

EIE3810 Microprocessor System Design Laboratory

Laboratory Report #3

Name: Tengfei Ma

Student ID: 121090406

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The Chinese University of Hong Kong, Shenzhen

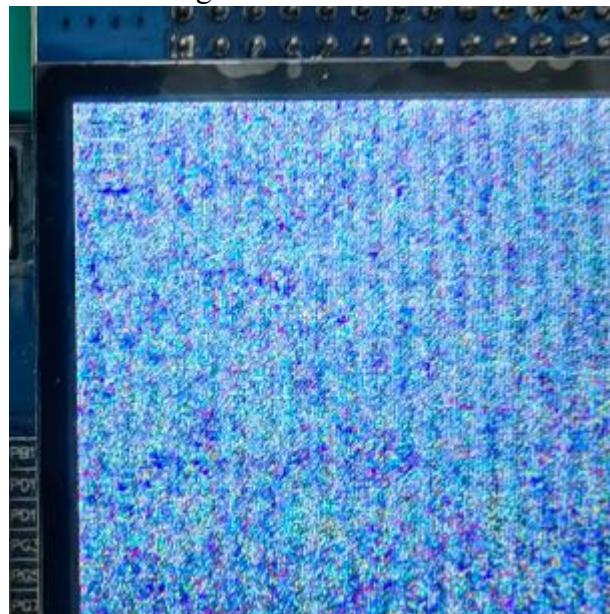
- Experiment 1: Draw lines on the TFT-LCD with different colors
- Experiment 2: Draw rectangle on the TFT-LCD
- Experiment 3: Draw a counting down digit by seven-segment on the TFT-LCD screen
- Experiment 4: Show alphabets on the TFT-LCD

1. Experiment 1

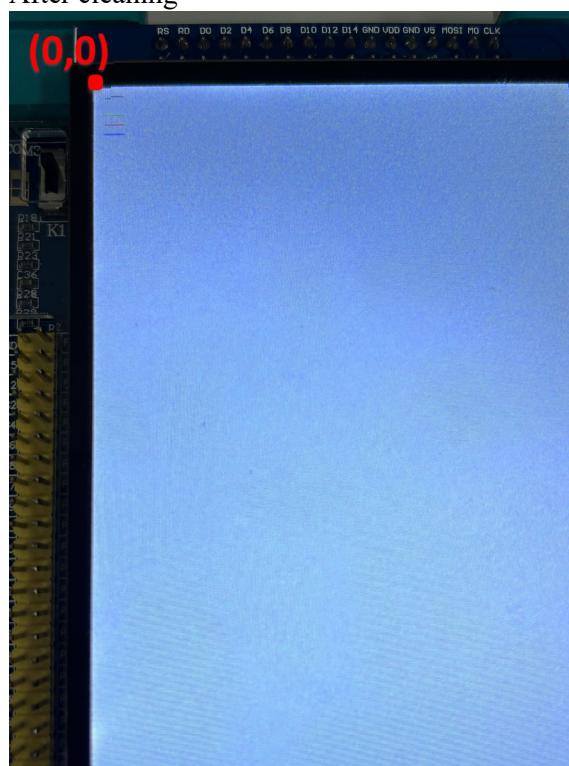
1.1 Result

I print 5 lines with 20 dots each and the colors are black, white, green, red and blue color, with the lines starting at $x=10$, $y=10, 20, 30, 40$, and 50 , respectively.

Before cleaning



After cleaning



1.2 Questions

1.2.1 After modifying background screen, how many lines can we see? why?

Four lines, because one of the lines is white, which is the same as the color of background.

1.2.2 where the origin (0, 0) is located on the screen?

(0,0) is at the upper left corner as the figure.

1.2.3 In the defined macros (Fig. 4), what other values can be?

(i)The macro LCD_COMMAND and LCD_DATA must be even number(LSB is 0),

(ii)and the range of LCD_COMMAND is 0x6C000000~0x6C0007FE,

(iii)the range of LCD_DATA is 0x6C000800~0x6C000FFE

Any integer such to (i)(ii)(iii) is OK.

