Etch’ N Sketch

Custom Project Final Report

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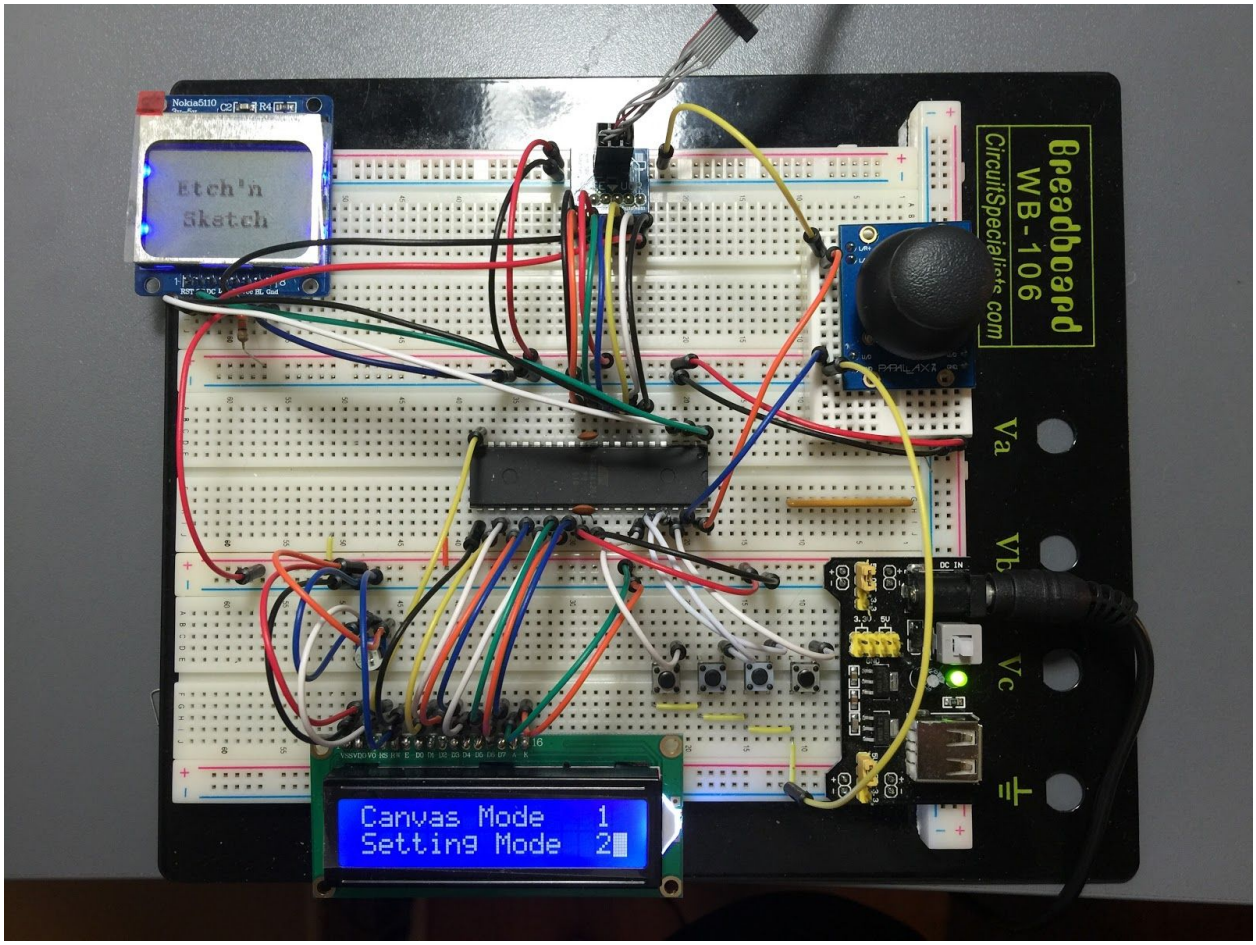
Introduction

For my Mini-Project, I am proposing an embedded system similar to an Etch and Sketch. In this project I will be using a Nokia LCD display, a LCD screen, a joystick and some buttons. The purpose of this project is to allow the user to draw on the LCD using a joystick. He or she can also erase or draw on the LCD display using the corresponding buttons. The user will also have the option to save and recalibrate the joysticks or adjust the contrast of the LCD screen.

