

Digital Computer Fundamentals

Course Project


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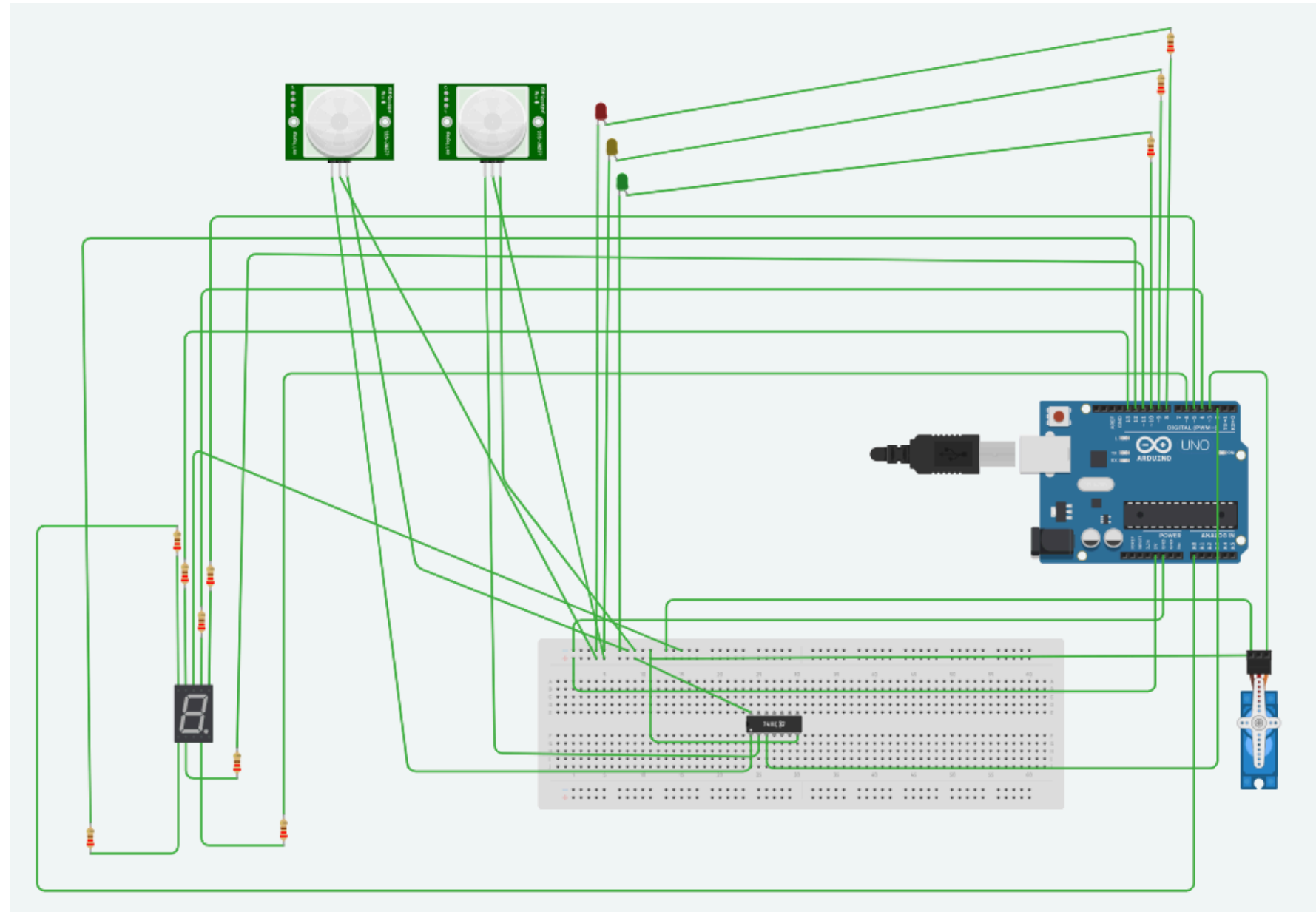
Introduction to the project: This project is about a traffic management system in which we have to use the concepts of digital computer fundamentals. In this system, we are using concepts of OR gate and 7 segment digital display in digital computer fundamentals and using the IR Sensor for sense the vehicles.

Problem Statement: Design a system of Traffic Management system using the concepts of digital computer fundamentals .

Components Used:- OR gate IC, 7 segment digital display, IR sensor, LEDS, Jumper wires, breadboard, servo motor, Aurdino Uno R3, Resistors.



Circuit diagram in Tinkercad



[Tinkercad Circuit Diagram Link](#)

Concepts Used in Project

1) 74HC32 IC :-

- This 74HC32 IC is a 14 pin quad 2 input OR gate. It give high if all or any of input signal is high.
- It consist of 4 OR gate. This IC provide four independent 2 input OR gate with standard pull or pull.
- In this course project we are using this IC for giving the siganl to re, green and yellow LEDs. As it each of them high according to traffic light system. This IC also connected to Aurdino to providing the signal.

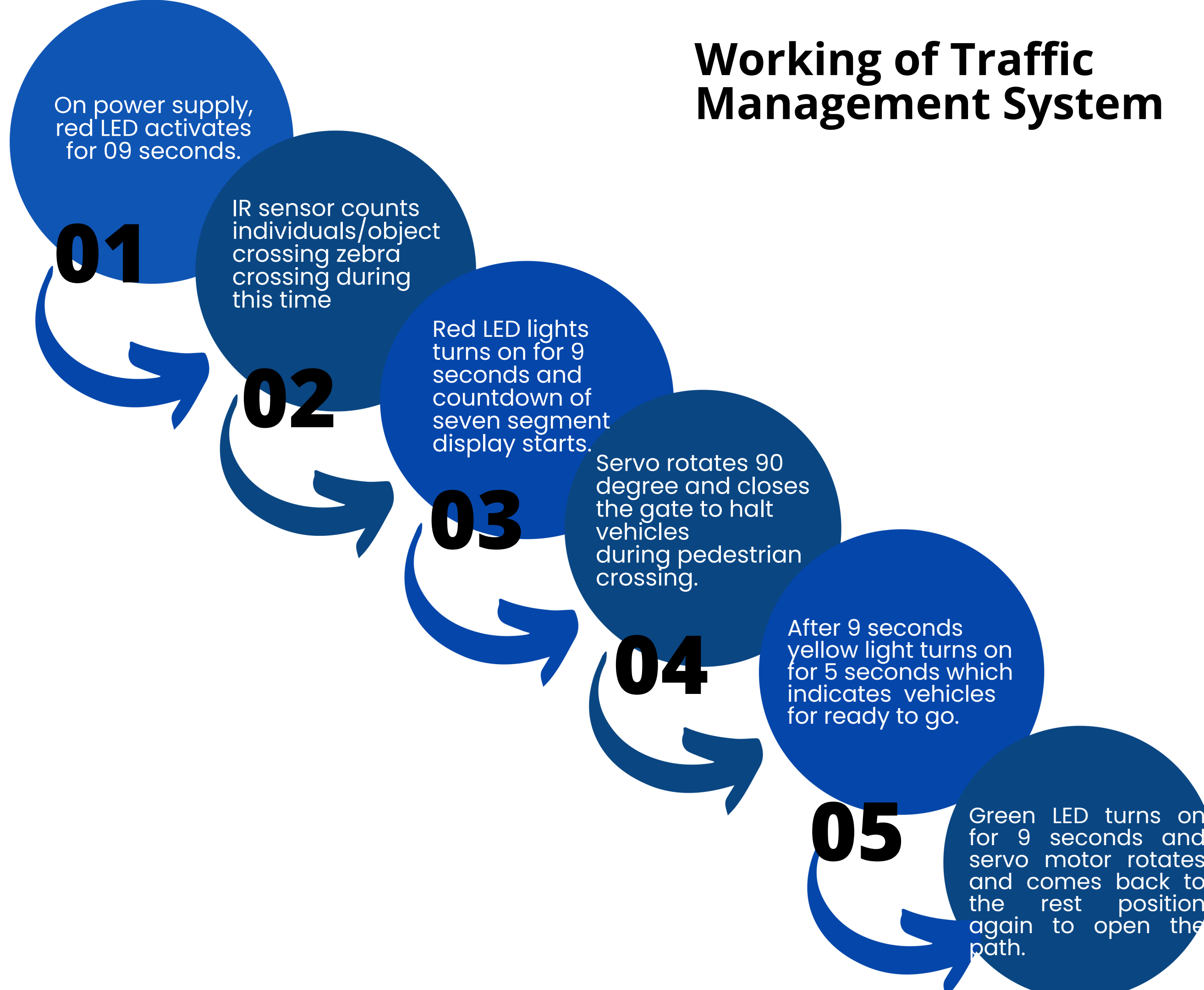
2) 1 digit 7 segment display :-

- A 1-digit 7-segment display is a simple electronic display device used to represent decimal numbers (0-9) by illuminating a combination of seven individual segments arranged in the shape of a figure "8." The segments are labeled A through G and are used to form different numbers by lighting up specific combinations.
- In this project we using this 1 digit 7 segment display to show number between 0 to 9.

