B. Tech - Computer and Communication Engineering

Department of Electronics and Communication Engineering

Amrita School of Engineering, Coimbatore – 641112

19CCE201 – Microcontrollers and Interfacing Techniques

Class and Semester: B. Tech CCE, Third semester

Group 11: Interfacing Traffic Lights using lpc2148

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Abstract:

Traffic lights, which may also be known as stoplights, traffic lamps, traffic signals, signal lights, robots, or semaphores, are signaling devices positioned at road intersections, pedestrian crossings, and other locations to control competing flows of traffic.

Traffic lights alternate the right of way of road users by displaying lights of a standard color (red, yellow/amber, and green), using a universal color code (and a precise sequence to enable comprehension by those who are color blind.

Introduction:

The LPC2148 microcontroller is designed by Philips (NXP Semiconductor) with several in-built features & peripherals. Due to these reasons, it will make a more reliable as well as an efficient option for an application developer. LPC2148 is a 16-bit or 32-bit microcontroller based on the ARM7 family. The LPC2148 microcontroller has 512-kB on-chip FLASH memory as well as 32-kB on-chip SRAM. Also, this microcontroller includes inherent support up to 2kB finish point USB RAM. This memory is well matched for all the microcontroller applications.

The Traffic light controller section consists of 12 LEDs arranged in 4 Lanes in LPC2148 Primer Board. Each lane has Go(Green), Listen(Yellow) and Stop(Red) LED is being placed.

Algorithm:

1. Configure P0.0 to 0.15 as GPIO

PINSEL0 = 0X00000000

2. Configure P0.0 to P0.15 as output ports

IO0DIR = 0X0000FFF0

[The simulation starts with the green light at the East and red lights in the other directions]

WHILE(1)

3. The green light on the EAST, connected to P0.12, and all the other red lights are turned on

IO0SET=0x00003090

4. The green light is turned off

IO0CLR=0x00001000

5. The yellow light is turned on in the east direction, while the red lights continue to be unaffected

IO0SET=0x00002890

6. The yellow light is turned off and the green light on the SOUTH, connected to P0.15, and all the other red lights are turned on

IO0SET=0x00008490

7. The green light is turned off

IO0CLR=0x00008000

8. The yellow light is turned on in the south direction, while the red lights continue to be unaffected

IO0SET=0x00004490

9. The yellow light is turned off and the green light on the WEST, connected to P0.6, and all the other red lights are turned on

IO0SET=0x000024C0

10. The green light is turned off

IO0CLR=0x00000040

11. The yellow light is turned on in the west direction, while the red lights continue to be unaffected

IO0SET=0x000024A0

12. The yellow light is turned off and the green light on the NORTH, connected to P0.9, and all the other red lights are turned on

IO0SET=0x00002610

13. The green light is turned off

IO0CLR=0x00000200

14. The yellow light is turned on in the north direction, while the red lights continue to be unaffected

IO0SET=0x00002510

15. The yellow light is turned off.

Note: Delays are included to ensure the proper functioning of traffic lights.

Program code:

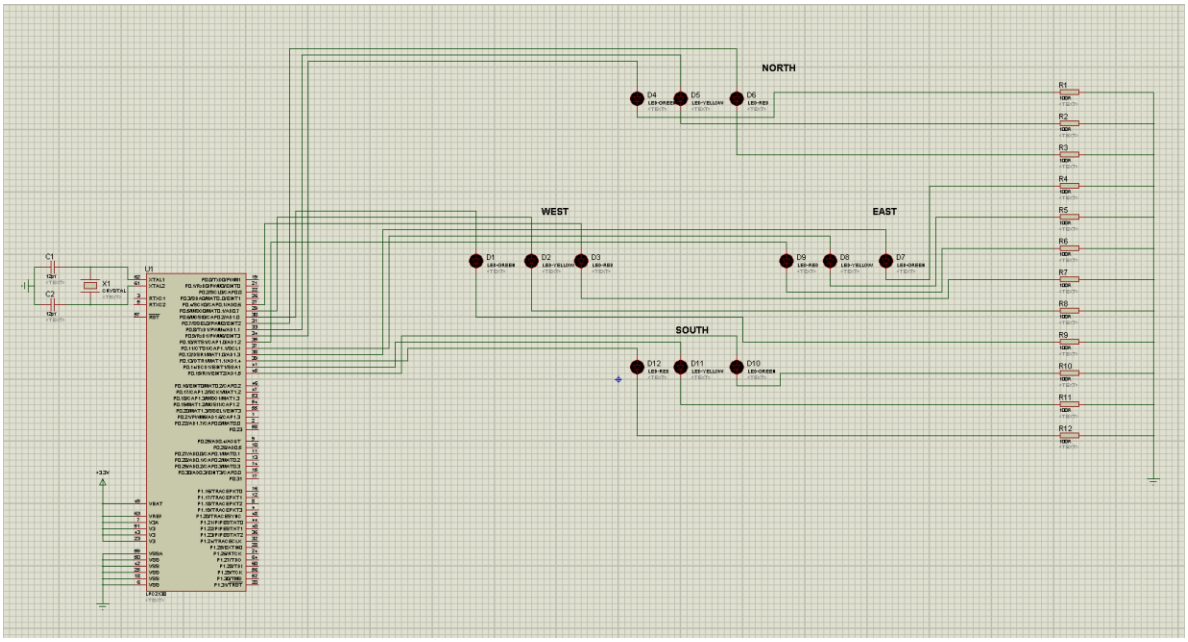
```
#include <LPC214X.H>


void Delay(int);                //Delay Routine
```

```
int main()
{
PINSEL0 = 0X00000000; // P0.0 TO P0.15 as GPIO
IO0DIR = 0X0000FFF0; // P0.4 TO P0.15 Configured as Output port.

while(1)            // The program runs until it is stopped
{

IO0SET=0x00003090;    // D7 [EAST] [PORT 0.12 connected to the
GREEN light and all the other RED light i.e., PORT 0.13,0.7 and
0.4 are turned on]
Delay(500);

IO0CLR=0x00001000;    // will set logic 0, i.e, the green light
is turned off

IO0SET=0x00002890;    // D8 [EAST] [PORT 0.11 connected to the
YELLOW light is turned on and all the other red rights continue
to be on]
Delay(100);

IO0CLR=0x000002890;   // will set logic to 0, i.e, lights are
turned off
Delay(1);

IO0SET=0x00008490;   // D10 [SOUTH] [PORT 0.15 connected to the
GREEN light and all the other RED lights i.e., PORT 0.4, 0.7,
0.10 are turned on]
Delay(500);
```

