Team 5

Guitar pedal with modular controls panels and reconfigurable processing core


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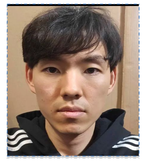
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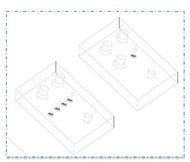
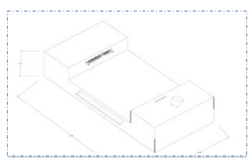
INTRODUCTION

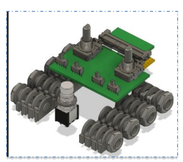
Guitar pedals are relatively simple signal processing devices. They tend to perform a single processing function, such as compressing, distorting, delaying, or reverberating the input signal. They often include one input (from a guitar) and one output (to a speaker). To create compound effects, guitarists must use multiple pedals serially. Pedals have simple controls so a user can adjust key parameters of the pedal's processing. Despite their simplicity, guitar pedals can be expensive and inflexible. Analog guitar pedals cannot be altered without opening the box and adding or swapping discrete components. Digital guitar pedals often include proprietary signal processing algorithms that cannot be changed by the user. Because current guitar pedal offerings fail to balance cost with reconfigurability, this group has designed a low-cost guitar pedal with modular controls panels and a reconfigurable core.

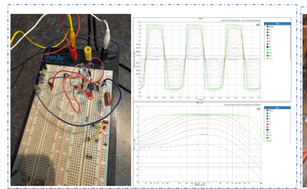
THEORY

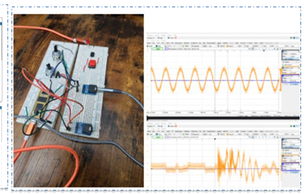
The design incorporates a guitar pedal base with a reconfigurable core and dedicated analog-feeling controls along with swappable control panels. The base consists of a daisy seed, a power input, a stomp switch, and 4 I/O's. The swappable controls panels we have designed have a mix of encoders, switches and potentiometers. Included in the swappable control panels are circuit boards the team designed to hold these components and also control distortion.

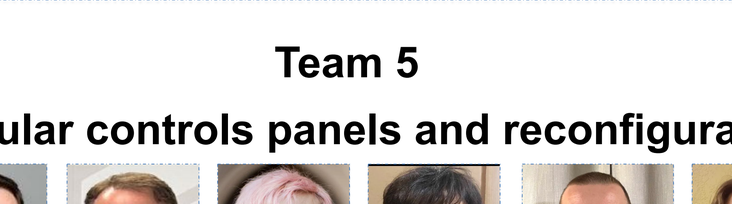




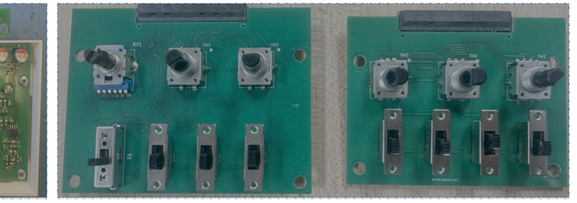


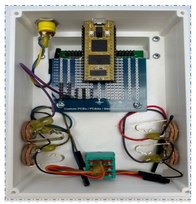






NOMENCLATURE	QTY	UNIT PRICE	TOTAL
Daisy Seed	1	$ 24.00	$ 24.00
Pure Tone PTTI Pure Tone Mono Output Jack -	4	$ 4.50	$ 18.00
ROTARY ENCODER MECHANICAL 24PPR	5	$ 1.72	$ 8.60
3D Filament	0.2	$ 16.99	$ 3.40
CONN SATA RCPT 22POS SLD R/A SMD	1	$ 6.84	$ 6.84
Foot Switch	2	$ 4.94	$ 9.88
CONN SATA PLUG 22POS SLD R/A SMD	2	$ 4.09	$ 8.18
ercoder knob	5	$ 0.75	$ 3.75
Slide Switch	7	$ 1.15	$ 8.05
Control module	2	$ 33.86	$ 67.72
		GRAND TOTAL	158.02

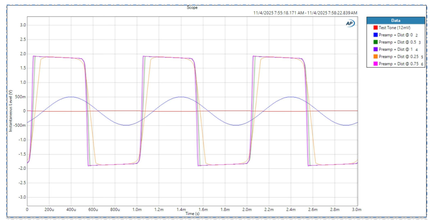




RESULTS

Validation of hardware included:

- Continuity check to ensure correct pinout
- Ensuring gain stages met expected amplification levels
- Verifying resistor chain output voltages
- Observing resulting waveform from applied distortion effect



CONCLUSION

Our guitar pedal combines cost savings, reconfigurability, and ease of use in our final design. We used our background skills and access to facilities to complete the guitar pedal. This pedal provides a unique solution for the musician who wishes to enjoy diverse processing capabilities without purchasing multiple analog pedals or an expensive digital pedal.