3) IR Sensor :-

- An Infrared (IR) sensor is a device that detects infrared radiation emitted by objects in its vicinity. These sensors are widely used for motion detection, distance measurement, and various other applications.
- The emitter is an IR LED and the detector is an IR photodiode. The IR photodiode is sensitive to the IR light emitted by an IR LED. The photo-diode's resistance and output voltage change in proportion to the IR light received. This is the underlying working principle of the IR sensor.

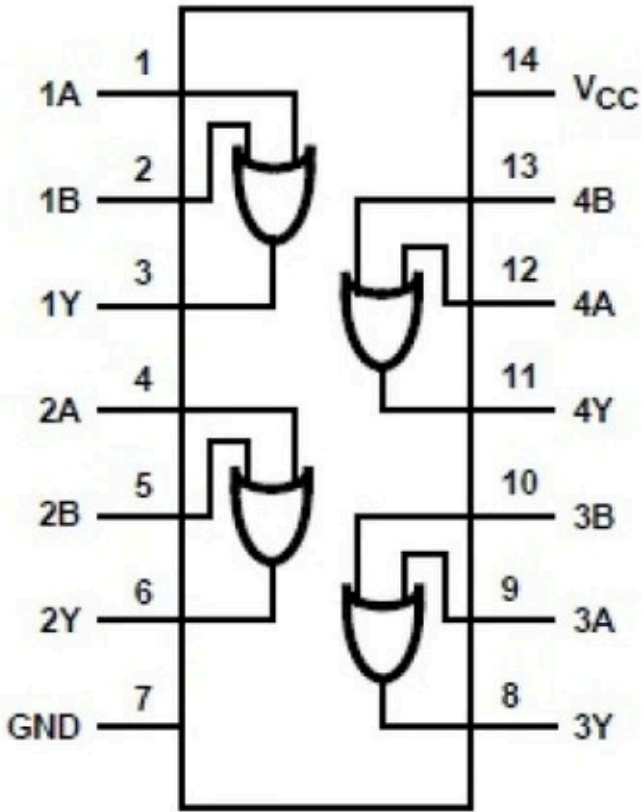
Working of Traffic Management System



Design and simplification of Logic Algebra

Truth table of OR gate

INPUT(A)	INPUT(B)	OUTPUT(A+B)
0	0	0
0	1	1
1	0	1
1	1	1

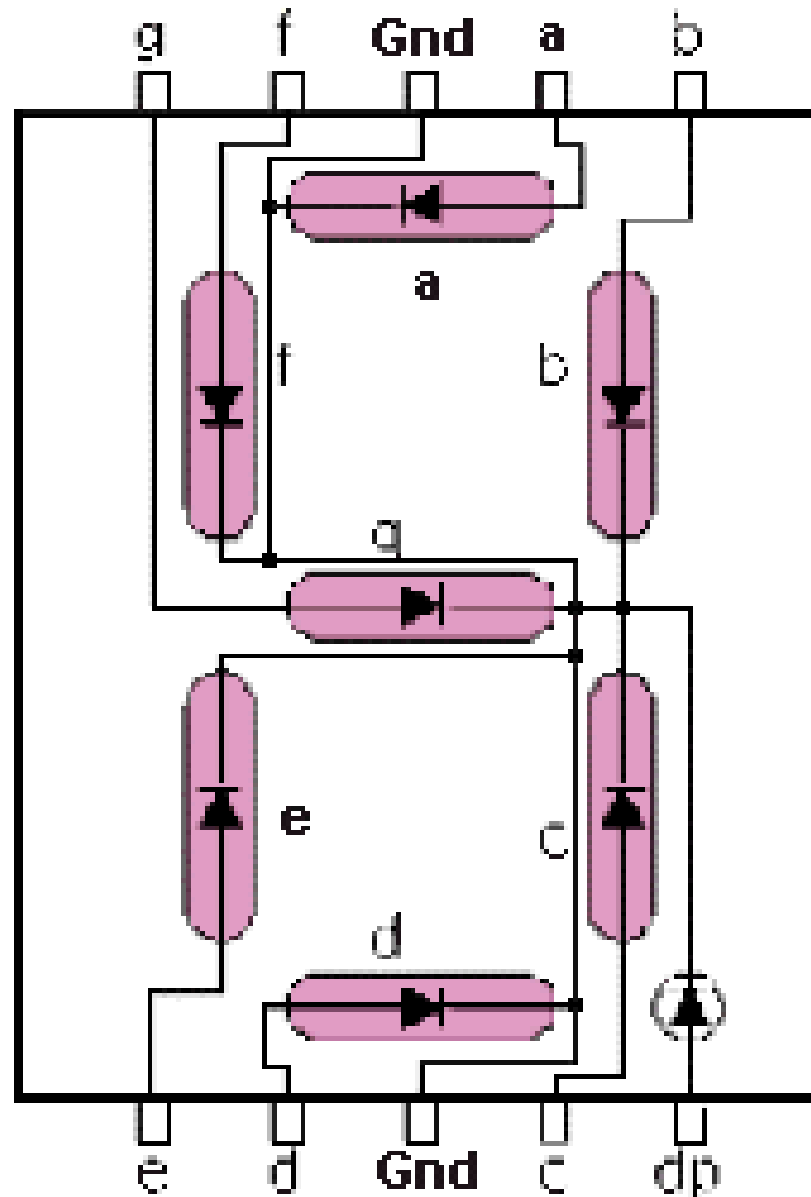


In the IC of OR gate, we use 3 OR gates out of 4 OR gates.

- Start with pin 1A of IC,1A is connected to the 8th digital pin of aurdino.1B is connected to the ground. Then output pin 1Y is connected to one leg of the LED and the other led is connected to the ground.
- Similarly, pin 2A and 2B of IC is connected to the 9th digital pin and ground respectively In OR gate if any input is one then the output is also one, this analogy we use in our traffic light system .
