2025 Digital IC Design Homework 2

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Functional Simulation Result				
Pattern1	**Pattern2**	**Pattern3**	**Pattern4**	**Pattern5**
Pass	Pass	Pass	Pass	Pass

Pattern 1

```
# All data have been generated successfully!
#
#                    ////////////////////////////
#                    /                          /        |__||
#                    /  Congratulations !!      /      / 0.0  |
#                    /                          /      /____   |
#                    /  Simulation PASS !!      /     /^ ^ ^ \  |
#                    /                          /     |^ ^ ^ ^ |w|
#                    ////////////////////////////     \m___m__|_|
#
#
# ** Note: $finish    : C:/Users/P76131474/Desktop/DIC_HW/HW2_LCD_Controller/file/testfixture.sv(171)
#    Time: 1315 ns  Iteration: 0  Instance: /testfixture
```

Pattern 2

```
# All data have been generated successfully!
#
#                    ////////////////////////////
#                    /                          /        |__||
#                    /  Congratulations !!      /      / 0.0  |
#                    /                          /      /____   |
#                    /  Simulation PASS !!      /     /^ ^ ^ \  |
#                    /                          /     |^ ^ ^ ^ |w|
#                    ////////////////////////////     \m___m__|_|
#
#
# ** Note: $finish    : C:/Users/P76131474/Desktop/DIC_HW/HW2_LCD_Controller/file/testfixture.sv(171)
#    Time: 1535 ns  Iteration: 0  Instance: /testfixture
```

Pattern 3

```
# All data have been generated successfully!
#
#                    ////////////////////////////
#                    /                          /        |__||
#                    /  Congratulations !!      /      / 0.0  |
#                    /                          /      /____   |
#                    /  Simulation PASS !!      /     /^ ^ ^ \  |
#                    /                          /     |^ ^ ^ ^ |w|
#                    ////////////////////////////     \m___m__|_|
#
#
# ** Note: $finish    : C:/Users/P76131474/Desktop/DIC_HW/HW2_LCD_Controller/file/testfixture.sv(171)
#    Time: 1615 ns  Iteration: 0  Instance: /testfixture
```

Pattern 4

```
# All data have been generated successfully!
#
#                    ////////////////////////////
#                    /                          /        |__||
#                    /  Congratulations !!      /      / 0.0  |
#                    /                          /      /____   |
#                    /  Simulation PASS !!      /     /^ ^ ^ \  |
#                    /                          /     |^ ^ ^ ^ |w|
#                    ////////////////////////////     \m___m__|_|
#
#
# ** Note: $finish    : C:/Users/P76131474/Desktop/DIC_HW/HW2_LCD_Controller/file/testfixture.sv(171)
#    Time: 1695 ns  Iteration: 0  Instance: /testfixture
```

LCD_CTRL Finite-State Machine Design:
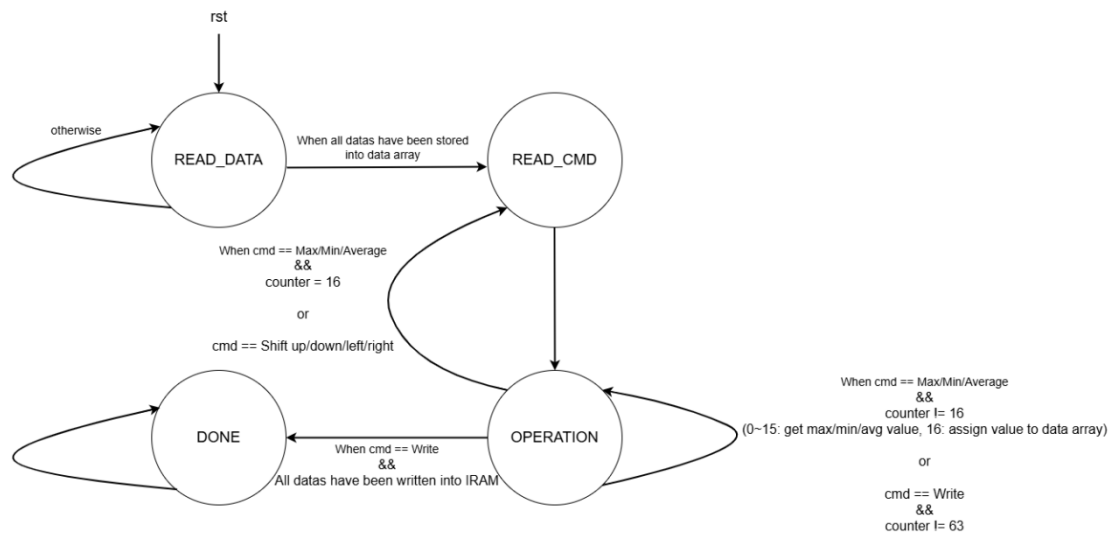
READ_DATA：把所有在 IROM 裡面的資料全部讀進宣告的 data array 裡面，讀完後會進入下一個 state。

READ_CMD：讀取 cmd，1 clock 之後進入下一個 state。

OPERATION：根據 cmd 會做不同的事情。

　　如果 cmd 是 Shift up/down/left/right，則移動點座標後結束，回到 READ_CMD state 讀取下一個指令；

　　如果 cmd 是 Max/Min/Average，則會先找到最大/最小/平均值，再將找到的值存進 data array 裡面後結束，回到 READ_CMD state 讀取下一個指令；

　　如果 cmd 是 Write，則會把 data array 裡面的所有資料寫進 IRAM 後結束，進入 DONE state。

DONE：把 done 訊號設為 1。