

**DENSITY BASED TRAFFIC CONTROL USING  
IR SENSORS**  
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**Abstract**—Nowadays, the number of road users constantly increases; vehicle population also increased to an extreme. . We are in need to find better solution for traffic control. There are several types of traffic control system existing but we focus on optimization of traffic light controller in a city using IR Sensor and Arduino Controller. Instead of using image processing techniques, IR sensors can be used. Image processing techniques is highly complex and expensive. So we use IR sensors as counter to count the number of vehicles passing through it on each side of the road. Then we compare the count of both sides of the road and give green signal for the count which is greater. This whole technique is based on the prioritization of higher density side of the road.

**KEYWORDS:** Arduino microcontroller Atmega 328., IR sensors, Counters.

## 1. INTRODUCTION

In the modern world, with the increasing population, the number of vehicles in the street and in the main roads are increasing day by day. Due to that traffic occurs in the main parts of the city. This is also a major cause for noise as well as air pollution. As a result, many birds and animals are getting affected badly and also in danger of becoming extinct. This also affects the people who are residing in the neighbourhood of the road. For them, it becomes a nuisance and disturbance. During the peak hours, it is very difficult for the people to move in the traffic. This is common during weekdays. Moreover, there will be a heavy traffic in one lane and quite the opposite for the other one. During that time following the static signal system increases the waiting time and also creates time in delay for people in reaching their destination. To overcome this, new idea is

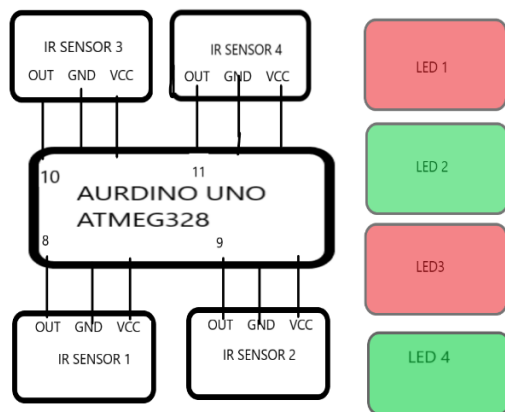
implemented which will be seen in the following extract.

## 2. BLOCK DIAGRAM

### MAIN COMPONENTS :

- *ARDUINO UNO*
- *IR SENSORS*
- *LED'S*

In this block diagram, Arduino is used as the main controller and IR sensors are used as counters for calculating the density of the vehicles. Connection layouts are shown below in the fig 1.1.



IR SENSOR1=8  
IR SENSOR2=9  
IR SENSOR3=10  
IR SENSOR4=11

Fig 1.1

### 3.METHODOLOGY:

In this, Aurdino Uno is used as microcontroller, IR sensor is used as counter for calculating the density in a particular region of road .In each side of the road, 2 IR sensors are placed in such a way that one of it is placed in front of the signal and the other one is placed at a certain distance from the first sensor. Each side is given with green and red LED representing signal. At the start, red signal is turned for all sides of the road for few seconds delay, then side1 is given green signal. Then in side 1,as the vehicles pass 1<sup>st</sup>IR counts and decrements the count value of the side1 and the 2<sup>nd</sup> one increments as the vehicles passes through it. So the count of side 1 is equal to the difference of the count of 2<sup>nd</sup> and 1<sup>st</sup>IR. This is applicable for all the sides. And for every alternate change in the signals between more than 2 sides of the road, there should be given few delay for making all red signals for all the sides. Then again the same steps in done.This keeps on going till the count of sides attains a threshold point .When it goes beyond threshold point, then for which count the value is greater ,for that side ,green signal is displayed.Then again it start from the static process, the dynamic method of the signal is attained only if there is more density of the vehicle in a particular side.