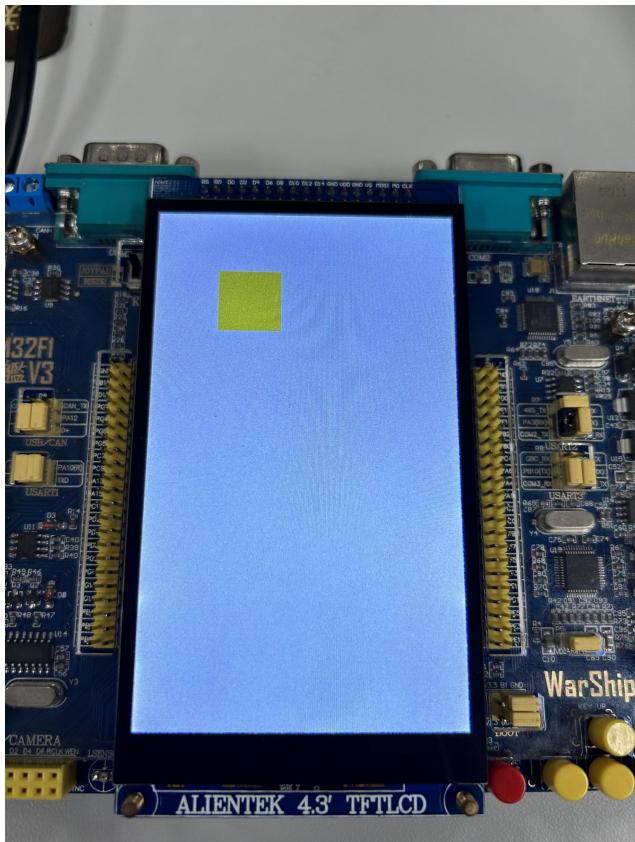
1.2.4 If we set LCD_COMMAND as 0x6C0007FF, is it correct? Why or why not?

Not correct, because LCD_COMMAND should be even number and 0x6C0007FF is out of range. It requires memory alignment, otherwise only a part of instruction can be read. (command is 16-bit, every address corresponds 8 bits, so only 8 bits of command is read.)

2. Experiment 2

2.1 Result

draw a rectangle at x=100, y=100, length, and width are 100 with yellow color on the screen.



