

1. PROBLEM STATEMENT

The market space for guitar pedals is diverse—even though only about 20 types of pedals exist [1], the differences between brands account for hundreds, if not thousands, of pedals on the market. Although Alternative Instrumentation's The Blackbox is one such pedal, its design focuses on ease of access, versatility, and robustness, allowing it (and the performers who use it) to stand above the rest.

1.1. Need Statement

Most guitar pedals in the contemporary design space function similarly in terms of user interface: usually, a large bypass switch in the center, several fine-tuning knobs, and occasionally an expression pedal operated by the user's feet. While this arrangement has its advantages, the performer has to bend down and take their hands off the instrument to adjust the strength of the effects, disrupting the performance. This problem compounds as the number of pedals on a user's setup increases, taking up precious minutes of performance time. Additionally, different pedals often include power supplies of varying voltages, requiring an aspiring musician to transform the input voltage to 9 V, 12 V, 18 V, and 24 V depending on their setup [2]. This cable management nightmare often forces new performers to sacrifice their time learning voltage regulations, money hiring a professional, or sound quality by ignoring impedance matching and feedback. Further, this voltage problem risks damaging components if done incorrectly, affecting the pedal's longevity.

1.2. Objective Statement

The Blackbox, engineered by Alternative Instrumentation, is an all-in-one modular system designed for a seamless user experience. It uses a digital microcontroller to emulate the effects of multiple pedals, allowing the performer to reorganize their effects chain and effect strength mid-performance. The Blackbox's user interface incorporates switches and pedals optimized to be controlled hands-free, including a powerful preset system that can adjust the effects chain (and its fine-tuned parameters) at the push of a button. Naturally, because the pedals are mostly software-controlled, the user can install new pedals from a connected device and use them immediately, sidestepping the complex setup process (and price point) necessary for a new physical pedal.

1.3. Background and Related Work

The most fundamental idea behind The Blackbox is a focus on many large foot-controlled pedals for performers to use, rather than the small, circular knobs used in most pedals today. Further, Alternative Instrumentation interviewed those in the local music scene in Starkville, MS to ascertain what effects consumers seek and problems they encounter when using guitar pedals. For instance, to implement greater control over effects, products called "Expression Pedals" allow one to strengthen or weaken a sound parameter smoothly with their foot. Most single or multi-FX pedals average around 2–3 slots for an "expression input" (for instance, an envelope or filter), which could adjust multiple parameters concurrently with one input. An advantage of this approach is a smaller form factor; however, interviews showed compactness was not a top priority, instead being sound quality. Moreover, a problem with the knob-based approach is that performers cannot adjust their pedal's sound parameters consistently and effortlessly in the middle of a performance. Additionally, collecting multiple pedals of different varieties can be tedious and expensive for users. As for products that fill this niche, the Helix by Line 6 exists to fulfill the function of multiple pedals in an all-in-one product [3]. Even so, The Blackbox's inclusion of multiple expression inputs allows for unalloyed control over every facet of sound.

References

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- [3] “Helix Family Overview,” Line 6, 2021–2024. [Online]. Available: <https://line6.com/helix/index.html> [Accessed Sept. 18, 2024].