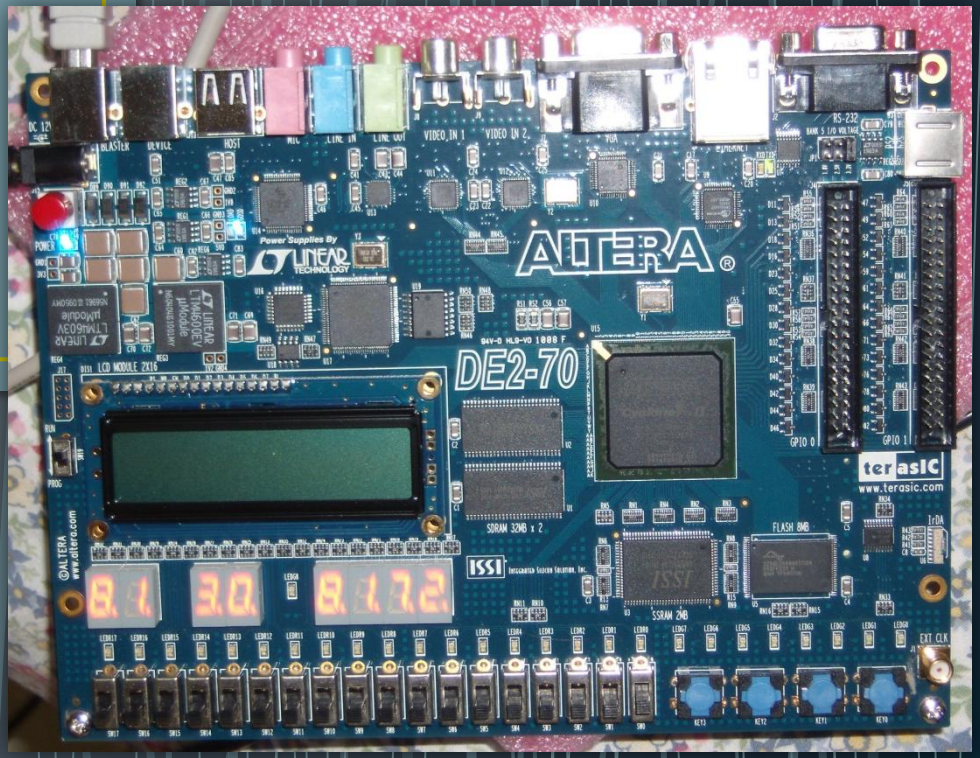
Tracking an object by color properties

-by Amit Patel
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ECE 641 Term Project
Advisor: Prof. Torun Mustafa



