# *LAB - 9*

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# Lab: Design a *Traffic Light System*



# Traffic Light System (1/2)

- Please design a traffic light system by using the following components:
  - 1 Seven-Segment Displays
  - 1 LED Dot Matrix Display
  - 1 reset button

# Traffic Light System (2/2)

- Seven-Segment Displays:
  - Count up from 1 to 15 when the light is green
  - Count up from 1 to 5 when the light is yellow
  - Count up from 1 to 10 when the light is red
- LED Dot Matrix Display:
  - Show image 1 when the light is green
  - Show image 2 when the light is yellow
  - Show image 3 when the light is red

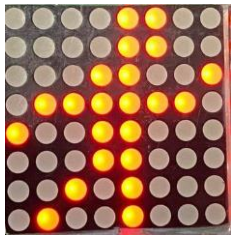


image1

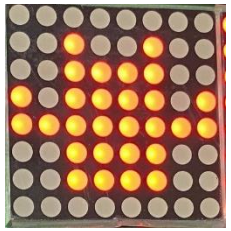


image 2

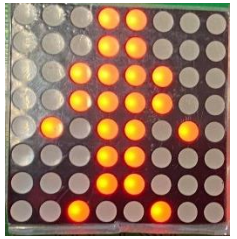
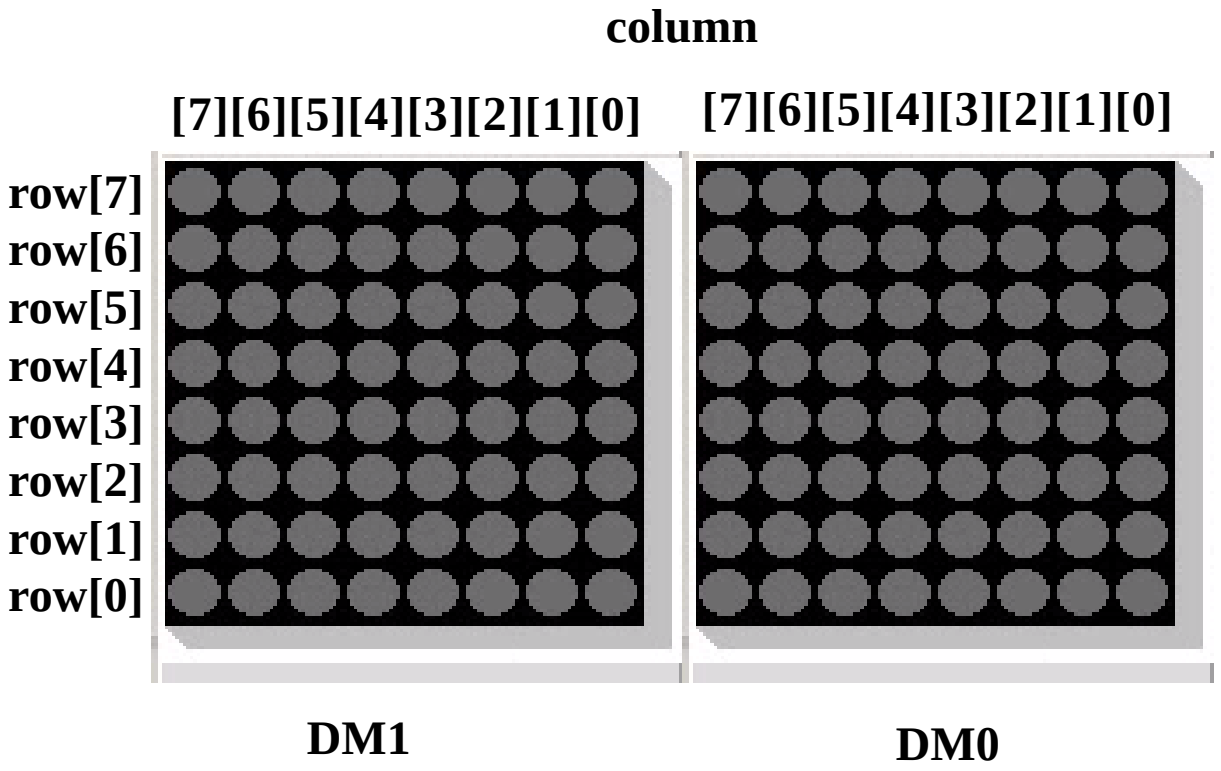


image 3

- Reset button:
  - Reset the system to the initial state – Set light to green, display 1 on Seven-Segment Displays, and show image 1.

