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Project Proposal: Sequencer

A step-sequencer is an essential part of every basic modular synthesizer setup. A fixed pattern of a certain number of steps is repeated continuously. The musician can decide whether to enable or disable each step and which note to play at that step. This makes a step-sequencer very attractive in the context of beat-making and was therefore the starting point of early drum machines. The user can set the number of steps, tracks and the beats per minute (BPM). Opposed to a real-time sequencer, and therefore lends itself more easily to implementation as an embedded system.

Elektron Machinedrum SPS-1 (Wikipedia)
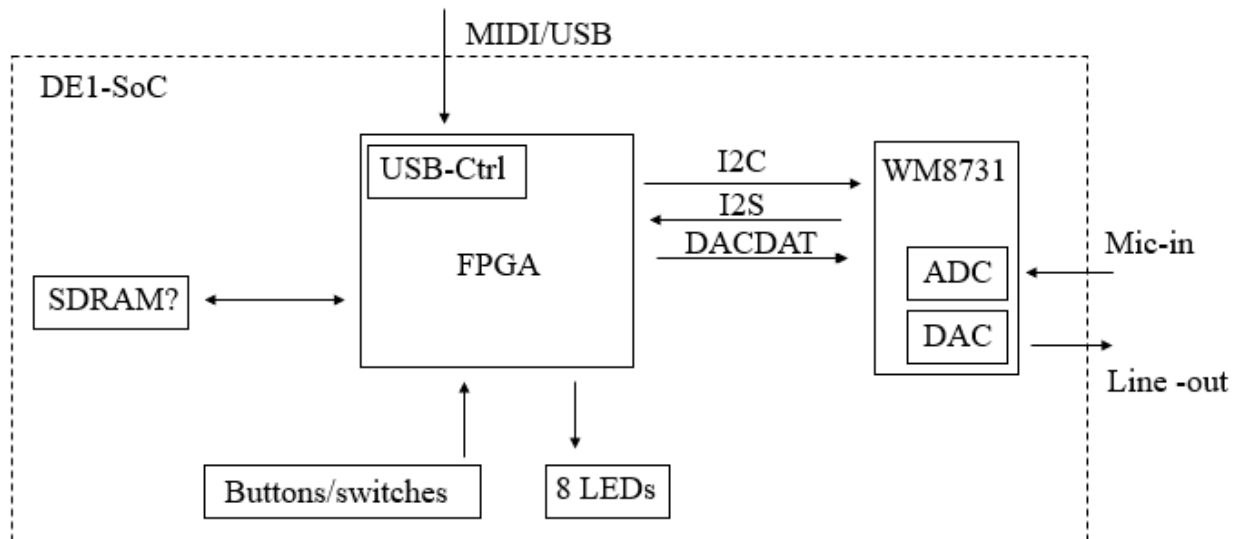
Proposed High-level layout

Hardware/peripherals

1. Wolfson WM8731 on the DE1_SoC
   a. Speakers connected to LINEOUT
   b. Microphone connected to MICIN
2. MIDI keyboard (either computer keyboard or Microbrute 2.0)
3. Slide switches to select the track
4. Push buttons to select BPM
5. 8 LEDs to display cycling through the sequence
6. 7-segment to display BPM/current active track

HW/SW Interfaces

- Libusb as a driver for the MIDI keyboard
- Driver for interpreting switch and button presses

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Task Overview

1. Use libusb and corresponding device driver to store MIDI data
2. Setup wolfson ADC for MIC input and store into SDRAM
3. Configure user interface driver that runs debouncing and tempo calculations from button inputs, track selection with switches, and LEDs indicating time step.
4. Configure the WM8731 over I2C Bus

References

https://en.wikipedia.org/wiki/Music_sequencer
https://cdn.sparkfun.com/datasheets/Dev/Arduino/Shields/WolfsonWM8731.pdf
file:///C:/Users/alexa/Downloads/DE1-SoC_User_manual_v.1.2.2.pdf