2.2 Questions

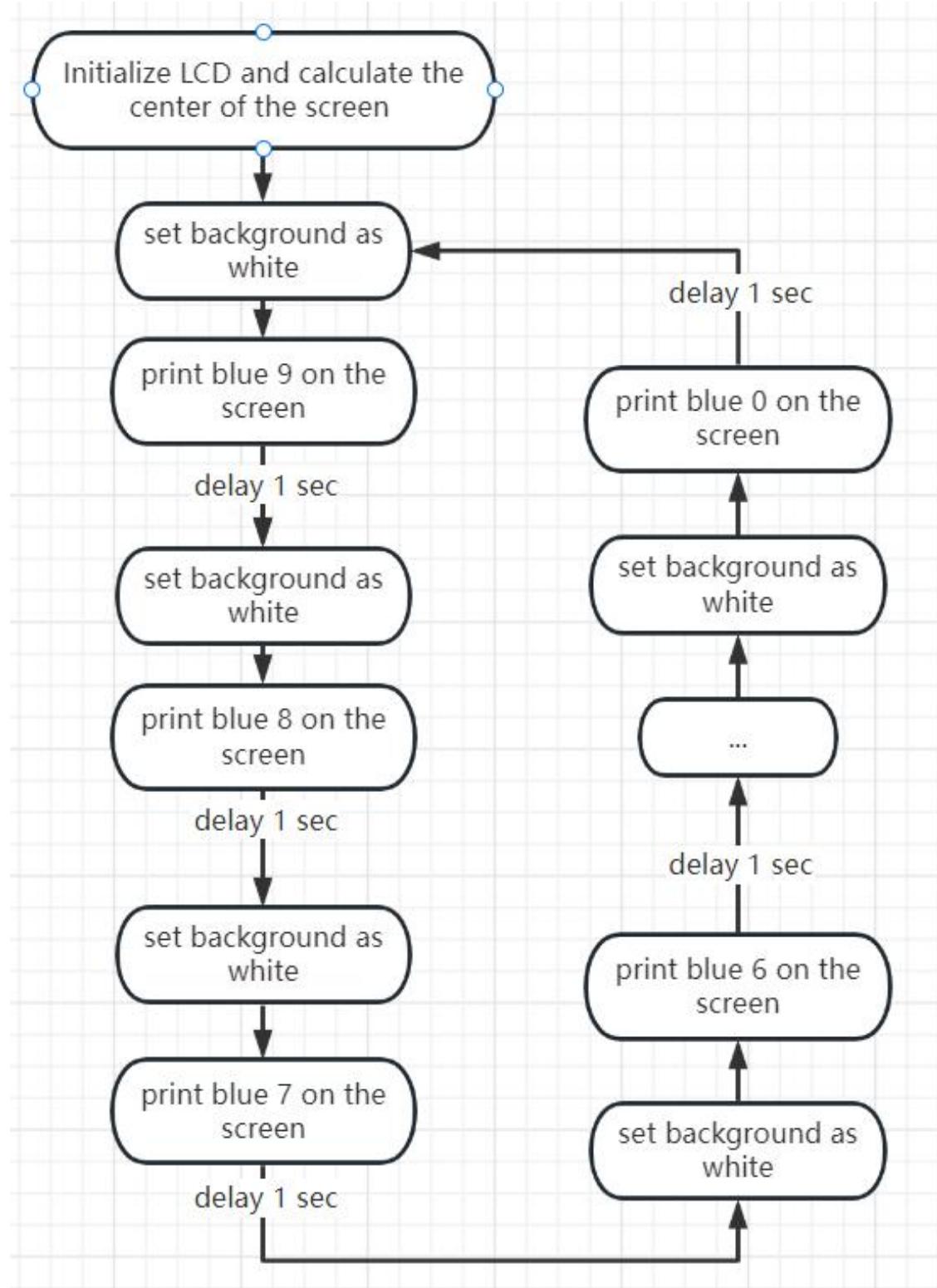
There is no question.

