Feedback from the FireFader

Julian Neri
McGill University

julian.neri@mail.mcgill.ca

Abstract

This research involved improving a popular open-source force-feedback device, the *FireFader*. Due to it's affordability and technical simplicity, the FireFader has been successful as an introductory force-feedback device. As a starter device, optimizations were exchanged for accessibility. In my research, it was found that some improvements could be made to the current configuration without complicating or convoluting the device as a whole, therefore avoiding deviation from the original project goals. A force-feedback instrument was implemented which demonstrates the modifications made during this research.

Improvements to the FireFader were installed while pursuing an emulation of a bass guitar. In the emulation, force-feedback from one fader simulated the restoring force of a plucked string, while the other fader emulated the feeling of sliding over frets. Absolute position and latency of force-feedback proved to be essential factors when considering the effectiveness of the model. A straightforward improvement to the existing device was completed by concatenating the output voltage from the position potentiometer into two bytes instead of one. After the modification the discrete position of the fader spanned 8 bits rather than 7, which effectively doubled the precision.

Decreasing costs in compact programmable lighting allowed for an update to the FireFader's visual feedback component. Halogen lighting provided visual feedback of each motor's output current in the original model of the FireFader. More advanced visual feedback was made possible by adding a programmable RGB LED array. Implementing visual effects can be done through a modified Max/MSP patch, and is no more complicated than the original open-source patch. By creating mappings from force to colour, the functionality of the device has been increased and varied. Capacitive sensors on the faders were used to add mode selection capabilities. Modes of the bass guitar emulation, like fretless or fretted playing, were selected through different combinations of touching and releasing of the faders. Psychological experiments were also conducted to compare the effect of visual and force-feedback modes on musical timing with promising results for future research.

Further research into affordable force-feedback projects should continue prodding their limitations. Performance should be optimized while maintaining a shallow learning curve to facilitate widespread use. By optimizing force-feedback devices constructed of affordable parts, a solid foundation will be formed for more advanced applications.