

❖ PUBLIC TRANSPORTATION OPTIMIZATION

PROJECT :INTELLGENT : TRANSPORTION SYSTEM
(Smart traffic control system)

INTRODUCTION:

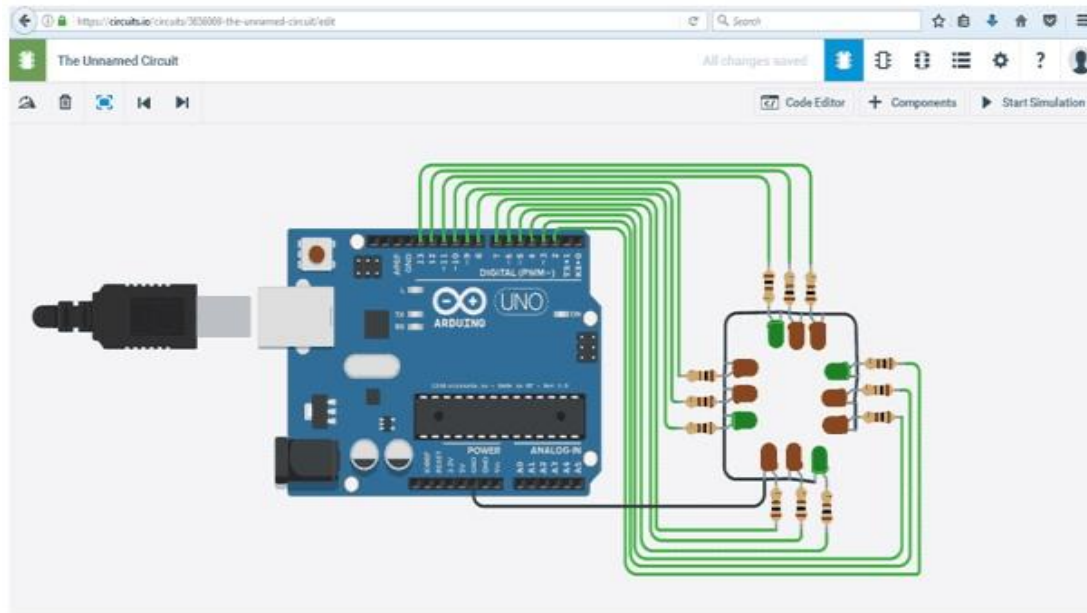
The signal is one of those elements that, for every commuter, seem to be part of everyday life. Wherever the Traffic are more number of cars, there will probably be one of these systems are present. This project is an Arduino board Based Traffic Light system.

The traffic light system provides instructions to the users (drivers and pedestrians) by displaying lights of standard colour on four cross streets.

The colours used in traffic lights are Red, Yellow and Green for stop, slow and go respectively. The system is programmed to control the traffic lights for smooth and safe movement of vehicle traffic. The system consists of electro mechanical controllers with modern solid state computerized systems which has easy setup and maintenance.

CIRCUIT DIAGRAM:

Connect All the LEDs as per the circuit diagram shown below for traffic light controller.



Note:

In practical, we did not have to use the current limiting resistors as the current from each digital I/O pin of the Arduino UNO is limited to 20mA only. Hence no resistor required LED connection.

