INTERNET OF THINGS-GROUP 4
TRAFFIC MANAGEMENT SYSTEM

STUDENT NAME:S MALINI

REGISTER NO:822621106008

NM ID:au822621106008

COLLEGE NAME:ARIFA INSTITUDE OF TECHNOLOGY

COLLEGE CODE:8226

EMAIL ID:malinivani03@gmail.com

Traffic Light Control Circuit

Introduction:

` Traffic Lights are used to control vehicular traffic on the road and publics streets. In the modern era, where everyone owns different types of vehicles resulting in a rise in the numbers of vehicles which leads to traffic jams and rush on the busy routes. That's why traffic lights are mandatory for smooth traffic to avoid the traffic jams and accidents.

Basically, there are three lights in the traffic signal, each having a different message for the drivers. Red light (upper one) asks the driver to yield at the intersection, green light (last one) gives the driver free license to drive through the intersection whereas the yellow light (middle one) alerts the driver to wait if the next light is red one or get ready to go / turn the engine ON if the green light is next.

Traffic lights have proved to be an amazing way to stop vehicular collisions and control the traffic jams and divert the traffic in smooth lanes. Let's see how to make a simple traffic light control system using basic electronic components as follows.

As the name of the project "Traffic Light Control Circuit" suggests, the fundamental idea of this simple electronic project is to control the traffic via lighting signals. It can be used to avoid vehicular collisions and traffic jams as the system ensures the smooth flow of traffic even on the busy routes. This project is just a one-way traffic controller, although it can be further modified as well. In short, the circuit can be used to provides the instructions to the driver via lighting symbols whether to drive through, stop or yield at the intersection.

Control Lights indication:

There are three control lights or signals, which will provide the instruction to the driver.

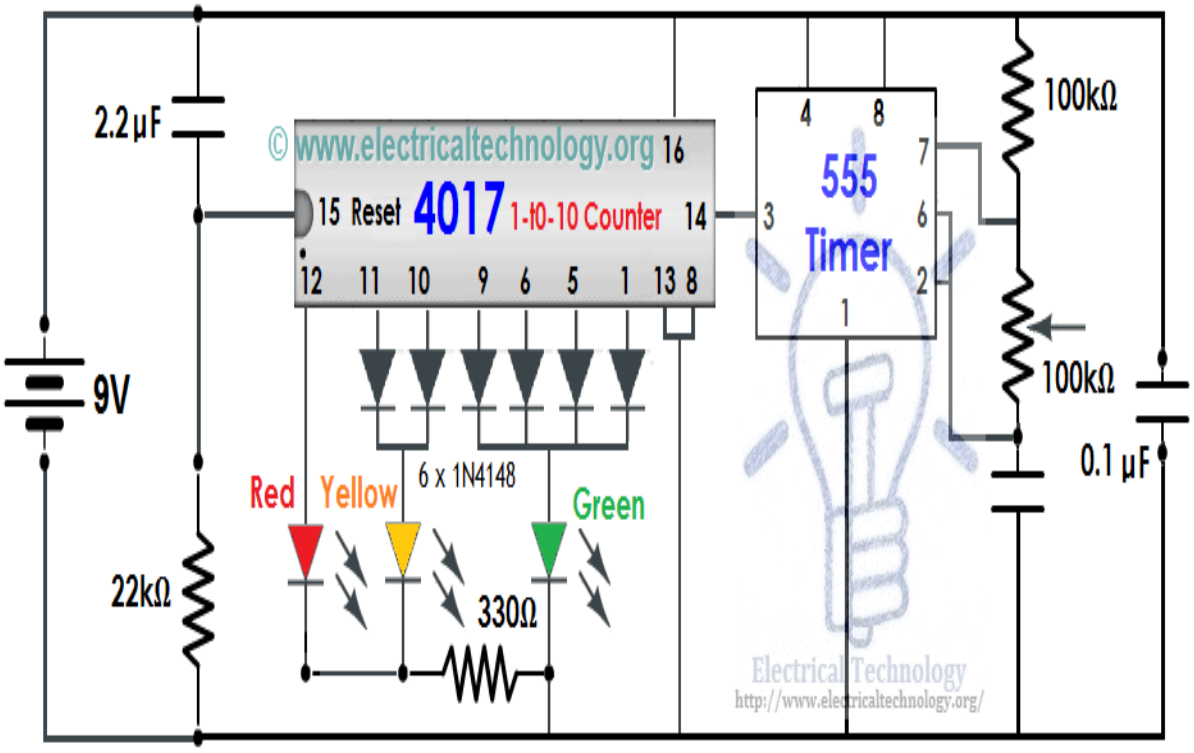
- **RED** light – instructs the driver to STOP at the intersection.
- **YELLOW** light– instructs the driver to WAIT (If red light is next) or GET READY (if green light is next)
- **GREEN** light – instructs the driver to GO through the intersection.

Components Requirements:

Following is the list of the basic components, which we will be using to make our traffic light Control System.