- Red led is high for 09 seconds then yellow led is high for 05 seconds then green led is high for 09 seconds .These all iterative process is controlled by Aurdino and 74HC32 IC.

Truth table ,K map and logic diagram of 1 digit 7 segment display

Common Cathode



Digit	A	B	C	D	a	b	c	d	e	f	g
0	0	0	0	0	0	0	0	0	0	0	1
1	0	0	0	1	1	0	0	1	1	1	1
2	0	0	1	0	0	0	1	0	0	1	0
3	0	0	1	1	0	0	0	0	1	1	0
4	0	1	0	0	1	0	0	1	1	0	0
5	0	1	0	1	0	1	0	0	1	0	0
6	0	1	1	0	0	1	0	0	0	0	0
7	0	1	1	1	0	0	0	1	1	1	1
8	1	0	0	0	0	0	0	0	0	0	0
9	1	0	0	1	0	0	0	0	1	0	0

Truth table ,K map and logic diagram of 1 digit 7 segment display

AB \ CD	00	01	11	10
00	1	0	1	1
01	0	1	1	1
11	x	x	x	x
10	1	1	x	x

$$a = A + C + BD + \overline{B}\overline{D}$$

AB \ CD	00	01	11	10
00	1	0	1	1
01	1	0	1	0
11	x	x	x	x
10	1	1	x	x

$$b = \overline{B} + \overline{C}\overline{D} + CD$$

AB \ CD	00	01	11	10
00	1	1	1	0
01	1	1	1	1
11	x	x	x	x
10	1	1	x	x

$$c = B + \overline{C} + D$$

AB \ CD	00	01	11	10
00	1	0	1	1
01	0	1	0	1
11	x	x	x	x
10	1	1	x	x

$$d = \overline{B}\overline{D} + C\overline{D} + B\overline{C}D + \overline{B}C + A$$

