Abstract

In the area of musical instruments, mainly pertaining to the guitar enthusiast, guitar pedals are widely used. Guitar pedals take the analog signal from a guitar, then manipulate and amplify the signal through an amplifier. This process is known as Digital Signal Processing (DSP) and is used in a variety of applications ranging from image processing to seismology. Through this project, DSP was explored and used in the creation of a prototype guitar pedal which allowed for the development of various computer codes to create guitar effects. These included clean, booster, tremolo, and distortion. To accomplish this, an open-source guitar pedal project was recreated from the ground up. This project used an Arduino microcontroller which gave a user-friendly platform for testing and analyzing code in the C and C++ programming languages. Some elements of mechanical engineering were also used in the design of an enclosure for the guitar pedal. Precise dimensioning and stress analysis simulations were done to ensure that the enclosure would work for the Printed Circuit Board (PCB) design. This project has been unique in that it has encompassed the fields of computer science and both mechanical and electrical engineering, making it an interesting, multidisciplinary project.