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ECE-447-201

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Lab 6: PWM, LCD, and Matrix Keypad Decoding

Introduction: The purpose of this lab is to implement a matrix keypad and display what is entered on the LCD on the MSP430. Keys A-D will turn on leds blue, red, yellow and green while the # key will reset the LCD and make it display 0. While the * key will removed the previously entered digit.
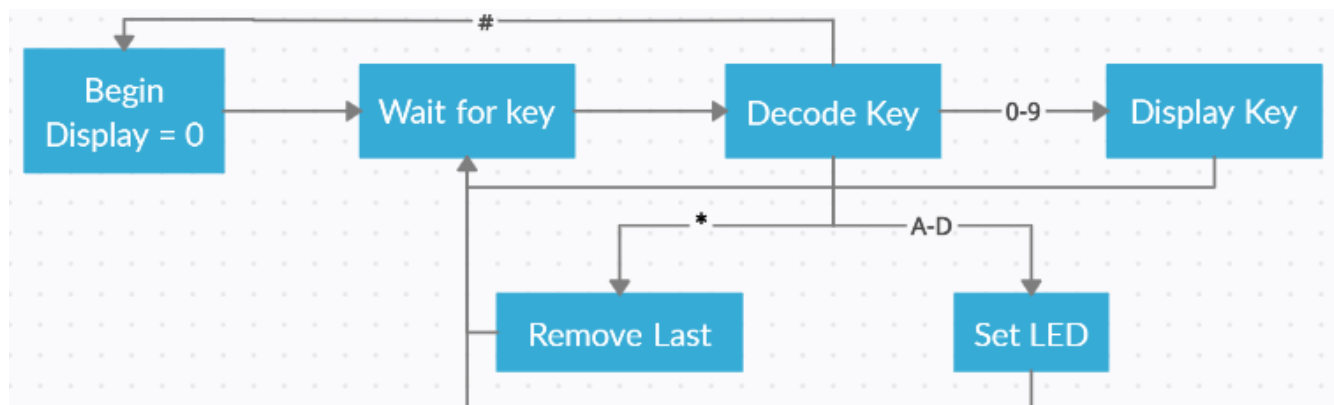
Hardware Design: I decided to use ports 2.0, 2.1, 2.2, 2.3 it made it easier for me to code and the lab still preforms the same requested functionality not expecting to lose points for this.
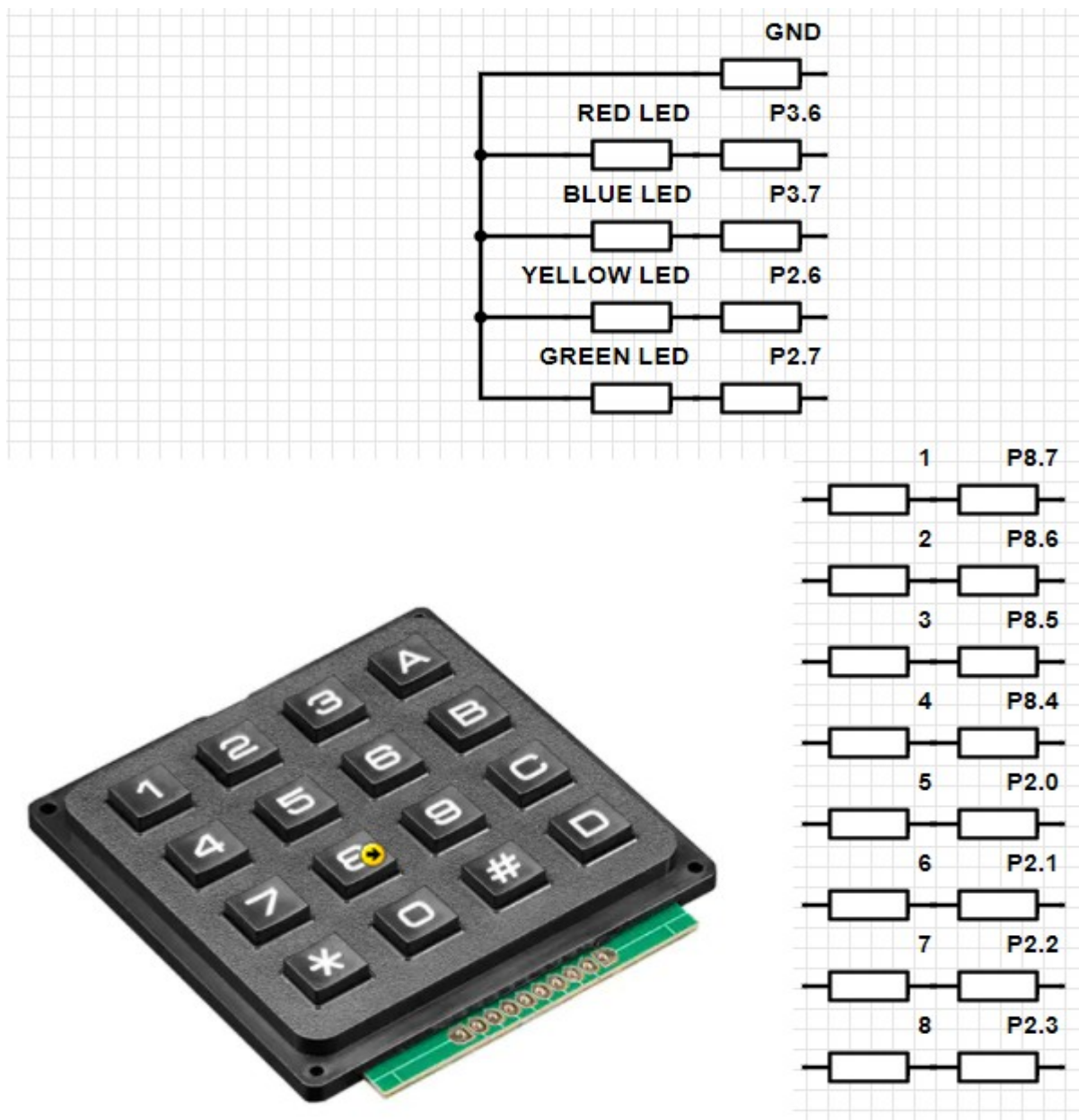
Software Design:
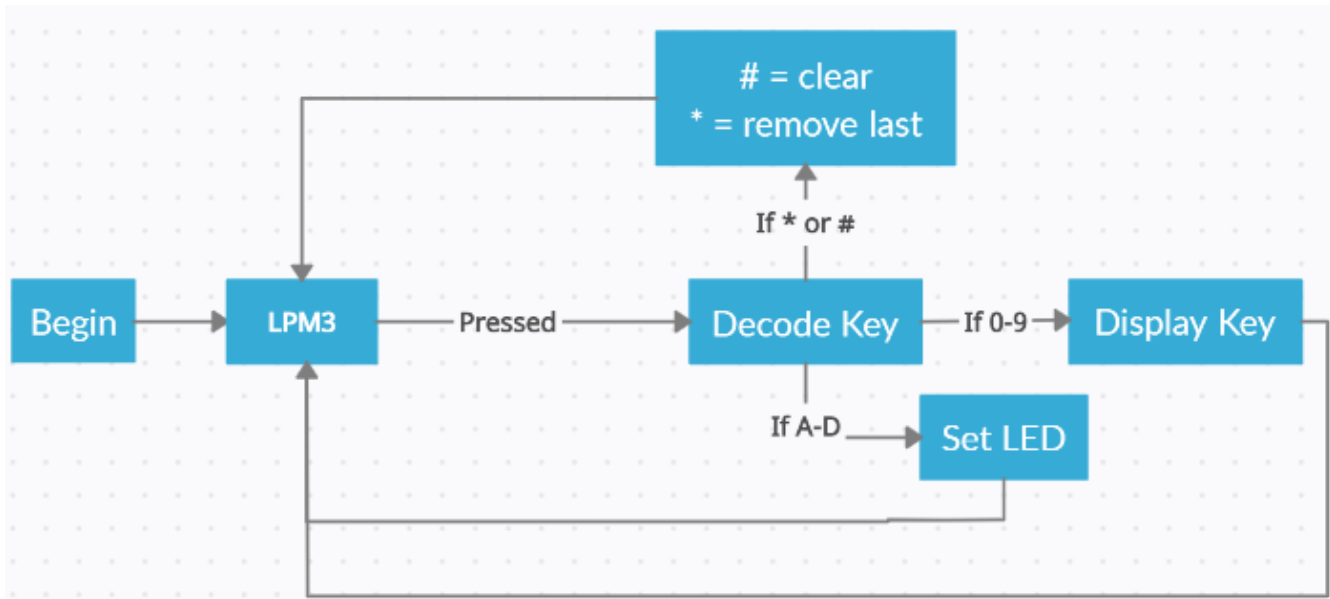
State Diagram:

Conclusions: I successfully managed to implement all the desired functions of the lab. The LCD will display a number between 1-100. While keys A-D will output whatever is currently displayed on the LCD to the blue, red, yellow and green leds. Also the # key resets the LCD while the * key removes the most recent digit entered.

Questions:

1) I used timer A2 and set it up with ID_0, TASSEL_1, MC_2, and TACLR. The equation I used to determine the delay was: $T_{delay} = 10*10^{-6} *$ ticks; $T_{delay} = 25 * 10^{-3}$ so ticks = $(25*10^{-3})/(10*10^{-6})$

2) I did not use a timer to set the red led on and off I used a delay loop. The equation I used to determine the delay was: $T_{delay} = 10*10^{-6} *$ ticks; $T_{delay} = 0.5$ so ticks = $(0.5)/(10*10^{-6})$

3) I used LPM3 because I needed ACLK to remain on and LPM3 saves the most power while still providing the functionality required to allow the code to work.

Demo Video: https://youtu.be/1Y0cpL0C7dE