Team 12 Product Design Specifications

Oct 18, 2023

Executive Summary with Concept of Operations

A guitar pedal takes an input signal from a guitar and modifies it with an effect before passing it on to the output chain (could be an amplifier). It's used by guitarists to achieve different tones and effects. Our pedal is specifically a distortion pedal, which increases the signal's gain to produce a gritty tone. The user is able to turn on and change the level of distortion using a foot pedal (button) and knobs.

Who are the intended customers / users?

Although we are designing this product with electric guitarists in mind, anyone who plays an instrument with a line signal could use this pedal. We are targeting the product towards those hoping to achieve different sounds or enhance their performance.

What is the competition? Why is your product different?

The competition is all custom guitar pedals. This includes companies like BOSS, Donner, Ibanez and Line 6. Additionally, there is a wide market and scene for smaller indie pedal producers, as well as DIY hobbyists.

In theory, what sets this pedal apart is the fact that it's programmable, as opposed to most typical, purely analog pedals. This means you could add, layer or otherwise change the effect via software, allowing a variety of sounds within the same product. That said, we are choosing to focus on a distortion effect as our minimal requirement.

What price do you think you can sell this for, and why? (keep it short, we're engineers, not marketing researchers)

The cheapest end of popular pedals on the market are around $60, so we aim to keep our model below that, at around $40-$50 per unit. Having a relatively lower price means customers are more likely to risk buying a product from an unknown manufacturer like our team, over a more reputable brand like BOSS. This is our goal for at least the minimal distortion pedal; Should we achieve the programmable multi-effect goal, we could charge more for the novelty.

Product Requirements

Must:

- Must distort the input signal in some way.
- Must be able to be toggled on/off.
- Must be durable enough to be operated by foot.
- Must not harm the user.
- Must be able to vary the level of the distortion effect.

Should:

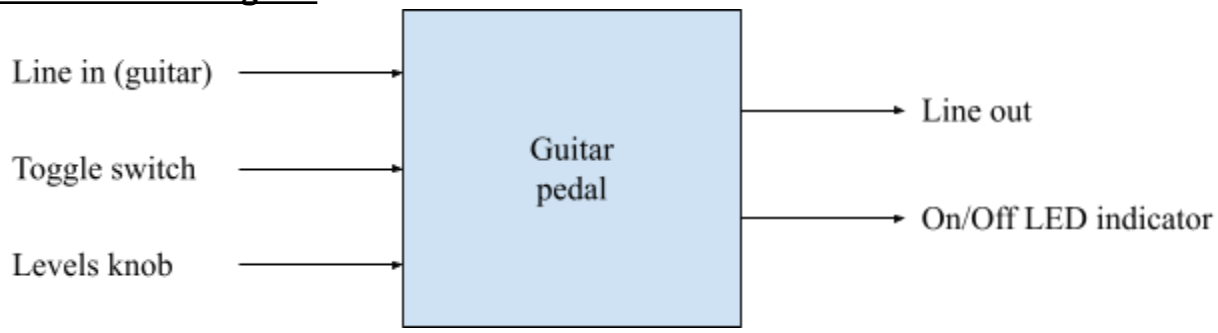
- Should not introduce significant noise when bypassed.

- Should be portable.
- Should be able to operate for an hour.

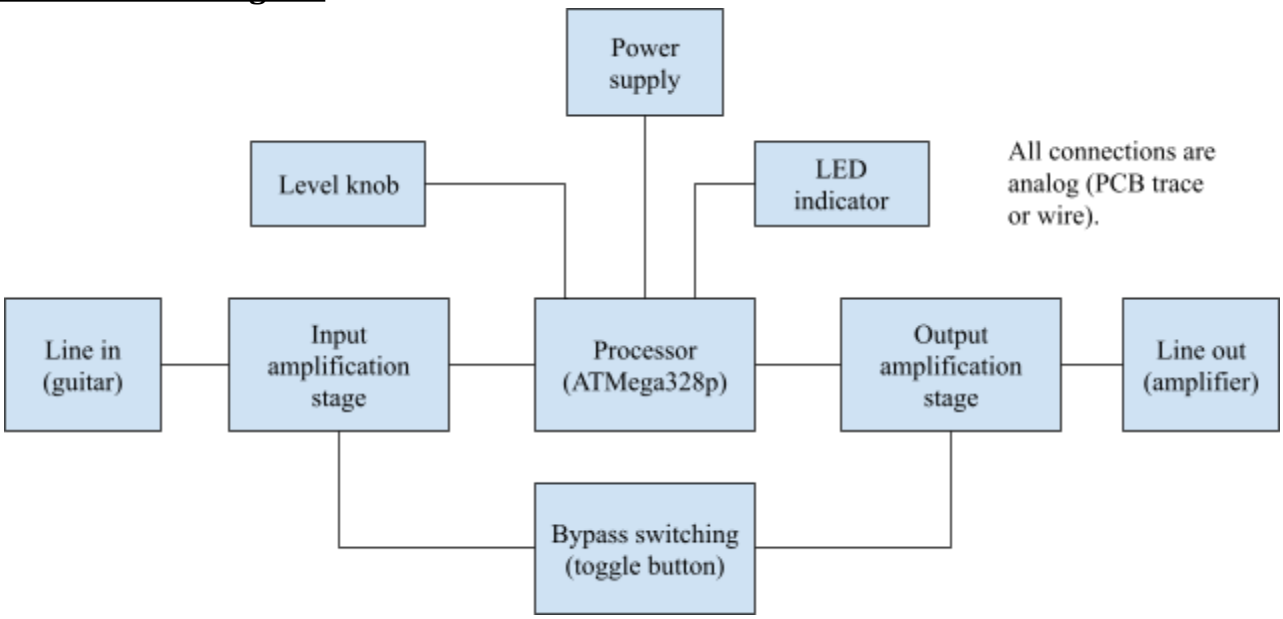
May:

- May have multiple effects.
- May be reprogrammable to change or add more effects.
- May operate while unplugged
- May have a power switch

Level 0 Block Diagram



Level 1 Block Diagram



Design Specifications

- 3D printed housing (potentially resin for durability)
- 1/4" input and output jacks (standard for guitar)
- Footswitch for the toggle button
- Potentiometer/encoder for effect levels
- Option for both battery powered or AC powered (from a wall outlet)
- Arduino bootloader on ATMega328p