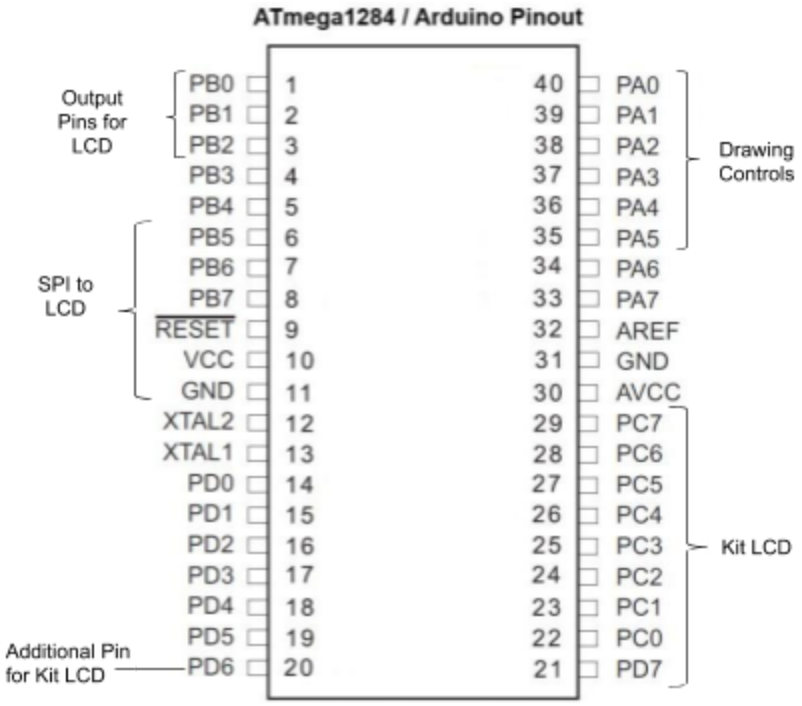


Hardware

Parts/Technologies List

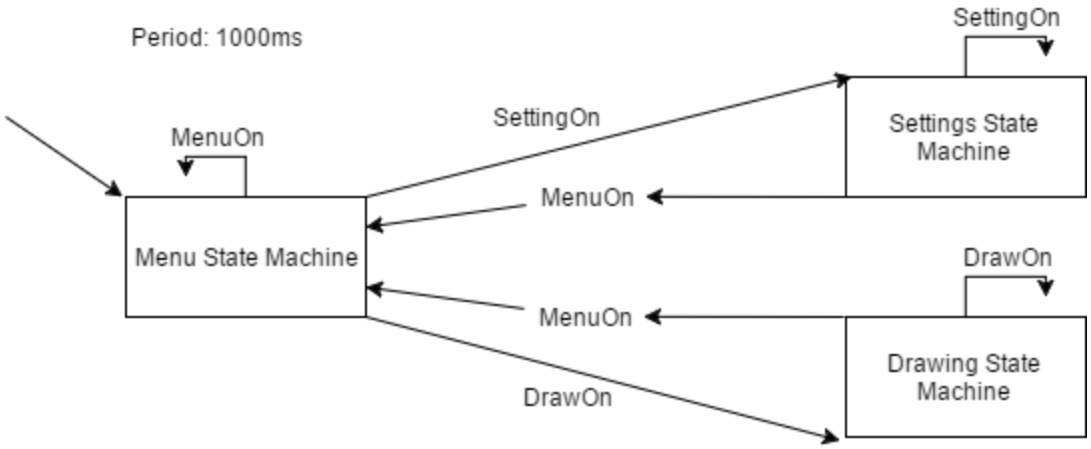
- ATMega1284 microcontroller
- AVR Studio 7
- LCD 16x2 Screen
- Buttons
- **Joystick**
- **Nokia 5110 LCD Screen**

Pinout

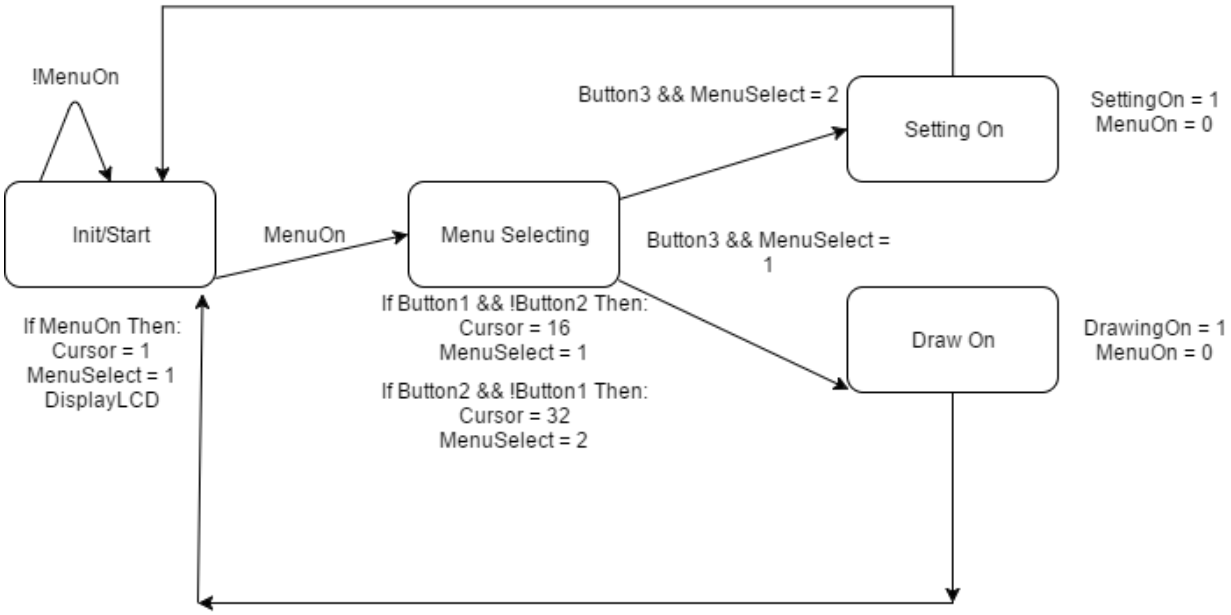


Software

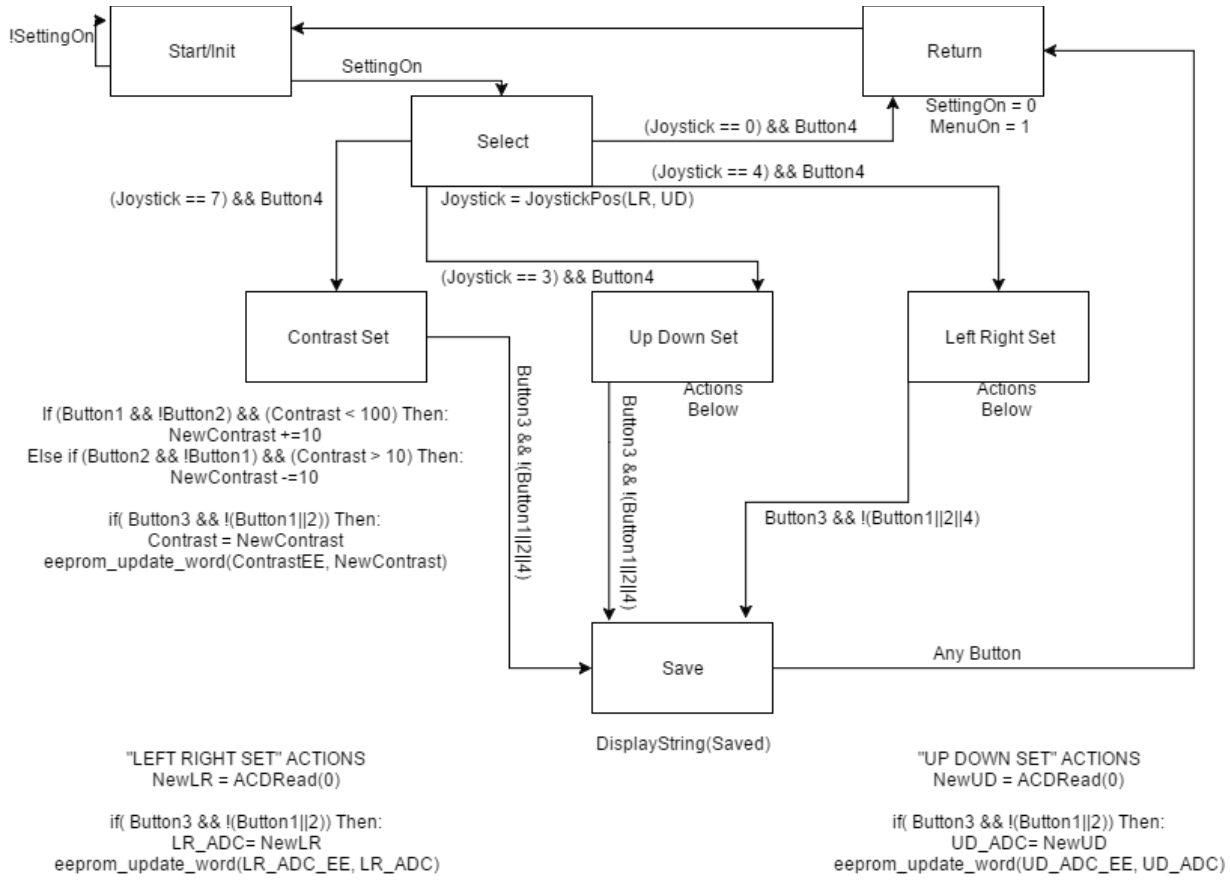
Overall Task Diagram:



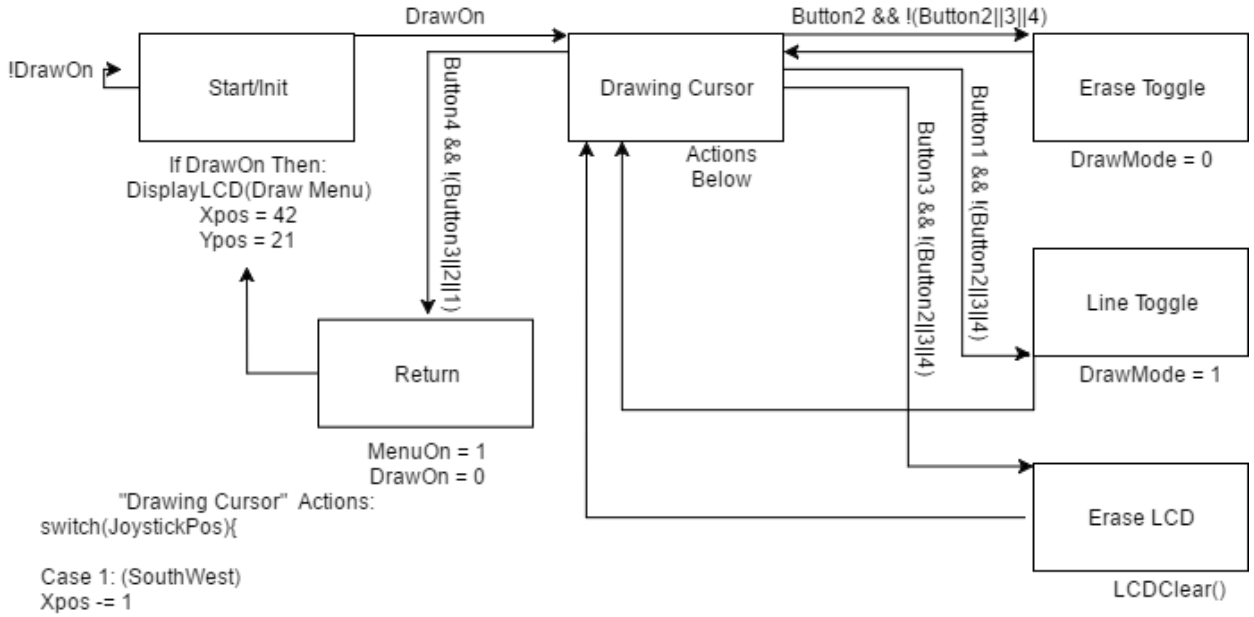
Menu State Machine:



Settings State Machine:



Drawing State Machine:



"Drawing Cursor" Actions:

```
switch(JoystickPos){

Case 1: (SouthWest)
Xpos -= 1
Ypos += 1
break;
..... (South,SouthEast, West, East, ..,North)
Case 8: (NorthEast)
Xpos += 1
Ypos -= 1
break;

}

LCDDraw(Xpos,Ypos, DrawMode)
LCDUpdate()
```

Complexities

Completed Complexities:

- Integrating and calibrating the joystick
- Using EEPROM to save the joystick and Nokia screen calibrations
- Creating custom characters on the 16x2 LCD screen
- Integrating and programing the Nokia 5110

Incomplete complexities:

- None, completed all said complexities.

Youtube Link:

CS 120B Calvin Kwong
(If hyperlink is down, youtu.be/aEEVnwL83GI)

Known Bugs and Shortcomings

- One of the bugs encountered was that on the border of the drawing canvas, the cursor sometimes fails to move and becomes jammed at that location. I would debug it by changing way that the movement of the cursor works. The cursor's movement tolerances would have to be changed such that it is more accurate of the screen's X and Y boundaries.

Future work

In the future I plan on adding more options for the user. One of these options might include being able to change the size of the drawing “brush” and adding a save/load canvas button. Another addition would be having an option to change the clock cycle rate for the canvas cursor speed. My project in its current state is pretty rough on the 16x2 LCD, I would try to implement it such that it only updates on user input instead of updating on every period.