- 9V Battery (Input battery)
- 100K, 22K and 330 ohm resistors
- 1µF, 10µF and 2.2mF capacitors
- Six 1N4148 diodes
- 555 timer IC (As a pulse generator)
- 4017 IC counter (Main IC of the circuit
- 1M Potentiometer (Controls the timing of pulse generated by 555 timer)
- Red, Yellow and Green LEDs. (Output lighting signals)

Circuit Diagram of Traffic Light Control:



Working Principle:

This traffic light circuit is designed based on a counter IC, which is mainly used in sequential circuits where a sequential circuit is used to count the numbers in the series. This way, we may call it a sequential traffic light system.

The working and operation of traffic lights control circuit, the main IC is 4017 counter IC which is used to glow the Red, Yellow and Green LED respectively. The 555 timer acts as a pulse generator providing an input to the 4017 counter IC.

The glowing time of certain LED lights totally depends upon the 555 timer's pulse, which we can control via the potentiometer, so if you want to change the time of glow for a specific LED, you can do so by varying the potentiometer which is used to handle the setting of timing durations.

Traffic Light using Arduino

Usage

There is multiple usage of the project:-

- If you are beginner so it is a intro to arduino
- You can Make a real but small Traffic Light using it
- You can also add more LED and Can change as per your usgae

Hookup

- Hook the **GND pin (Negative Pin)** of all led to **Pin GND** of Arduino.
- Connect Red LED **VCC Pin (Positive Pin)** to **Pin 9** of Arduino.
- Connect Yellow LED **VCC Pin (Positive Pin)** to **Pin 8** of Arduino.
- Connect Green LED **VCC Pin (Positive Pin)** to **Pin 7** of Arduino.

SIMULATING SENSORS:

Simulation methods make it possible to assume different sequences of traffic lights for the system and consider animations to show that how the system behaves. Moreover, simulation is less expensive and less time-consuming compared to the other mentioned methods. Finally, because of the probabilistic nature of the traffic flow in the intersection (entities arrival, time spent in the system, length of the queue), simulation would be an appropriate method for traffic light system evaluation.

Simulation Modeling

In this research, Arena simulation software is applied for system modeling. As it was mentioned before, the current traffic system is a three-stroke cycle light; Due to the large and dense bustle of the cars and pedestrians, the current system suffers from various problems like tight spacing, slow vehicle movements, frequent car accidents, vehicles long waiting times, passengers delay, more fuel consumption, air and noise pollution, etc. According to the characteristics of this intersection, it seems that one of the main causes of confusion and chaos is the three-stroke cycle traffic light. In this regard, a simulation model is developed and validated according to the current system. After that, a four-stroke cycle is designed and considered in the simulation model in order to make a comparison for system performance by taking into account both types of traffic lights. Assumptions considered in the model are as bellow

- ➔ There are four types of vehicles (with different numbers) including buses, cars, vans and pickups (different vehicles choose different routes with different chances).
- ➔ The direction of all the vehicles (to left, straight or right) are determined exactly once they are generated and logged to the system
- ➔ There considered three lanes in each street: the first lane from the left is called lane1, the middle one is lane2, and another one is lane3.
- ➔ Any vehicle arrives the system, chooses the lane which has the minimum queue (unfortunately this is what happens in reality) and in the situation where lanes have the same number of vehicles, they choose the lane nearest to the direction that they want to go (i.e. vehicles want to go straight or turn left will stop in lane1 or lane2 and vehicles with intent to turn right, will go through lane3. It seems that this category of vehicles does not need to wait for the traffic light but the vehicle of the other two categories (especially the ones who intended to go straight) blocks their way to the right).
- ➔ For a given vehicle in row i, the time takes to reach to the frontline of the intersection could be calculated as below

Arduino Code

```
 int red = 9;
 int yellow = 8;
 int green = 7;
void setup(){
 pinMode(red, OUTPUT);
 pinMode(yellow, OUTPUT);
 pinMode(green,  OUTPUT);
}
void loop(){
 digitalWrite(red, HIGH);
 delay(15000);
 digitalWrite(red,  LOW);
 digitalWrite(yellow, HIGH);
 delay(1000);
 digitalWrite(yellow,  LOW);
 delay(500);
 digitalWrite(yellow, HIGH);
 delay(1000);
 digitalWrite(yellow,  LOW);
 delay(500);
 digitalWrite(yellow, HIGH);
 delay(1000);
 digitalWrite(yellow,  LOW);
 delay(500);
 digitalWrite(yellow, HIGH);
 delay(1000);
 digitalWrite(yellow, LOW);
 delay(500);
 digitalWrite(yellow, HIGH);
 delay(1000);
```

```
digitalWrite(yellow, LOW);
delay(500);
digitalWrite(green, HIGH);
delay(20000);
digitalWrite(green,  LOW);
//
digitalWrite(yellow, HIGH);
delay(1000);
digitalWrite(yellow,  LOW);
delay(500);
digitalWrite(yellow, HIGH);
delay(1000);
digitalWrite(yellow,  LOW);
delay(500);
digitalWrite(yellow, HIGH);
delay(1000);
digitalWrite(yellow, LOW);
delay(500);
digitalWrite(yellow, HIGH);
delay(1000);
digitalWrite(yellow, LOW);
delay(500);
digitalWrite(yellow, HIGH);
delay(1000);
digitalWrite(yellow, LOW);
delay(500);


}
```

Circuit Diagram Of Arduino Code: