Project 2

Course: CSE 321 – Embedded Systems

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Specification:

Purpose: The systems prints “locked/unclocked” on the LCD based on the 4-digit code that is entered through a key pad. Every time a key is pressed, an Led gets lighted.

Input: 4 digit code.

Output: Led get lighted every time a value is entered. Additionally, “locked/unlocked” statement gets printed on the LCD when all 4 digit codes are entered.

Constraints: The buttons don’t work if power is not provided to every row on the matrix keypad when it’s necessary.

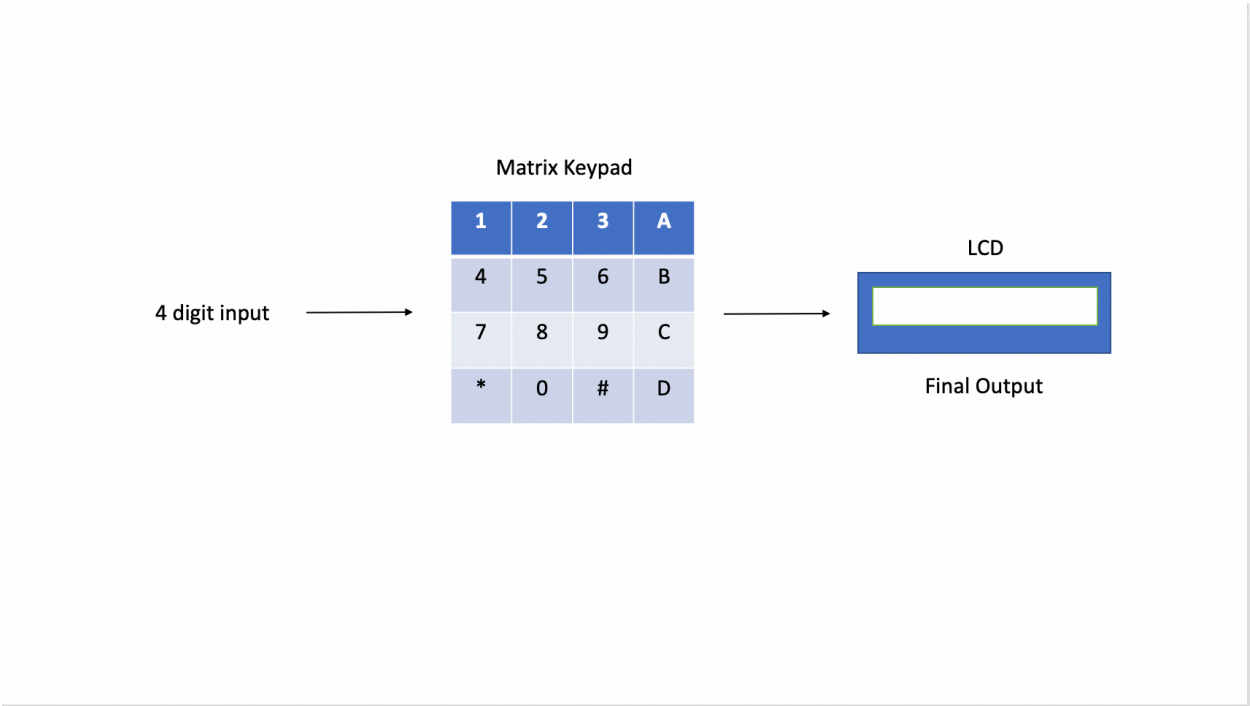
Features:

- Passcode could be altered by the user
- Output can be printed on the LCD
- Runs forever
- System can be locked with a single button
- Key pad includes letters and numbers

Applications:

- Digital safes
- Lock boxes
- Door access control system

Block Diagram:



Final output gets printed on the LCD when all 4 digits are entered.

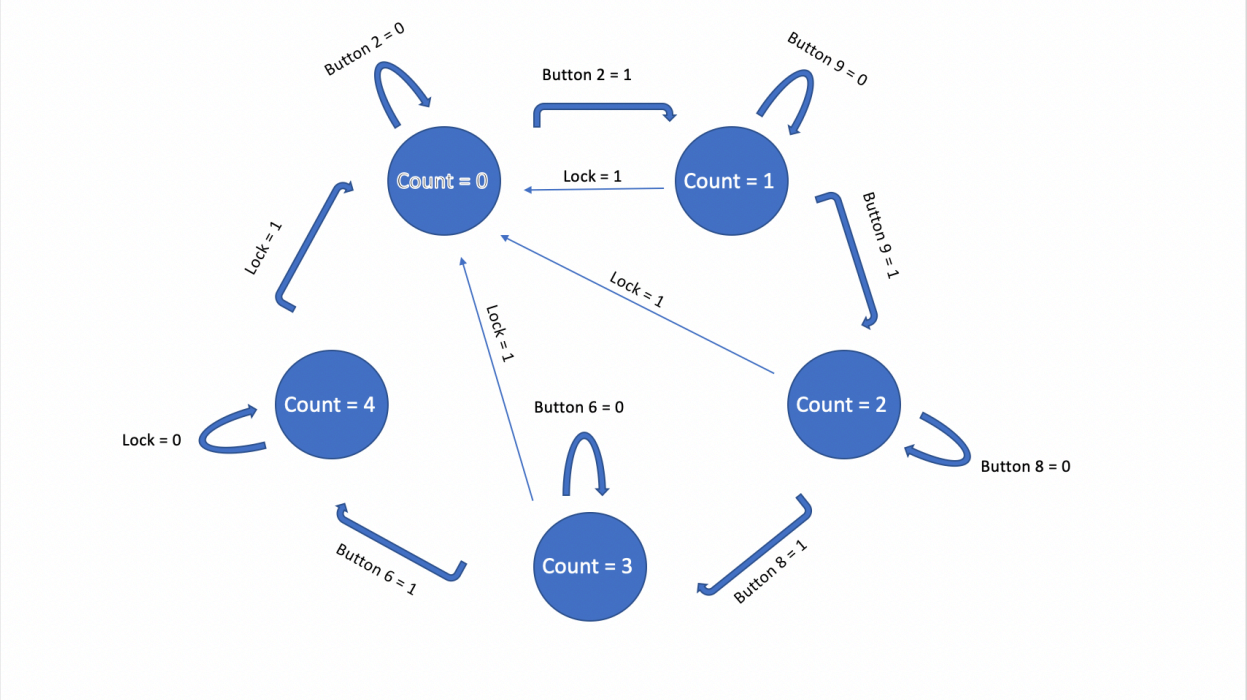
Functionality Diagram:

Variables:

Button 2 == 1 => count++
Button 9 == 1 => count++
Button 8 == 1 => count++
Button 6 == 1 => count++

Lock
Count

As you can see in the chart below, when a value of any button is equal to 1, the value of count gets incremented by 1. If it's not equal to 1, the value of count remains the same. When count reaches 4, the LCD prints "Unlocked". In addition, if the value of lock is equal to 1, the value of count returns to 0, and the cycle starts again.

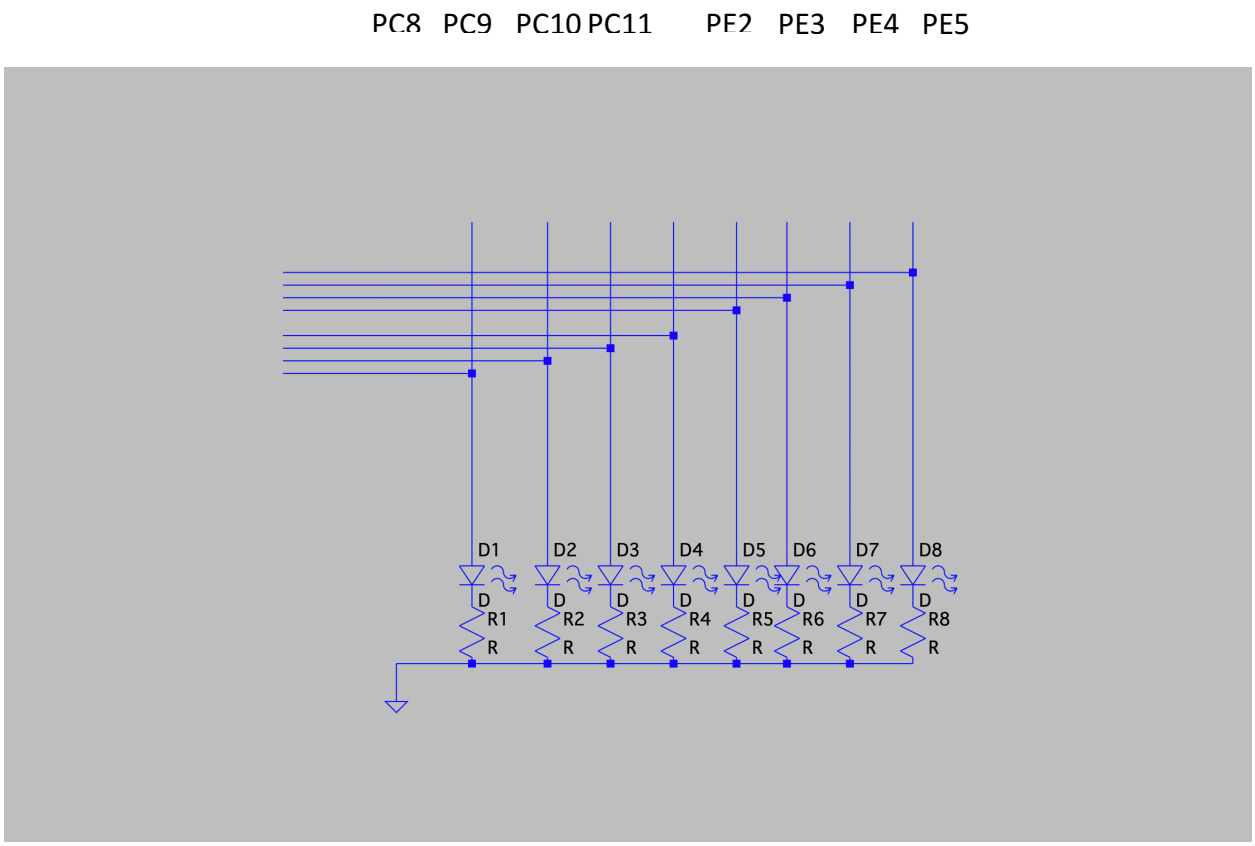


BOM:

- 4 x4 Matrix Keypad
- NUCLEO-L4R5I
- Grove-16x2 LCD (White on Blue)
- 8 5mm round LEDs
- 8 100 OHM resistors
- Jumper cables
- Breadboard

Note: The system does not require 8 LED's and 8 resistors. Some LED's are utilized to see if power is provided from the NUCLEO to the keypad.

Schematic:



Inputs: PE_2, PE_3, PE_4, PE_5
Outputs: PC_8, PC_9, PC_10, PC_11

The wires going to the left are supposed to be connected to the keypad. The bottom 4 wires provide power to the rows and top 4 are inputs. I used LEDs to see if the inputs are working.

Test:

I used LEDs to test inputs and outputs since print statements were not working. I had to unplug the NUCLEO from my computer all every time I ran the code.