PROGRAM:

```

1  # Import the necessary libraries
2  from pyfirmata import Arduino, util
3  import time
4
5  # Define the pin numbers for the traffic lights for each set
6  red_pins = [13, 10, 7, 4]
7  yellow_pins = [12, 9, 6, 3]
8  green_pins = [11, 8, 5, 2]
9
10 # Initialize the Arduino board
11 board = Arduino('/dev/ttyACM0') # Update with the correct port
12
13 # Set up the pin modes for each set of traffic lights
14 for i in range(4):
15     board.digital[red_pins[i]].mode = 1 # OUTPUT
16     board.digital[yellow_pins[i]].mode = 1 # OUTPUT
17     board.digital[green_pins[i]].mode = 1 # OUTPUT
18
19 # Function to control the traffic lights for each set
20 def traffic_light_controller():
21     for i in range(4):
22         # Set the red light on
23         board.digital[red_pins[i]].write(1)
24         board.digital[yellow_pins[i]].write(0)
25         board.digital[green_pins[i]].write(0)

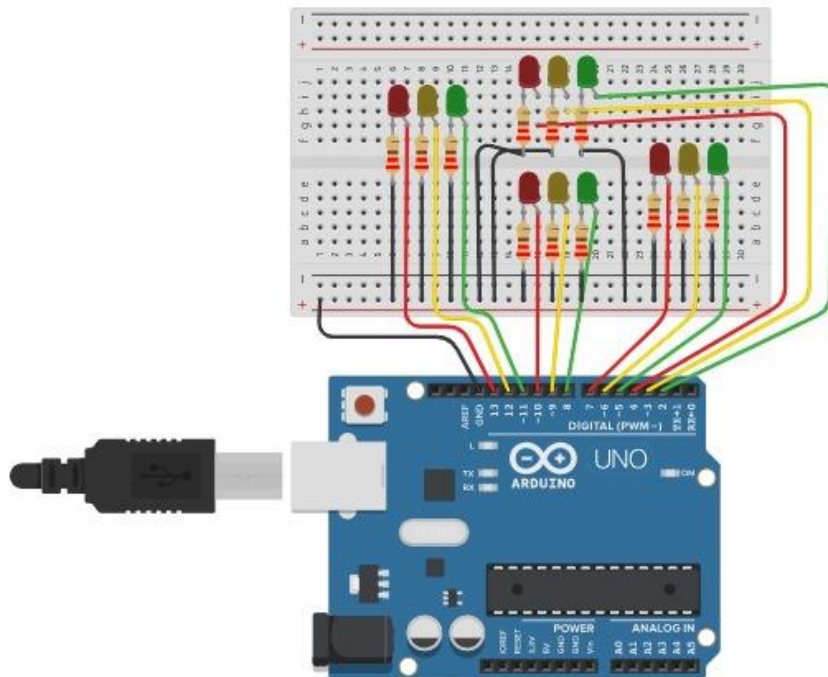
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```

26     time.sleep(5) # Wait for 5 seconds
27
28     # Set the yellow light on
29     board.digital[red_pins[i]].write(0)
30     board.digital[yellow_pins[i]].write(1)
31     board.digital[green_pins[i]].write(0)
32     time.sleep(2) # Wait for 2 seconds
33
34     # Set the green light on
35     board.digital[red_pins[i]].write(0)
36     board.digital[yellow_pins[i]].write(0)
37     board.digital[green_pins[i]].write(1)
38     time.sleep(5) # Wait for 5 seconds
39
40     # Set the yellow light on
41     board.digital[red_pins[i]].write(0)
42     board.digital[yellow_pins[i]].write(1)
43     board.digital[green_pins[i]].write(0)
44     time.sleep(2) # Wait for 2 seconds
45
46 # Call the traffic light controller function
47 traffic_light_controller()
48
49 # Close the Arduino connection
50 board.exit()

```

OUTPUT:



Working :

In this project, a simple traffic light system for a 4 way intersection is implemented using Arduino UNO development board. Although it is not the practical implementation for real life scenarios, it gives a general idea of the process behind the traffic light control system

Simple traffic light controller is made using Arduino UNO, where the traffic is controlled in based on programmed timings. For better understand let's consider time delays as below

- **Green-20 sec.**
- **Yellow – 5 Sec.**
- **Red – 75 Sec.**

Each lane gets time duration of 25 seconds including the yellow light time to move.

The yellow light turns ON for short duration after green light, indicating vehicles to slow down before the red light appears to avoid sudden stoppage.

Vehicles in every lane have to wait for 75 Sec. during red signal.

	Lane 1	Lane 2	Lane 3	LANE 4
Lane 1	20G	25R	50R	75R
Green	5Y	5R	30R	55R
Lane 2	75R	20G	25R	50R
Green	55R	5Y	5R	30R
Lane 3	50R	75R	20G	25R
Green	30R	55R	5Y	5R

Lane 4	25R	50R	75R	20G
Green	5R	30R	55R	5Y

CONCLUSION:

The smart traffic light control system represents a breakthrough in urban traffic management. By harnessing technology and data, it optimizes traffic flow, enhances safety, and reduces congestion. Its implementation holds the promise of more efficient, sustainable, and safer cities for the future.