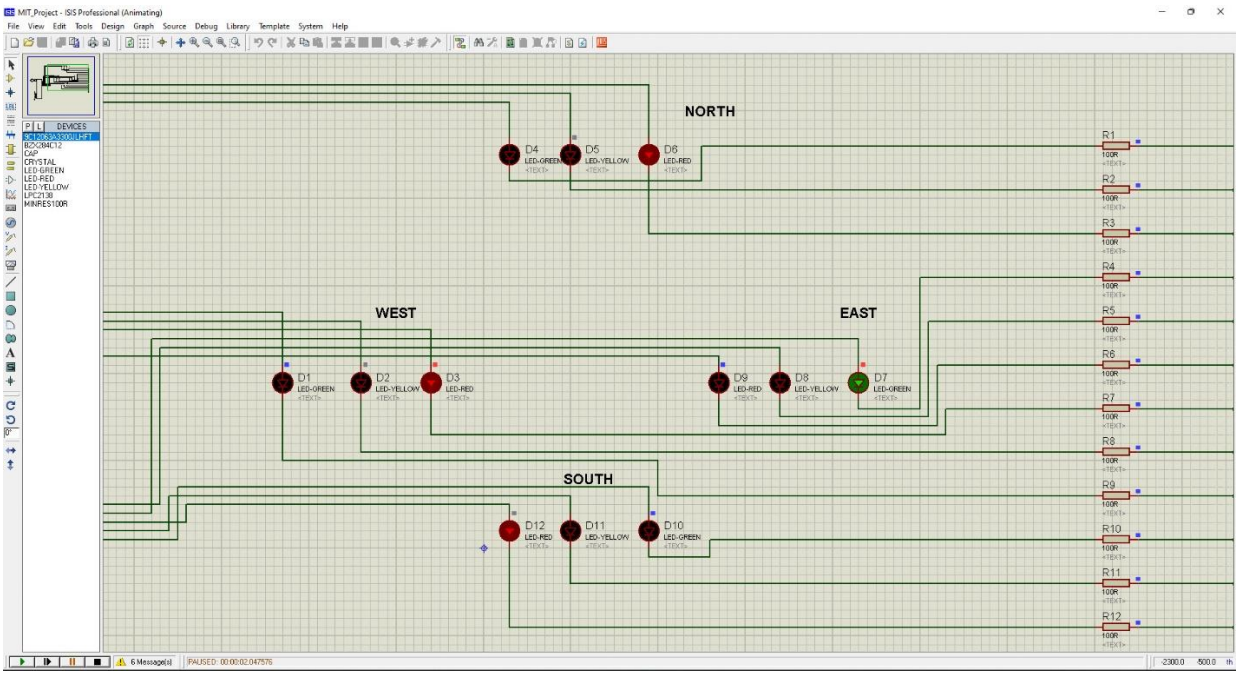
```
IO0CLR=0x00008000;   // will set logic 0, i.e, the green light
is turned off


IO0SET=0x00004490;  // D11 [SOUTH] [PORT 0.14 connected to the
YELLOW light is turned on and all the other red rights continue
to be on]

Delay(100);


IO0CLR=0x00004490;  // (will set logic to 0), i.e, lights are
turned off

Delay(1);


IO0SET=0x000024C0;       // D1 [WEST] GREEN [PORT 0.6 connected
to the GREEN light and all the other RED lights i.e., PORT 0.7,
0.10 and 0.13 are turned on]

Delay(500);


IO0CLR=0x00000040;  // will set logic 0, i.e., the green light
is turned off


IO0SET=0x000024A0;  // D2 [WEST] YELLOW [PORT 0.5 connected to
the YELLOW light is turned on and all the other red rights
continue to be on]

Delay(100);


IO0CLR=0x000024A0;  // (will set logic to 0), i.e, lights are
turned off

Delay(1);


IO0SET=0x00002610;  // D4 [NORTH] GREEN [PORT 0.9 connected to
the GREEN light and all the other RED lights i.e., PORT 0.4,
0.10 and 0.13 are turned on]

Delay(500);
```

```
IO0CLR=0x00000200;  // will set logic 0, i.e., the green light
is turned off



IO0SET=0x00002510;  // D5 [WEST] YELLOW [PORT 0.8 connected to
the YELLOW light is turned on and all the other red rights
continue to be on]
Delay(100);


IO0CLR=0x00002510;  // (will set logic to 0), i.e, lights are
turned off
Delay(1);









}
}



void Delay(int n)        //function for Delay
{
int p,q;


for(p=0;p<n;p++)
{
for(q=0;q<0xFFF0;q++);
}
}
```

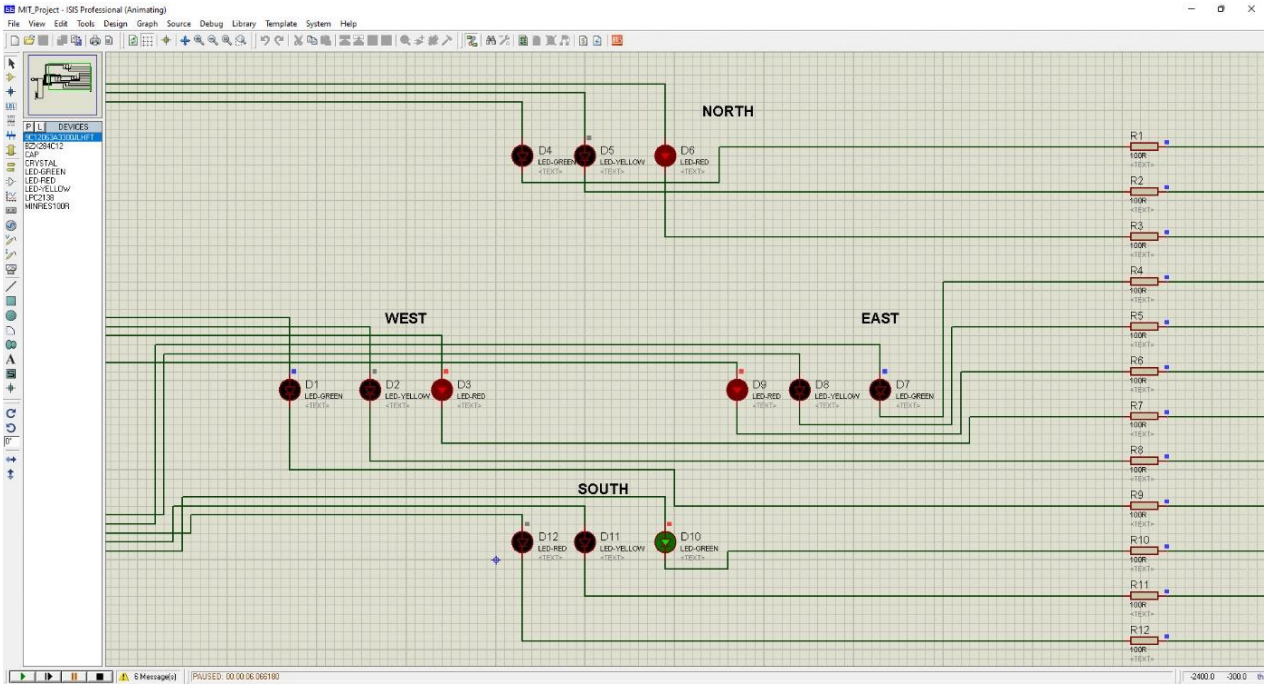
Simulation Results:



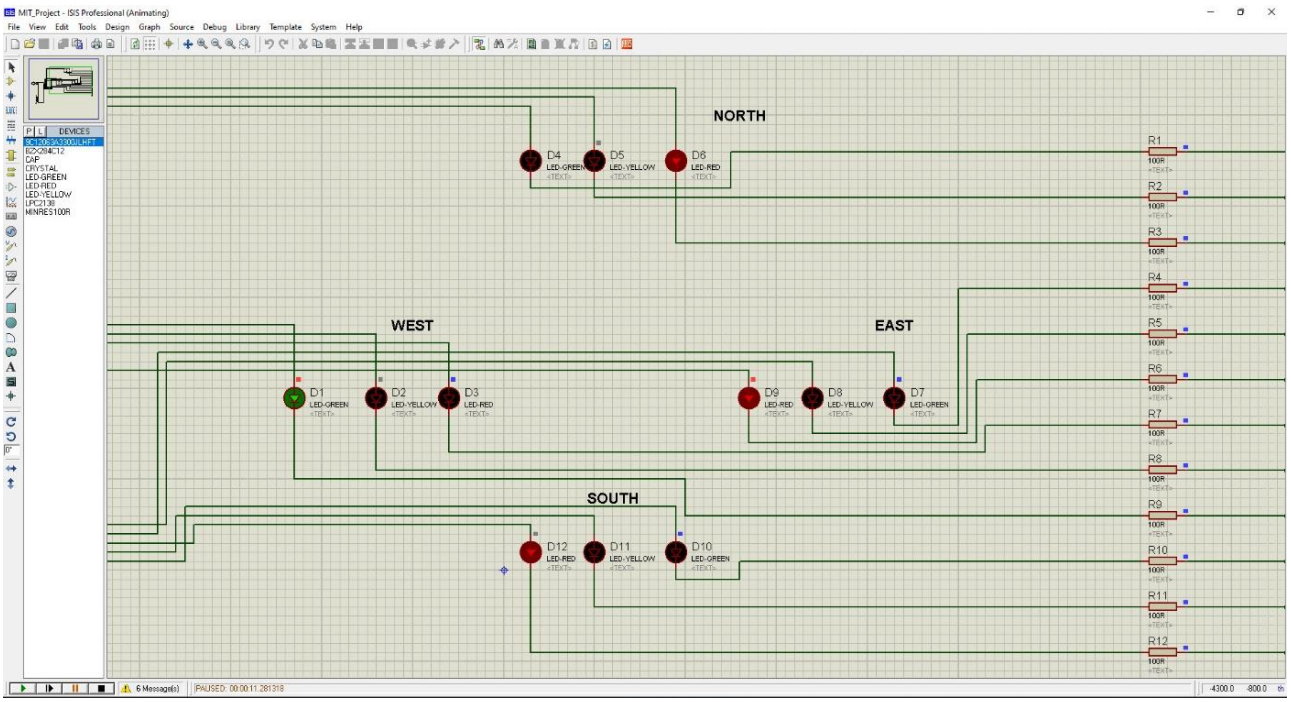
CASE-1:



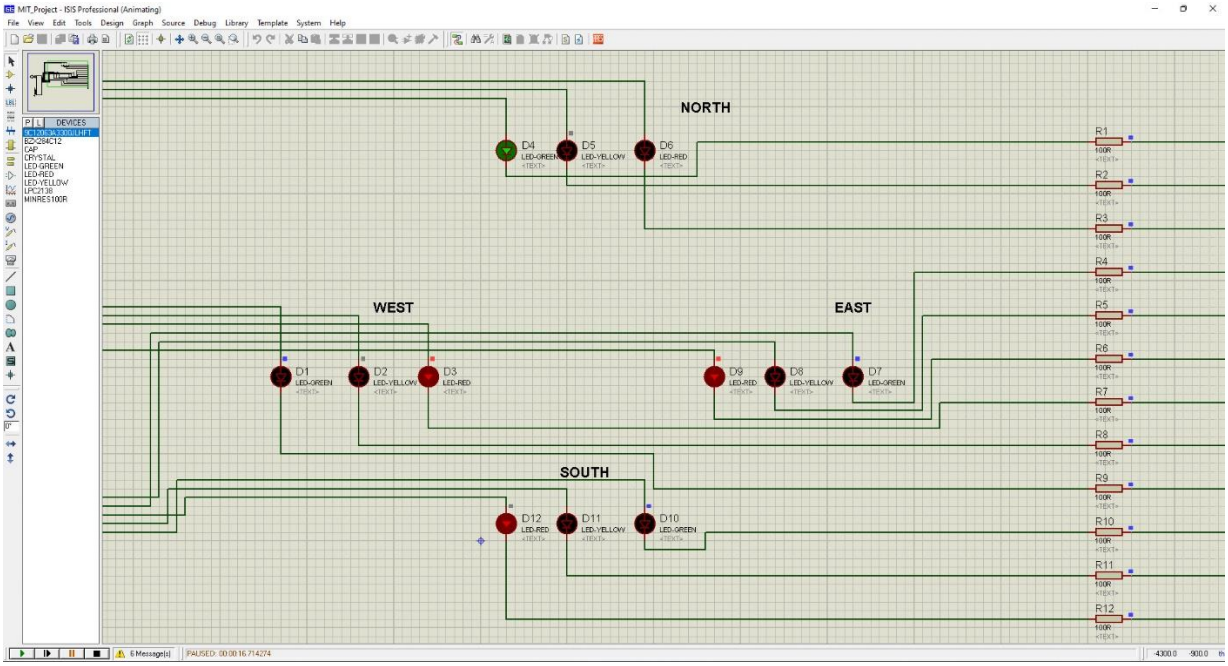
CASE-2:


MIT_Project - ISIS Professional (Animating)
NORTH
WEST
EAST
SOUTH
D1 LED-GREEN
D2 LED-YELLOW
D3 LED-RED
D4 LED-GREEN
D5 LED-YELLOW
D6 LED-RED
D7 LED-GREEN
D8 LED-YELLOW
D9 LED-RED
D10 LED-GREEN
D11 LED-YELLOW
D12 LED-RED
R1 100R
R2 100R
R3 100R
R4 100R
R5 100R
R6 100R
R7 100R
R8 100R
R9 100R
R10 100R
R11 100R
R12 100R

CASE-3:


MIT_Project - ISIS Professional (Animating)
NORTH
WEST
EAST
SOUTH
D1 LED-GREEN
D2 LED-YELLOW
D3 LED-RED
D4 LED-GREEN
D5 LED-YELLOW
D6 LED-RED
D7 LED-GREEN
D8 LED-YELLOW
D9 LED-RED
D10 LED-GREEN
D11 LED-YELLOW
D12 LED-RED
R1 100R
R2 100R
R3 100R
R4 100R
R5 100R
R6 100R
R7 100R
R8 100R
R9 100R
R10 100R
R11 100R
R12 100R

CASE-4:


MIT_Project - ISIS Professional (Animating)
File View Edit Tools Design Graph Source Debug Library Template System Help
NORTH
WEST
EAST
SOUTH
D1 LED-GREEN
D2 LED-YELLOW
D3 LED-RED
D4 LED-GREEN
D5 LED-YELLOW
D6 LED-RED
D7 LED-GREEN
D8 LED-YELLOW
D9 LED-RED
D10 LED-GREEN
D11 LED-YELLOW
D12 LED-RED
R1 100R
R2 100R
R3 100R
R4 100R
R5 100R
R6 100R
R7 100R
R8 100R
R9 100R
R10 100R
R11 100R
R12 100R