Lab 9: VGA Display

1 VGA displaying functions.

1.1 Inputs of the VGA controller are clk, reset, en and outputs of the VGA controller are hsync, vsync, vga\_red[3:0], vga\_green[3:0], vga\_blue[3:0].

1.2 At the beginning or when reset (button) is pressed, the VGA display shows the image (e.g. amumu.jpg). The VGA image stay still until en (button) is pressed.

1.3 Pressing odd times en button to start/resume scrolling. Pressing even times en button to pause scrolling. Counter for en press is reset to zero when reset is pressed.

**Design Specification**

IO輸出入設定

輸入: clk(1 bit), rst(1 bit), rst\_pb(1 bit), en\_pb (1 bit)

輸出: vga\_red(4 bits), vga\_blue(4 bits), vga\_green(4 bits), h\_sync(1 bit), v\_sync(1 bit)

**Block diagram**

**Design Implementation**

**Logic diagram**

**Pin assignment**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IO | clk | rst | rst\_pb | en\_pb |
| Pin | W5 | R2 | T17 | W19 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IO | vga\_red[3] | vga\_red[2] | vga\_red[1] | vga\_red[0] |
| Pin | N19 | J19 | H19 | G19 |
| IO | vga\_blue[3] | vga\_blue [2] | vga\_blue [1] | vga\_blue [0] |
| Pin | J18 | K18 | L18 | N18 |
| IO | vga\_green [3] | vga\_green [2] | vga\_green [1] | vga\_green[0] |
| Pin | D17 | G17 | H17 | J17 |

**Discussion**

結果如我預期所想，基本上可以達到題目要求的scrolling 的效果。但是我vga的rgb顏色順序好像用錯了(藍色綠色順序顛倒)，導致出來的圖片和原本圖片有所差異。不過我想說該小題只要做到scrolling的效果，便沒有特別回去修改了

**Conclusion**

在這一小節裡，我學到了

* Vga的操作與使用

第一次接觸vga使用，感覺有點複雜。雖然原理很直觀，但實際處理時卻感到非常複雜。且同時我們也要處理記憶體的優化，導致我在實作過程中碰到許多困難。但還好老師有提供範例程式碼，讓我得以慢慢摸清楚如何寫vga。