Abstract

In most electronic keyboards and synthesizers, there is a trade-off between what types of expressive controllers are available. Some keyboards, like digital stage pianos, have a full complement of control pedal inputs for the three types of pedals on a piano, plus a continuously variable volume pedal; but they may not have pitch bend and/or modulation controllers. Others, like many synthesizers, have expressive controllers like pitch bend and modulation joysticks/wheels, but only one or two pedal inputs. I plan to use the ARM processor to create a MIDI “expression box” that can be connected to any MIDI-capable instrument or keyboard for added functionality that fills in the gaps. Ideally, I would like to add a pitch bend stick and a modulation wheel that emulates those found on Nord keyboards, as well as four \( \frac{1}{4} \)" TRS inputs for expression pedals. Because there will simply be six resistive sensors and one set of MIDI in and out ports, I anticipate that this project will be much more code-heavy than circuit-heavy. I will be utilizing C to map each sensor’s output to a corresponding MIDI data stream, with i2c control signals as needed.

Project Goals

First Demonstration:

By the first demonstration, I plan to have my pitch bend and modulation sensors built, and all sensors interfaced with the ARM processor on a breadboard. I also plan to have my block diagram and schematics finished.

Second Demonstration:

By the second demonstration, I hope to have finished the code that allows the processor’s output to conform to the MIDI standard. This will likely be demonstrated by writing MIDI messages directly into the code (such as a simple note on and note off). If things are going well, then I would like to have implemented a “soft-Thru” function in which the MIDI data coming into the MIDI Input is combined with the generated MIDI data at the output. But that is likely to be implemented by the final demonstration, if at all.

Final Demonstration:

For the final demonstration, the sensors will ideally have their outputs correctly converted into MIDI signals in real time, which can be demonstrated by connecting the unit to a synthesizer and using the pedals and pitch/modulation sensors to change parameters on the fly. This may still be at the breadboard level, unless it takes me less time than expected to implement MIDI on the ARM processor, in which case I would hope to have a PCB prepared.

Tentative Schedule

Tuesday: 2:00pm-4:00pm
Wednesday: 2:00pm-4:00pm
Thursday: 12:30pm-3:30pm
Friday: 2:30pm-4:30pm
## Final Report and Project Files

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