3. Experiment 3

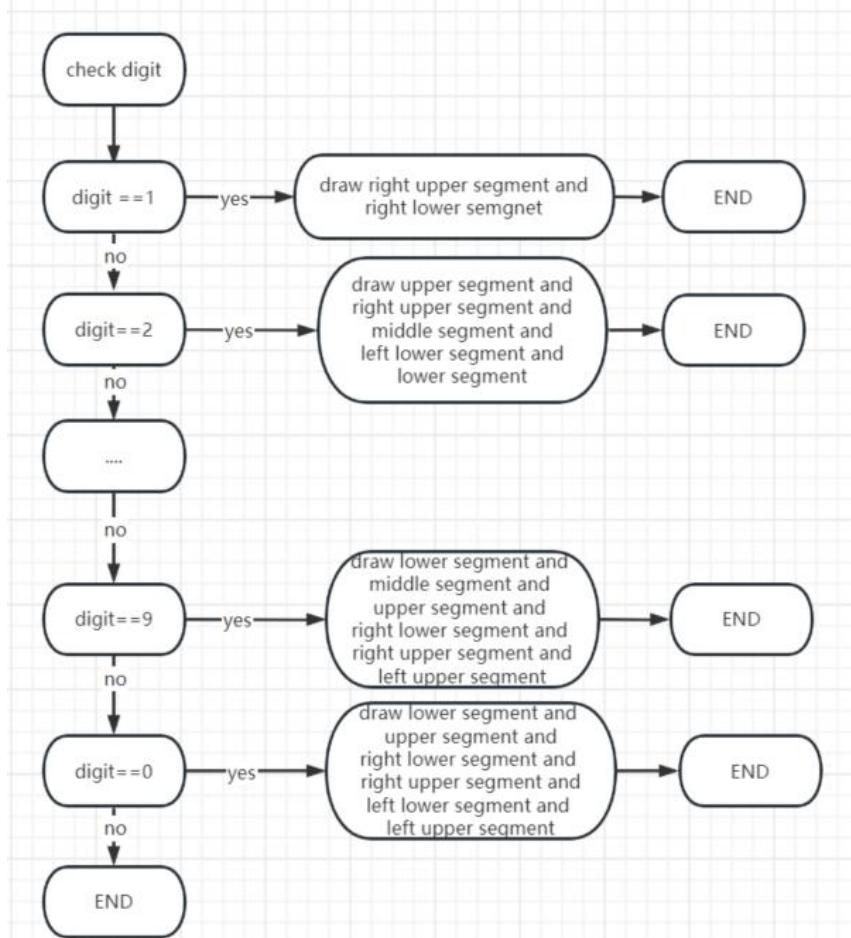
3.1 Design

3.1.1 Designed program flowchart

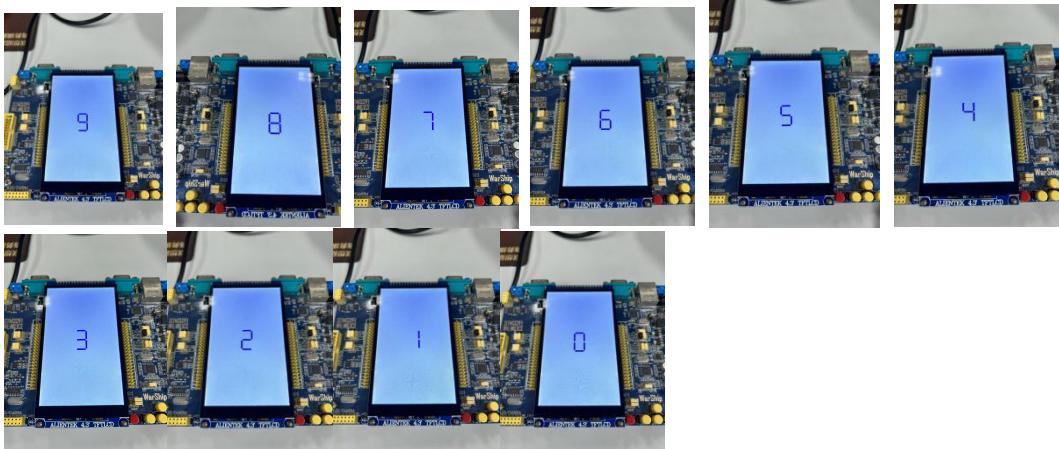
Main structure:



TFTLCD_SevenSegment:



3.2 Result



display count-down digit from 9 to 0, periodically

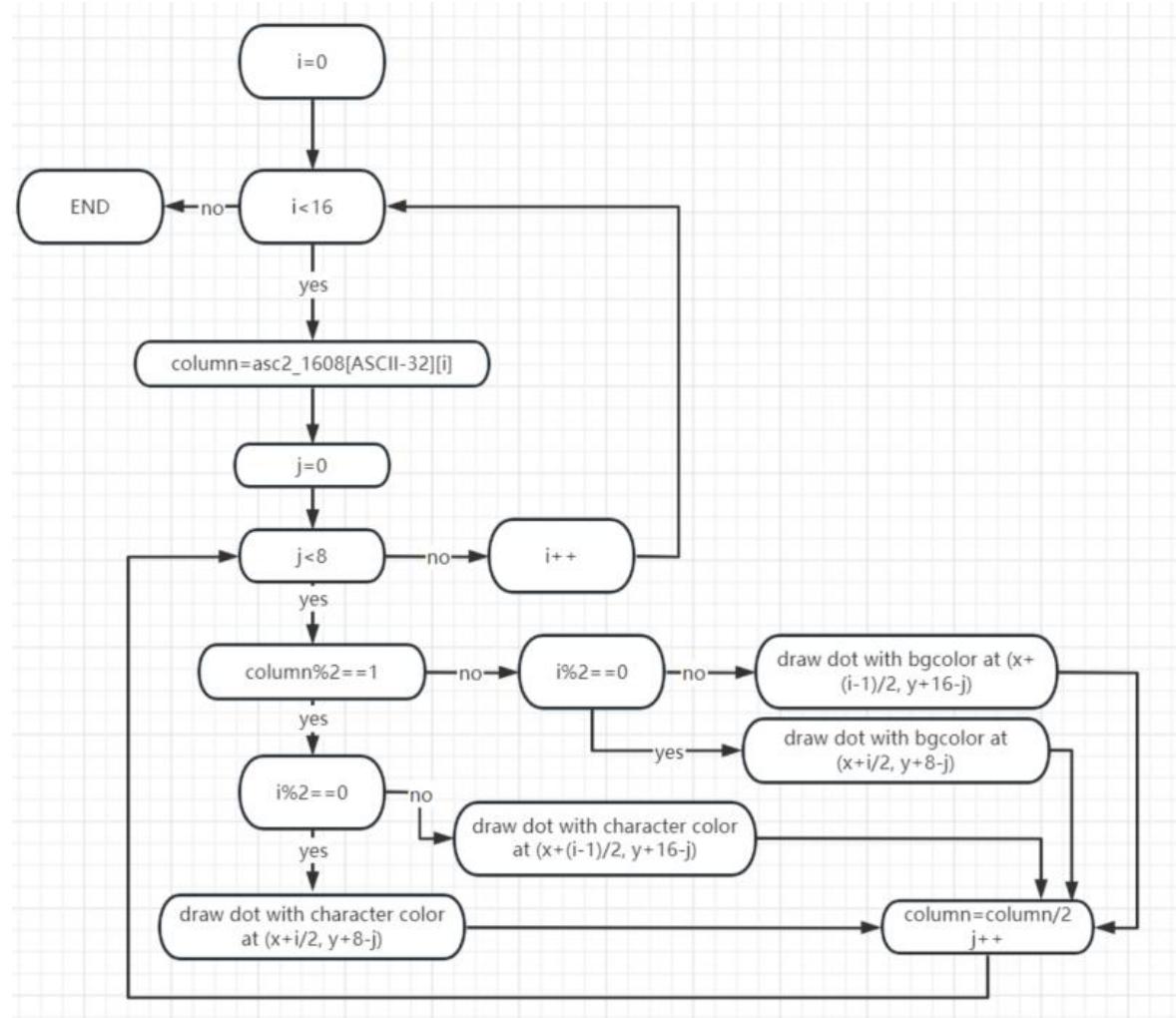
3.3 Questions

There is no question.

4. Experiment 4

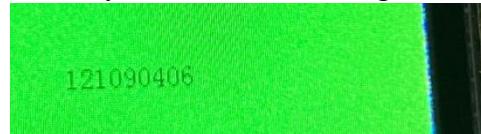
4.1 Design

4.1.1 flowchart of your EIE3810_TFTLCD_ShowChar()