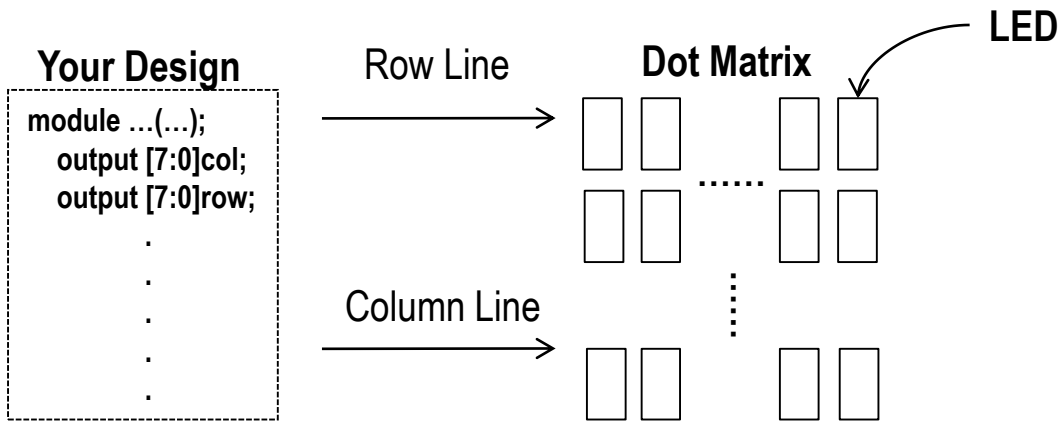
# LED Dot Matrix Display (1/4)