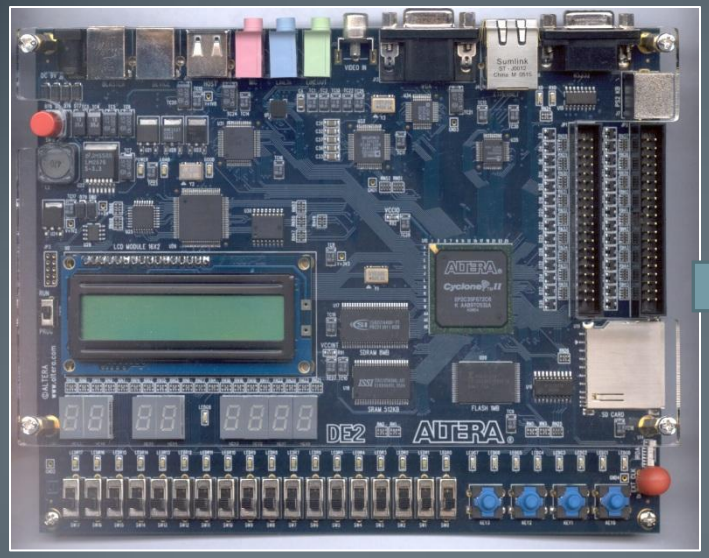
ABOUT THE PROJECT

Objective

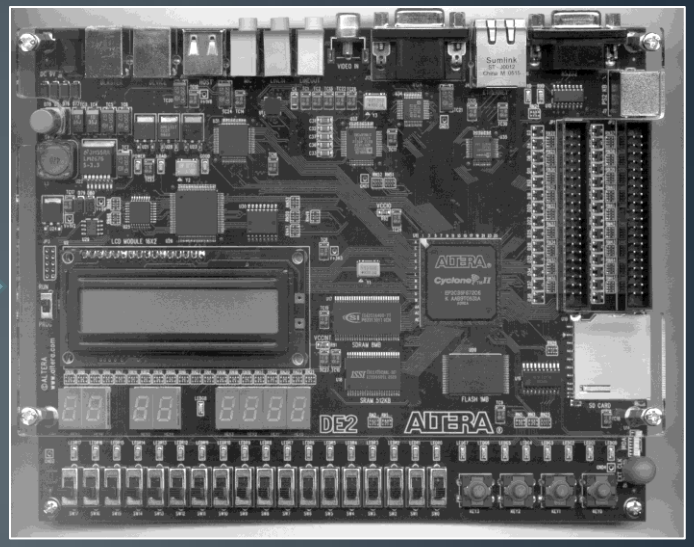
To locate an object within an Image using its color properties

Display the coordinates on the 7 segment LCD screen on Demo Board

DESIGN STEPS: PREPROSSESING

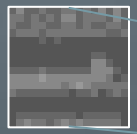


Original RGB Image: 1643×1293

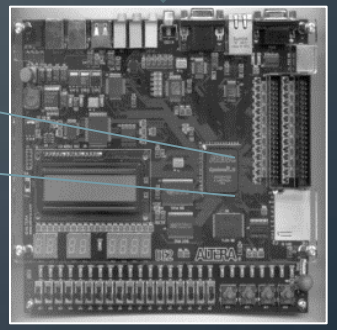


Gray scale Image: 1643×1293

Preprocessing in MATLAB



Cropped Image: 16×16



Resized Image: 256×256

Images are not to the scale

DESIGN STEPS: APPROACH

- Import pixel values of Complete Resized Image to 1st MIF file for 1st Port 1 RAM
- Import pixel values of Cropped Image to 2nd MIF file for 2nd Port 1 RAM
- Look for best match for Cropped Image within the Complete Image
- Display the coordinates of best match

