

# Smart Traffic Signal System

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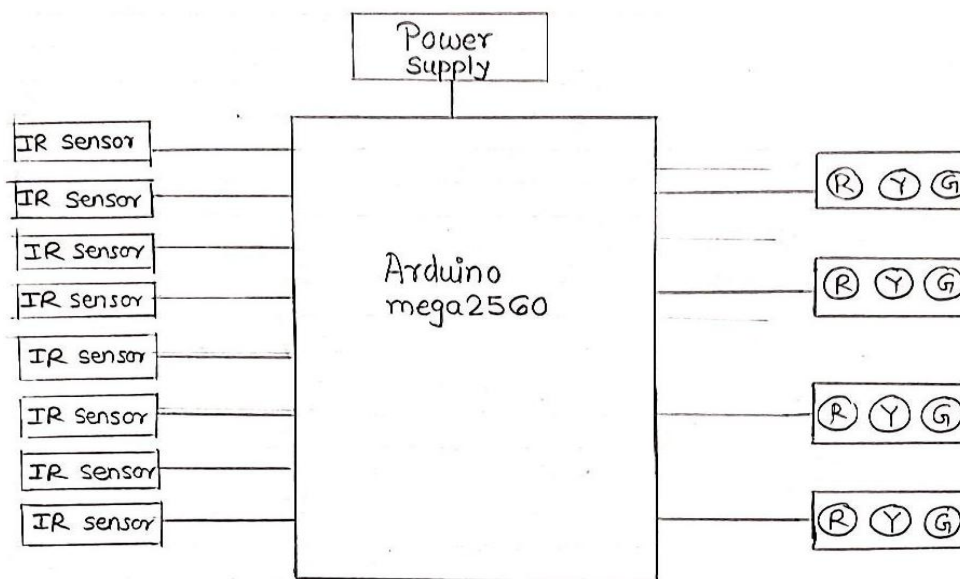
**Abstract:** *Vehicles selling are increasing in developing countries and it causes an increase in traffic on the road. In India, in metro cities like Mumbai, Chennai and Delhi, the issue of traffic management has become a critical issue as compared to other cities. Traffic congestion is severe problem in most of the cities across the world and it has become a nightmare for the citizens. It is caused by delay in signal, inappropriate timing of traffic signaling, etc. The delay of traffic light is hard coded and it does not depend on traffic. Therefore for optimizing traffic control, there is increasing demand in systematic quick and automatic system. The proposed system is designed to develop a density based dynamic traffic signal control. The signal timing changes automatically on sensing the traffic density at the junction. The microcontroller used in proposed system is ARDUINO. The system contains IR sensors (transmitter & receiver) which will be mounted on either side of the road on poles. It gets activated and receives the signal as the vehicles pass close by it. The traffic lights shall be changed to each side for some fixed time. Even though there are no vehicles at particular side, the traffic signals will glow for a given fixed time. Due to that there is wastage of time & vehicles on the other side have to wait for the time to complete the process. So to reduce the wastage of time, we can implement the system that controls the traffic based on the heavy flow vehicles at each side at the junction and give path to the particular side which has denser traffic and keeping the other sides stopped.*

**Keywords:** Arduino Mega2560 Controller, IR Sensor, Power Supply

## I. INTRODUCTION

Traffic administration has the goal to constantly improve traffic system and regulation. As the number of vehicle users constantly increases and resources provided by current infrastructure are limited. Intelligent control of traffic will be point of focus in the future. Avoiding traffic jams is beneficial to both environment and economy. Traffic management system is considered as one of the major dimensions of a smart city. In our research, we focus on optimization of traffic light controller in a city using IR sensor and developed using Arduino. An intelligent transportation system (ITS) estimates the traffic parameters and optimizes traffic signals to reduce vehicles delays and stop. Fixed control on traffic is basically not control according to the density, but in a manner of programming which is already fixed in the system. This project proposes an intelligent system using Arduino for implementing it in the city. Vehicular traffic control at road crossings has always been a matter of concern for administrations in many modern cities around the world. Several attempts have been made to design efficient automated systems to solve this problem. Most of the present day systems use pre-determined timing circuits to operate traffic signals which are not very efficient because they do not operate according to the current volume of traffic at the crossing. It is often seen in today's automated traffic control systems that vehicles have to wait at a road crossing even though there is little or no traffic in the other direction. There are other problems as well, like ambulance getting caught up by a red traffic signal and wasting valuable time. Congestion is also translated into lost time, missed opportunities, delivery delay. Actually the traffic congestion is not only recurring (caused by recurring demand that exists virtually everyday) but also non-recurring (caused by traffic incidents like damaged vehicles, work zones, weather and special events) in nature. To manage non-recurring congestion some sensor based system were suggested for improvement over fixed control.

