks, and buffers to achieve a rich, dynamic tone.
6. **Signal Integrity and Reliability**
   * Implement buffering and impedance matching throughout the signal chain to preserve sound quality.
   * Use proper grounding, decoupling capacitors, and shielding to minimize noise and interference.
7. **Documentation and Reproducibility**
   * Create thorough documentation (starting with this document!), including schematics, LTSpice sims, and pictures of my design process along the way
   * Prototype and test the full amplifier system to validate performance and refine the design.
8. **Skill Development**
   * Gain hands-on experience with analog circuit design, power electronics, and audio engineering principles.
   * Develop problem-solving skills through iterative design, testing, and troubleshooting.

### **Project Aspirations**

* Have fun and learn a lot
* Build a portable guitar amp with flexible power options that delivers a professional-sounding tone.
* Create a user-friendly interface with intuitive controls for gain, tone, and volume.
* Achieve a balance between size, power output, and sound quality suitable for home practice and small gigs.
* Build a solid foundation for future custom amplifier or effects pedal projects.