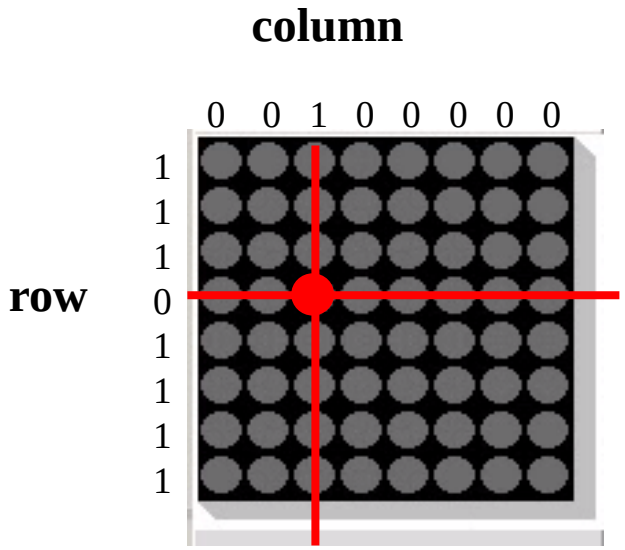
- **In DE0-CV external board**



# LED Dot Matrix Display (2/4)

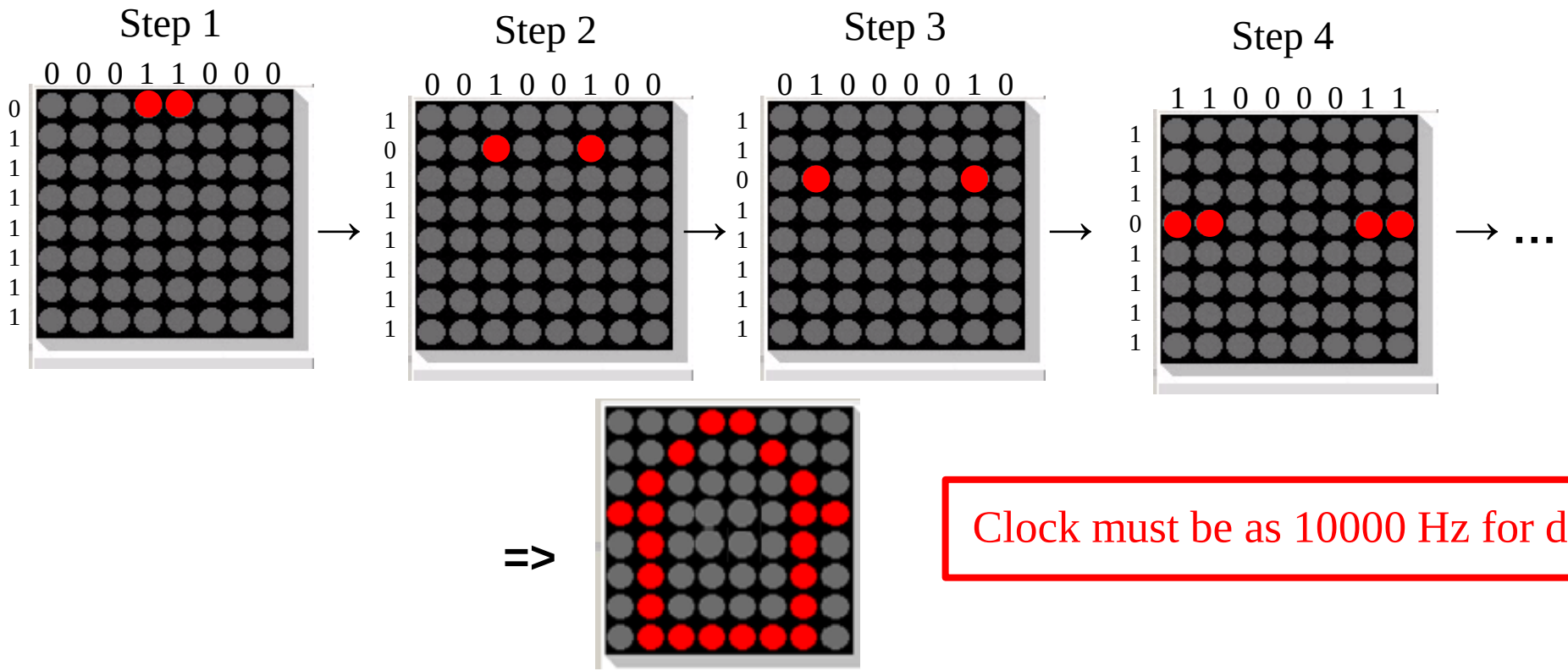
- The dot matrix is controlled by 8 column lines and 8 row lines.
- When the signal of column is 1 and the row is 0, the dot will be turned on.



# LED Dot Matrix Display (3/4)

- Scan the rows each by each frequently and control the column lines,  thus the image will be shown due to **Persistence of vision.**




Clock must be as 10000 Hz for display !!!

# LED Dot Matrix Display (4/4)

- **The example for dot matrix control**

```
always@ (posedge clk_div or negedge rst ) begin
        if (~rst) begin
            dot_row <= 8'b0;
            dot_col <= 8'b0;
            row_count <= 0;
        end
        else begin
            row_count <= row_count + 1;
            case (row_count)
                3'd0: dot_row <= 8'b01111111;
                3'd1: dot_row <= 8'b10111111;
                3'd2: dot_row <= 8'b11011111;
                3'd3: dot_row <= 8'b11101111;
                3'd4: dot_row <= 8'b11110111;
                3'd5: dot_row <= 8'b11111011;
                3'd6: dot_row <= 8'b11111101;
                3'd7: dot_row <= 8'b11111110;
            endcase
            case (row_count)
                /*
                    design col signals here
                */
            endcase

        end
    end
```