### 4. HARDWARE RESULTS

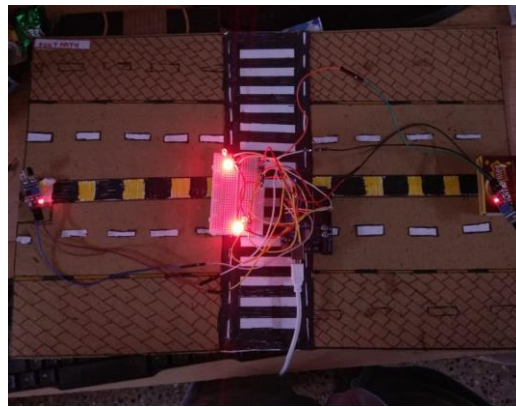


Fig1.2

Initial Stage of traffic signal with sample two lanes of roads[Fig1.2]. The traffic light goes with a static change in the interval of time. The signal will be set with a particular time delay interval.

The Static characteristics of the signal is unchanged until it faces a traffic or more density in any side of the road.

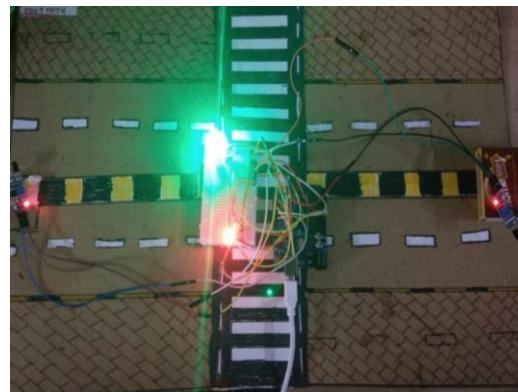


Fig1.3

The[Fig1.3] shows a sample change in the Static time delay in the signal into the dynamic change in the traffic signal.

The prototype displays the sample Traffic signal changing from the Static time delay to the dynamic time delay based on the density on one side of the road. The density of the vehicle is calculated between signal to a certain point of a junction, so the side with a more density will get a dynamic change in the traffic light, which will clear the

density of the vehicle in the particular region and it will come back to the static change in the delay of the traffic lights and makes the situation normal.

## 5. PROJECT OUTCOMES

The conversion of static signal system to dynamic signal system is obtained in this proposal. By implementing the technology of detection of vehicles using IR sensor and viewing the count value in the both the lanes traffic will be cleared by comparing the count value. Due to that there is a easiness for the people during the peak hours. This reduces the waiting time in the traffic and ensures smooth movement of vehicles.

## 6. FUTURE ENHANCEMENT

This topic can further be developed over the field of Accident prevention, Road safety, control of traffic flow, Priority for the Selected vehicles, etc. One of the main applications of the traffic control is Accident prevention using QR code. In this method, QR scanners are placed at the ends of the road perpendicularly both the sides for each lane. QR generators are created by using android app which is then given to each vehicle passing through the QR. Those 2 scanners are connected in series to the signals of that side of the road. QR is activated when that side of the road is displayed with red signal. So, when it is red signal, QR is made to scan the QR code of each vehicle which is passing through it at the time of STOP. When the scanner scans the vehicle's QR, it automatically sends message to the violator and to traffic stations saying about the amount of fine to be paid by the person. This is a very useful method to prevent violators to violate rules. As a result, number of accidents in every part of the city can be reduced drastically. Another major application is Hydraulic platforms. This is already implemented in Singapore and is practically feasible. The main motive of this concept is to prioritize ambulance during peak hours in road. At that time pedestrian road are elevated through hydraulic techniques for the ambulance to pass through the subway.

## 7. Conclusion

By implementing this method, Traffic congestion in the city can be controlled. This technique can replace the use of image processor which is currently prevailing in our country. It helps for betterment of the people during the peak hours in reaching their destination in time. We conclude that use of IR sensor for traffic control can be cost effective and works efficiently in all the climatic condition. This will also reduce the pollution and the wastage of fuel that is caused by the stagnant of vehicle in a particular region.

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