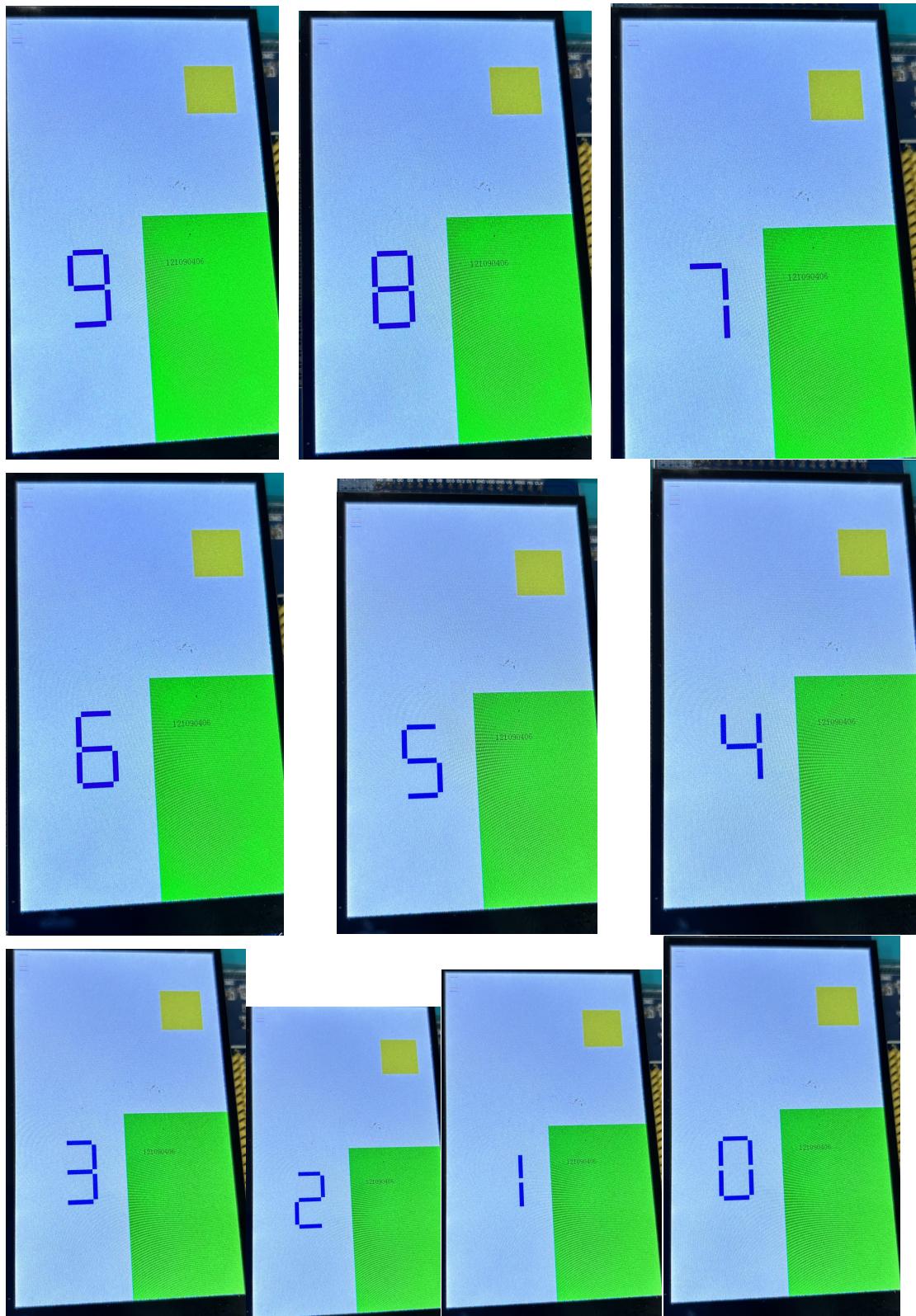


4.2 Result

Print my student ID and use green background and green bgcolor



Print 4 experiments simultaneously



4.3 Questions

- 4.3.1 To show all the 4 experiments simultaneously, what consideration in exp1-4 do you need to make, and why?

- (i) Position: I divided the screen into four parts as shown above. This can prevent overlapping each other.
- (ii) Execution sequence: I execute exp_1 exp_2 exp_4 first, and then execute exp_3, because exp_3 needs refreshing over and over again.
- (iii) Refresh: experiment3 needs to count down periodically, so I refresh the region of experiment3 per second.

5. Conclusion

I learned about the interfacing of Flexible Static Memory Controller (FSMC) of Cortex-M3. We interfaced a TFT-LCD with FSMC and study the control of TFT-LCD. In details, we study drawing lines and rectangles, and displaying seven segment and alphabet characters on the TFT-LCD. I can print anything in the screen. In some sense, we may know how to implement GUI.