### 1.1 How it Works



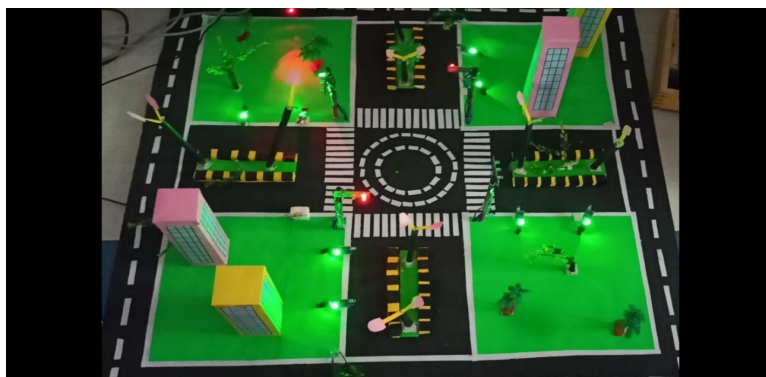
The Block Diagram shown above is of “Smart Traffic Signal System”. In this there are 8 IR Sensors which are present on either sides of road to detect the presence of the vehicles and send the information to the Arduino Mega2560. Based on it, the LED’s will be controlled. Regulated power supply of 12V is used in above system. The 12V power supply is based on commercial 7812 voltage regulated IC. This IC contains all the circuitry needed to accept any input voltage from 8 to 16 Volts. And produces a steady 12V output.

## II. DENSITY BASED TRAFFIC LIGHT CONTROL SYSTEM CIRCUIT DESIGN

This circuit consists of 8 IR sensors, Arduino Mega 2560 microcontroller, 4 traffic lights. IR transmitter looks like an LED. This IR transmitter always emits IR rays from it. The operating voltage of this IR transmitter is 2 to 3v. These IR (infra red) rays are invisible to the human eye. But we can view these IR rays through camera.

IR receiver receives IR rays that are transmitted by IR transmitter. Normally IR receiver has high resistance in order of mega ohms, when it is receiving IR rays the resistance is very low. The operating voltage of IR receiver also 2 to 3V. We have to place these IR pair in such a way that when we place an obstacle in front of this IR pair, IR receiver should be able to receive the IR rays. When we give the power, the transmitted IR rays hit the object and reflect back to the IR receiver.

Instead of traffic lights, you can use LEDs (RED, GREEN, YELLOW). In normal traffic system, you have to glow the LEDs on time basis. If the traffic density is high on any particular path, then glows green LED of that particular path and glows the red LEDs for remaining paths. In normal traffic system, we allow the traffic for a time delay of 1 minute for each path.



### **III. APPLICATIONS**

Traffic light control systems are widely used to monitor and control the flow of automobiles through the junction of many roads. They aim to realize smooth motion of cars in the transportation routes. A traffic signal, or stoplight as it is also known, controls vehicle passing through the intersection of two or more roadways by giving a visual indication to drivers when to proceed, when to slow, and when to stop. In some cases, traffic signals also indicate to drivers when they may make a turn.

### **IV. BENEFITS**

1. Ambulance service will no longer be affected by traffic jams.
2. Use of radio frequency signal (not blocked by objects, fast).
3. Over a wide range applicability.
4. One time investment cost.
5. Life of people can be saved.
6. A modernized way of controlling traffic.
7. Number of road accidents can be reduced to a large extent.
8. Easy traffic regulation in busy cities such as Delhi, Mumbai etc..
9. Help the traffic police in easy control of traffic

### **V. FUTURE WORK**

The Future scope includes Profiling of the traffic by storing the data and managing the traffic lights according to the collected data. The Profiling can also be used for Traffic study and the variation in traffic density throughout the day, week, month or a year. Further, we can optimize this system for the emergency Vehicles such as Ambulance. The Traffic data collected can be used to locate different routes for a specific daily vehicle to avoid the congestion problem.

### **VI. CONCLUSION AND RECOMMENDATIONS**

System intelligently changes its ON/OFF time according to traffic density. Automatically clear the road for emergency vehicles. If any theft vehicle is detected from its RFID tag then system will send the message to the police control vehicle. The work presents review of the existing research done in field and tries to develop a system suitable for developing countries. The project has two objectives, which are, first, calculating the length of the vehicles on the road for the flow of the traffic smoothly without congestion and, second, developing priority-based signaling which will help to give the priority to the emergency vehicles such as ambulance. The microcontroller can be programmed easily which gives scope for deployment better algorithms in future. The sensors are to be fitted on the side of the roads and connected to the controller at the intersection. These are some hectic jobs which are to be dealt before implementing the system, but once implemented, it will make our traffic system more convenient and cities smarter.

### **REFERENCES**

- [1]. Bilal Ghazal, Lebanese University; Khaled Khatib, Lebanese International University; Khaled Chahine, The American University of the Middle East; Mohamad Kherfan "Smart traffic light control system"
- [2]. Bilal Ghazal Faculty of Sciences IV, Lebanese University (UL); Zahle, Lebanon Khaled ElKhatib; Lebanese International University, Bekaa, LB; Khaled Chahine School of Engineering, Lebanese International University (LIU), Khyara, Lebanon "Smart traffic light control system"
- [3]. Vignesh. Viswanathan and Vigneshwar. Santhanam "Intelligent Traffic Signal Control Using Wireless Sensor Networks", 2nd International Conference on Advances in Electrical and Electronics Engineering (ICAEE'2013) March 17-18, 2013 Dubai (UAE).
- [4]. ARDUINO MEGA: <https://store.arduino.cc/products/arduino-mega-2560-rev3>