UCR CS/EE 120B Spring 2015 - Gustavo Blanco - Drum Machine

High Level Description

This project will consist of implementing a looping Drum-Machine. The drum machine will have three different sounds that will be produced using varying PWM to act as three different drums. The user will be able to press one of three buttons in any sequence to generate a beat. There will be a recording button that the user will be able to press in order to initiate saving a succeeding sequence of button presses. There will also be a play button that the user can press to simply play back their saved beat indefinitely. During both recording and playback, a sequence of LEDs will light up notifying the user of the allotted time they have to record/play back their beat. Upon saving a new beat it will be stored into EEPROM so the user can save said beat even after shut off.

User Guide

The Drum-Machine has 5 input buttons for Drum1, Drum2, Drum3, Play, and Record functionality, a speaker for play the beats, and a bank of LEDs to show progress through recording space. At startup it will load any existing beat that has been previously recorded.
The user can play any beat using the Drum1, Drum2, and Drum3 buttons at any time.
If the user wishes to record a beat they just need to press the Record button to initiate recording, play their beat using the 3 drum buttons, and then press the Record button again to complete recording. At completion of recording the beat will be saved to EEPROM for playback even after shutoff.
If the user wishes to play back their beat they just need to press the Play button and their beat will begin to play back. They can then press the Play button again to cancel playback.

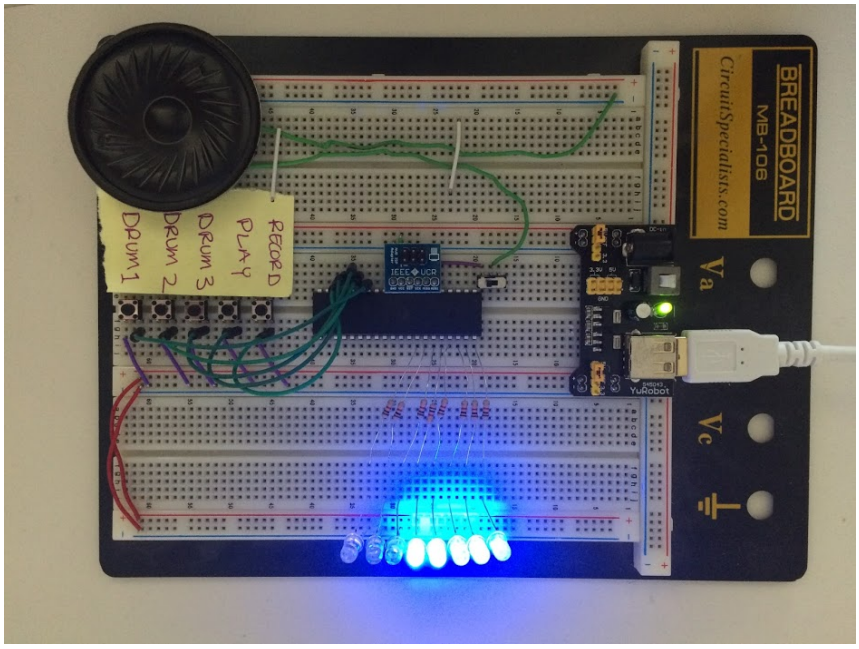

figure 1) Drum-Machine during playback

Technologies and Components

This project incorporates EEPROM and PWM. The entire project was programmed using the avr-dude tool chain and coded using the Atom Text Editor with manual flashing and setting of fuses.

Parts List:

Part	Quantity	Description/Comment
ATmega1284	1	microcontroller
Buttons	5	tactile buttons
Speaker	1	speaker used for sound
LED	8	used to show beat progress

Demo Video

The demo video can be found here: https://youtu.be/AIx_B2E4rTI

Source Files

The souce code can be found here: https://github.com/gusbee/CS120B-DrumMachine

Included Code:

main.c - contains all code base for this project including the button monitoring, playback functionality, and storing to EEPROM

Makefile - contains the Makefile used with avr-dude in order to flash the above main.c file onto the ATmega1284

Schematic Diagram

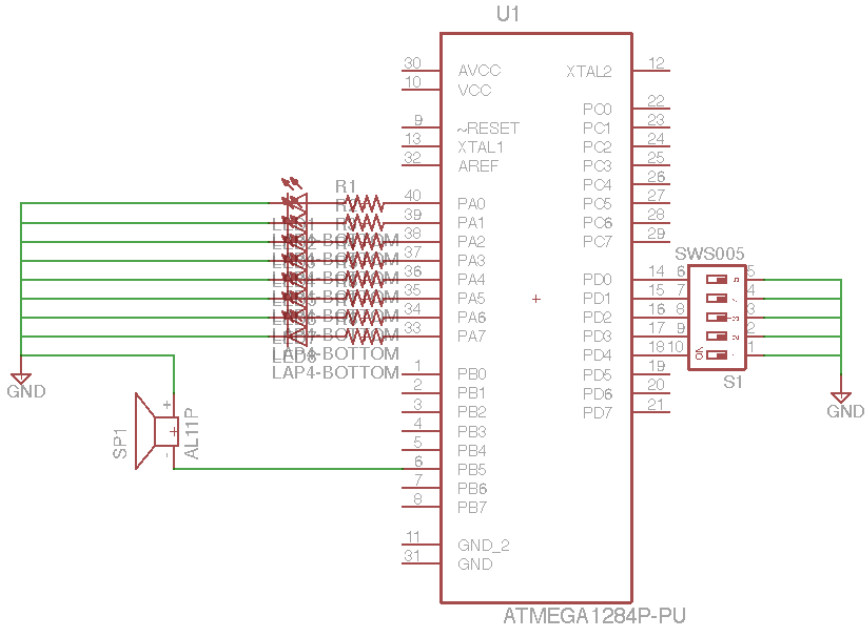

figure 2) Drum-Machine schematic

Cited Sources

Dean Camera - for his PDF tutorial on how to use EEPROM in AVR-GCC (http://deans-avr-tutorials.googlecode.com/svn/trunk/EEPROM/Output/EEPROM.pdf)

UCR IEEE- for providing parts and turorials on their website (http://ieee.ee.ucr.edu/)

Chris Curtis & Kelly Downey - for teaching the course!