DESIGN STEPS: FPGA MIF file limitation

Problem

MIF file for RAM initialization is a 1-D array while the image is 2-D array

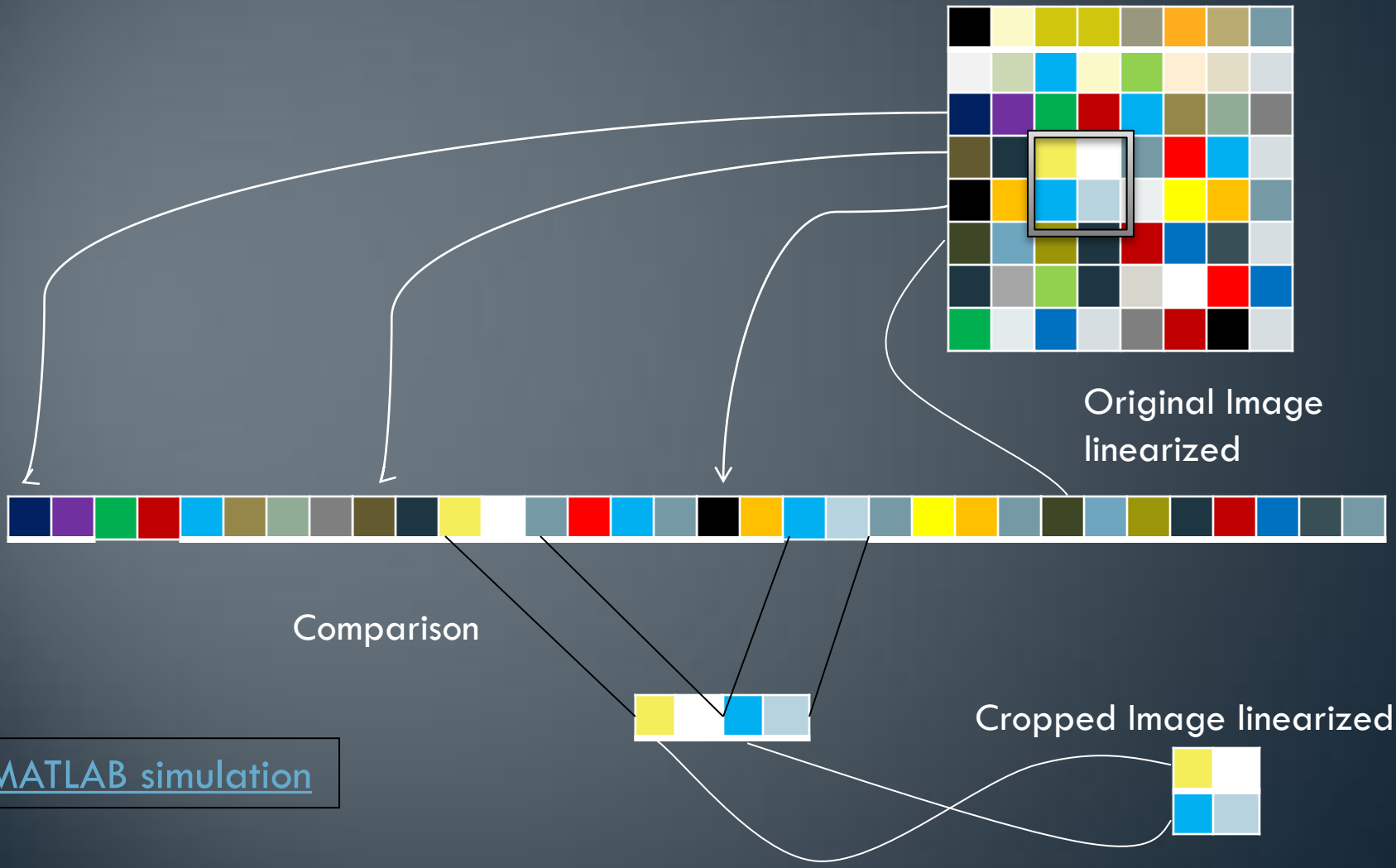
Solution

Convert image to 1-D array



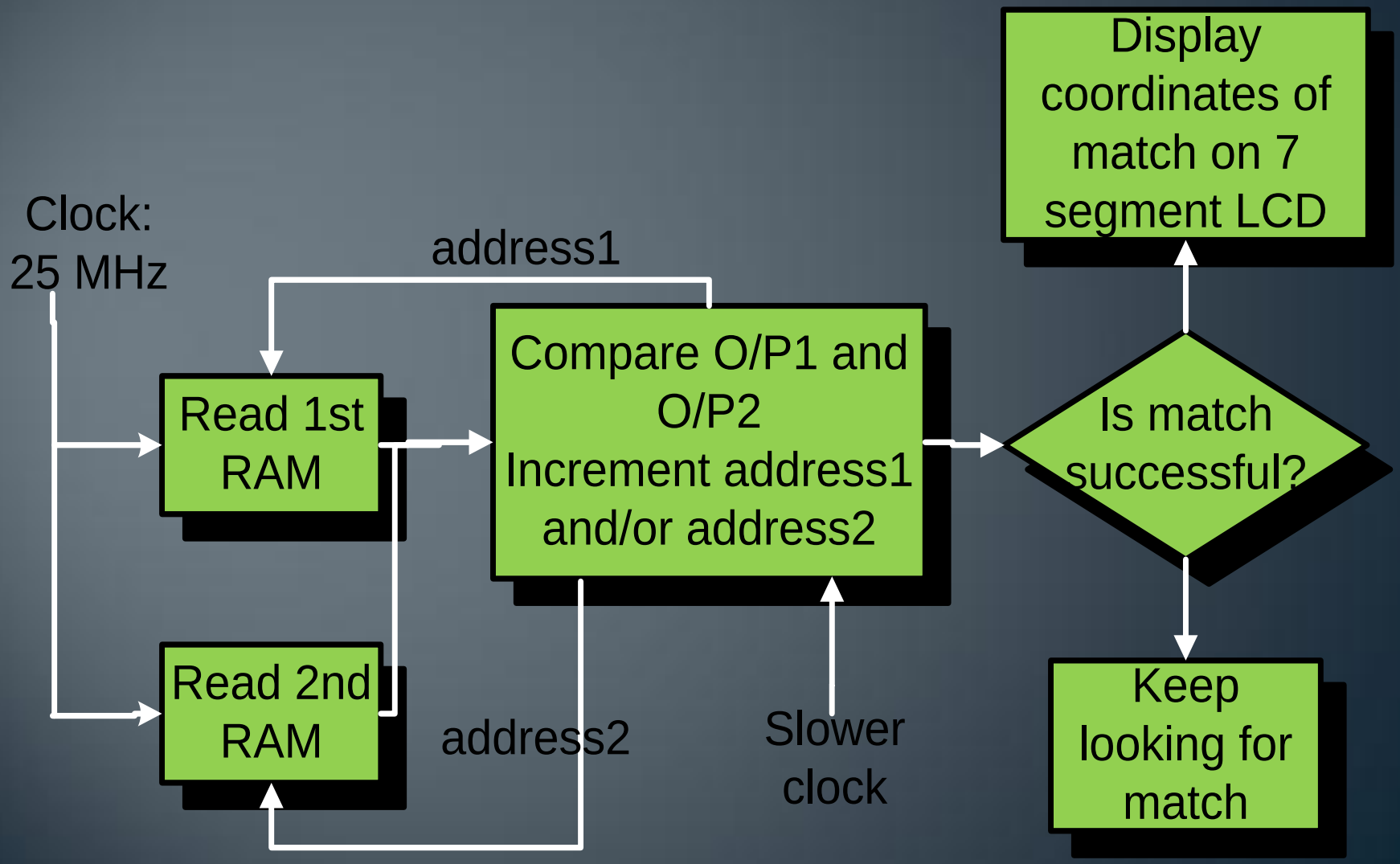
Converting 2-D Image to 1-D Image