AB \ CD	00	01	11	10
00	1	0	0	1
01	0	0	0	1
11	x	x	x	x
10	1	0	x	x

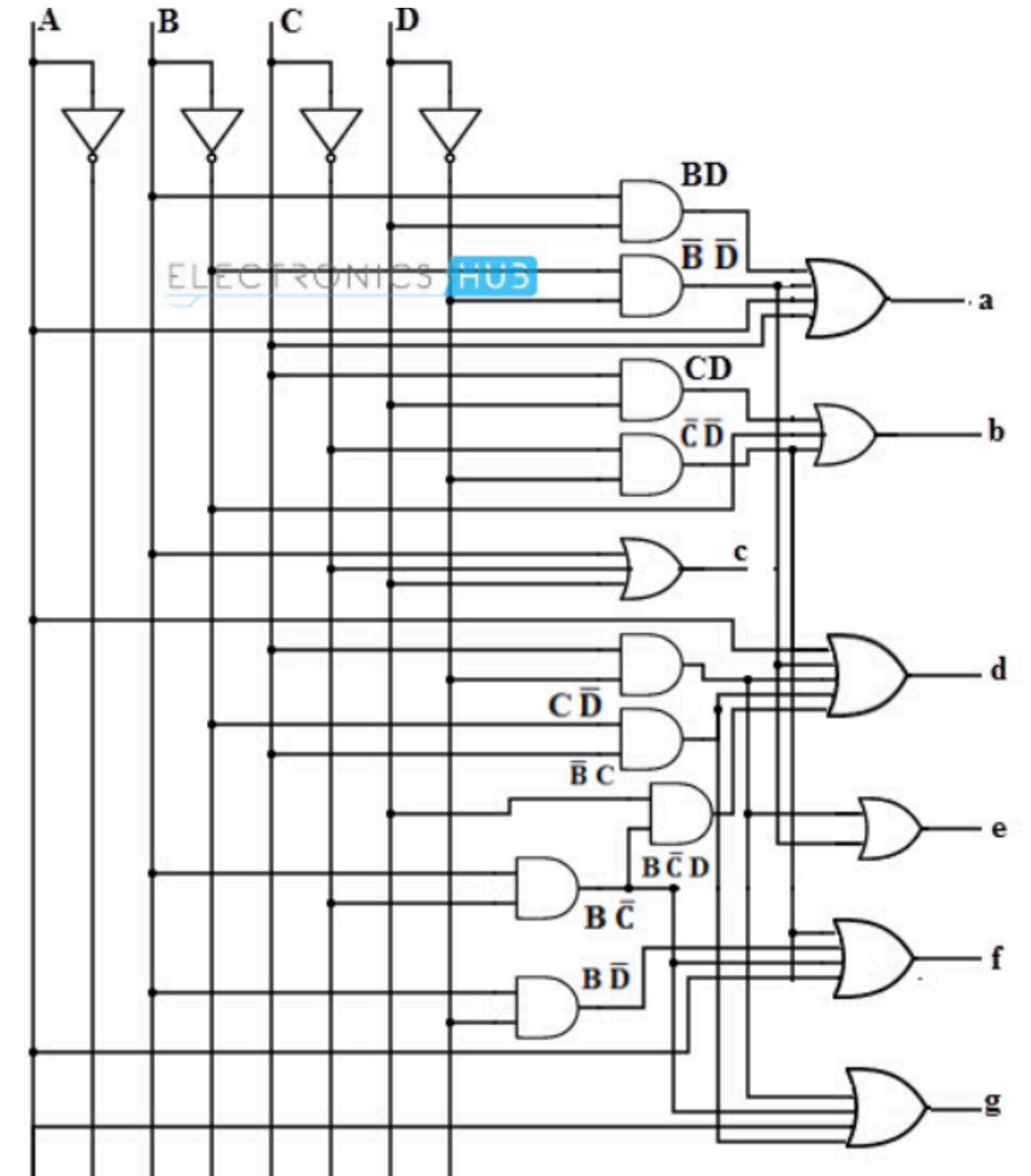
$$e = \overline{B}\overline{D} + C\overline{D}$$

AB \ CD	00	01	11	10
00	1	0	0	0
01	1	1	0	1
11	x	x	x	x
10	1	1	x	x

$$f = A + \overline{C}\overline{D} + B\overline{C} + B\overline{D}$$

AB \ CD	00	01	11	10
00	0	0	1	1
01	1	1	0	1
11	x	x	x	x
10	1	1	x	x

$$g = \overline{B}C + C\overline{D} + B\overline{C} + B\overline{D} + A$$



Conclusion

In conclusion, our course project focused on the design and implementation of an Traffic Management System, integrating fundamental concepts from the realm of digital computer fundamentals. By amalgamating our knowledge of various types of Integrated Circuits (ICs) and their interconnections, we successfully created a functional and efficient traffic control solution. We gained an in-depth understanding of different ICs , displays and their applications.

Drive link of working of project

<https://drive.google.com/drive/folders/12GnPTsz-AhG2POVZSAL4yN04hcgLUYJr?usp=sharing>

Thank You...