DESIGN STEPS: Image Comparison Algorithm

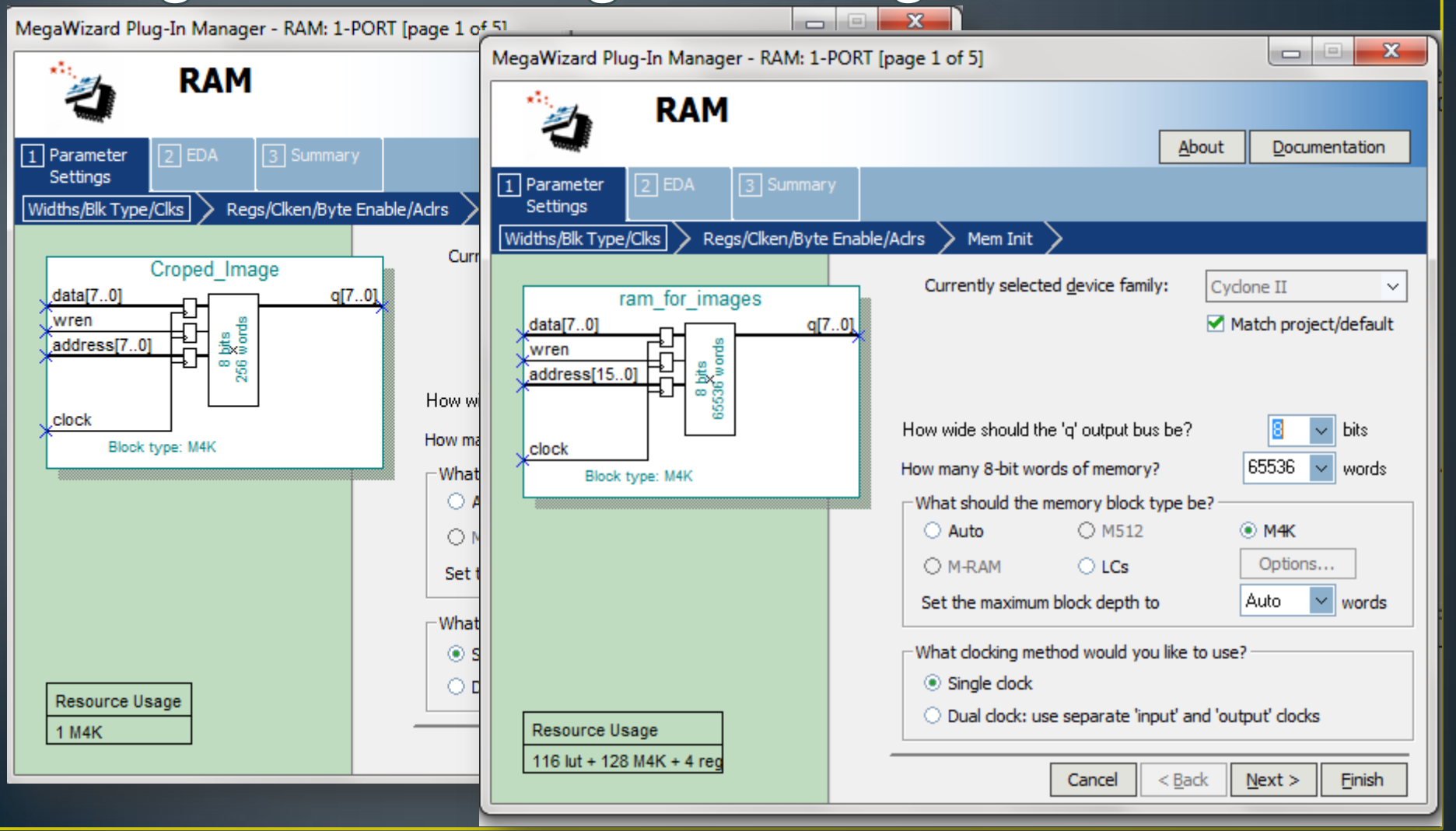


MATLAB simulation

VHDL code flow chart



RAM structure Implementation: MegaWizard Plugin Manager



Using Segment Displays

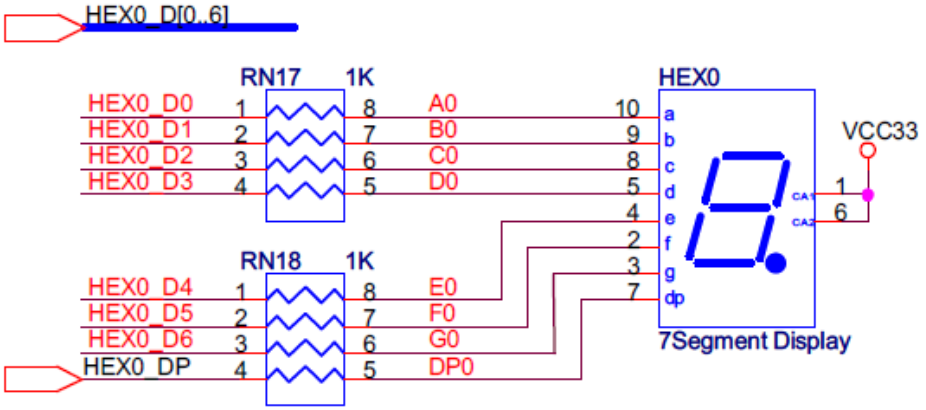


Figure 5.6. Schematic diagram of the 7-segment displays.

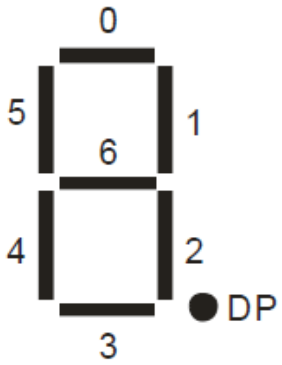


Figure 5.7. Position and index of each segment in a 7-segment display.

PIN PLANNAR Assignments

Quartus II - C:/Users/Amit/Desktop/My drive/amits journals/Spring 2011/ECE641/term project/My proje

File Edit View Processing Tools Window

Named: Edit:

	Node Name	Direction	Location	I/O Bank
1	clk_28	Input	PIN_E16	4
2	disp_coord_sp1[6]	Output	PIN_M6	2
3	disp_coord_sp1[5]	Output	PIN_M7	2
4	disp_coord_sp1[4]	Output	PIN_M8	2
5	disp_coord_sp1[3]	Output	PIN_N7	2
6	disp_coord_sp1[2]	Output	PIN_N10	2
7	disp_coord_sp1[1]	Output	PIN_P4	2
8	disp_coord_sp1[0]	Output	PIN_P6	2
9	disp_coord_sp2[6]	Output	PIN_G1	2
10	disp_coord_sp2[5]	Output	PIN_H3	2
11	disp_coord_sp2[4]	Output	PIN_H2	2
12	disp_coord_sp2[3]	Output	PIN_H1	2
13	disp_coord_sp2[2]	Output	PIN_J2	2
14	disp_coord_sp2[1]	Output	PIN_J1	2
15	disp_coord_sp2[0]	Output	PIN_K3	2
16	disp_coord_x0[6]	Output	PIN_AD12	8
17	disp_coord_x0[5]	Output	PIN_AD11	8
18	disp_coord_x0[4]	Output	PIN_AF10	8
19	disp_coord_x0[3]	Output	PIN_AD10	8
20	disp_coord_x0[2]	Output	PIN_AH9	8
21	disp_coord_x0[1]	Output	PIN_AF9	8
22	disp_coord_x0[0]	Output	PIN_AE8	8
23	disp_coord_x1[6]	Output	PIN_AD17	7
24	disp_coord_x1[5]	Output	PIN_AF17	7
25	disp_coord_x1[4]	Output	PIN_AE17	7
26	disp_coord_x1[3]	Output	PIN_AG16	7
27	disp_coord_x1[2]	Output	PIN_AF16	7
28	disp_coord_x1[1]	Output	PIN_AE16	7
29	disp_coord_x1[0]	Output	PIN_AG13	8
30	disp_coord_x2[6]	Output	PIN_AE19	7
31	disp_coord_x2[5]	Output	PIN_AB19	7
32	disp_coord_x2[4]	Output	PIN_AB18	7

Pins

Quartus II - C:/Users/Amit/Desktop/My drive/amits journals/Spring 2011/ECE641/term project/My pro

File Edit View Processing Tools Window

Named: Edit:

	Node Name	Direction	Location	I/O Bank
31	disp_coord_x2[5]	Output	PIN_AB19	7
32	disp_coord_x2[4]	Output	PIN_AB18	7
33	disp_coord_x2[3]	Output	PIN_AG4	8
34	disp_coord_x2[2]	Output	PIN_AH5	8
35	disp_coord_x2[1]	Output	PIN_AF7	8
36	disp_coord_x2[0]	Output	PIN_AE7	8
37	disp_coord_y0[6]	Output	PIN_M2	2
38	disp_coord_y0[5]	Output	PIN_M1	2
39	disp_coord_y0[4]	Output	PIN_N3	2
40	disp_coord_y0[3]	Output	PIN_N2	2
41	disp_coord_y0[2]	Output	PIN_P3	2
42	disp_coord_y0[1]	Output	PIN_P2	2
43	disp_coord_y0[0]	Output	PIN_P1	2
44	disp_coord_y1[6]	Output	PIN_K5	2
45	disp_coord_y1[5]	Output	PIN_K4	2
46	disp_coord_y1[4]	Output	PIN_K1	2
47	disp_coord_y1[3]	Output	PIN_L3	2
48	disp_coord_y1[2]	Output	PIN_L2	2
49	disp_coord_y1[1]	Output	PIN_L1	2
50	disp_coord_y1[0]	Output	PIN_M3	2
51	disp_coord_y2[6]	Output	PIN_E4	2
52	disp_coord_y2[5]	Output	PIN_F4	2
53	disp_coord_y2[4]	Output	PIN_G4	2
54	disp_coord_y2[3]	Output	PIN_H8	2
55	disp_coord_y2[2]	Output	PIN_H7	2
56	disp_coord_y2[1]	Output	PIN_H4	2
57	disp_coord_y2[0]	Output	PIN_H6	2
58	memory_input1[7]	Input		
59	memory_input1[6]	Input		
60	memory_input1[5]	Input		

FPGA Demo

- Demo_Amit_Project

POSSIBLE APPLICATIONS

- Medical Imaging
- On road Speed Ticket camera
- Micro air vehicle horizon detection
- Other real time object positioning related application

Reference

- "DE2_70_User_manual_v108." 2009. Web. 2 Mar. 2011. <http://www.eecs.berkeley.edu/~derenzo/DE2_70_User_manual_v108.pdf>.

- GRECO, JAMES. "Parallel Image Processing and Computer Vision Architecture." (2005). *Http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.87.4883&rep=rep1&type=pdf*. Web. 2 Mar. 2011.