

## **SMART TRAFFIC CONTROL SYSTEM BASED ON TRAFFIC DENSITY**

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**Abstract:** Now a days traffic congestion has become a big problem in main cities and towns. The congestion is due to large signal light delays. Irrespective of traffic density the signal light delay is fixed to predefined time and large amount of power is wasted for the lights presented along the roads of these junctions. So this project is designed to reduce or control the traffic jams especially at multi-road junctions. The project is based on IR sensors. IR LEDs and photodiodes are placed either sides of the roads. This entire IR Sensors are controlled by Arduino board. With the help of these traffic density is tracked based on traffic density, signal light time is updated every time and traffic is managed well. Street lights present along the roads will be ON only when there is any vehical present there. The system entirely depends on Arduino board.

### **I. INTRODUCTION:**

Population has been increasing day by day in our country mainly in big cities and towns. As a result traffic goes on increasing which leads to traffic congestion especially at the multi road junctions. These traffic congestion affect daily life and pose all kind of challenges and problems. So reducing traffic congestion not only improves traffic management but also avoid risk. There is a big need of introducing advance technologies to improve the state of traffic control. In the present work the designed system aim to achieve the following:

1. signals the traffic lights to go red if the road is empty and to go green if the road is with high density.
2. Signals the traffic lights to go red if the maximum time for the green light elapsed even if there are vehicals present on the road.

The present conventional system is based on timer which has a limitations like heavy traffic jams, wastage of time even if there are zero vehicals present on other side. Power is being wasted for the lights across and around junctions if there are no vehicals. Keeping all these limitations in mind, lot of ideas have been developed. In order to solve the above limitations, this paper is introduced a system which is mainly based on traffic density. The system entirely depends on Arduino board.

### **II. CONCEPTUAL IMPLEMENTATIONS IN THIS CONTROL SYSTEM**

Usage of IR photo diode sensors This IR photo diode sensors consists of IR LED and a photo diode. The IR pairs can be placed either on the same side or opposite side. Here in this work, IR pairs are kept on opposite sides of the roads present in junctions. From the signals received by the IR receiver vehicle density can be determined and it signals the traffic lights.

#### **Limitations:**

As infrared rays has LOS transmission (line of sight), rays cannot transmit through the walls, doors etc...

1. IR sensors sometimes absorb normal light also. Because of this, the traffic system may not work properly.
2. IR sensors won't work for long distances.
3. Arrangement of sensors should be in Accurate manner otherwise density may not be detected.

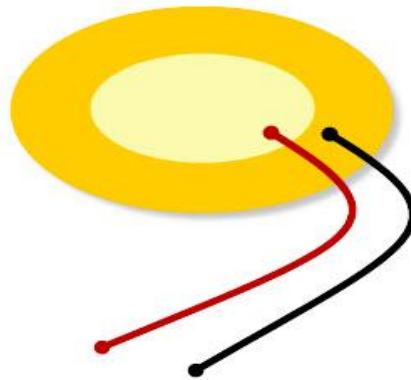
#### **Using Arduino board:**

Present traffic control system are based on microprocessors, microcontrollers and now Arduino boards. This control system makes use of Arduino board for which is embedded technology is given. Usage of Arduino boards is more preferable than microcontrollers and microprocessors as they are less in cost, compatible. Coding to the Arduino is very easy when compared to the controllers and processors.



**Usage of piezo electric sensors:**

These sensors use the piezo electric effect. These measure changes in acceleration, force by converting mechanical energy into electric charge. In this project, sensors are placed on these roads in the junction. When the vehicals enter on the sensors, energy is converted into electric charge and is stored and used for the street lights glow.



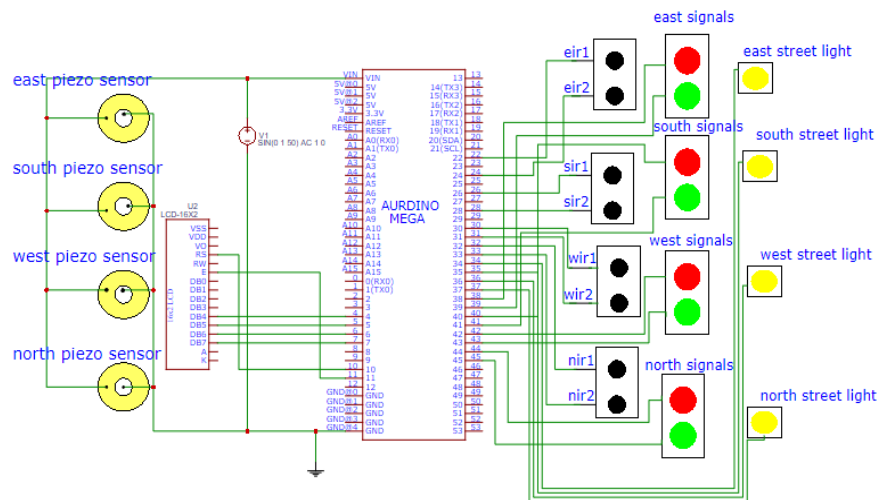
**III. Key components of the project**

- IR photo diode sensor
- Arduino mega 2560
- LEDs
- LCD
- Rechargeable battery
- Power Supply

**IV. IMPLEMENTATION AND WORKING**

**Implementation:**

**BLOCK DIAGRAM**



**Working:**

When the vehicals enters the junction IR sensors keep on tracking the density of the vehicals on all the sides of the junction. Signals are sent to traffic lights and automatically they are updated based on density. Green lights will be ON for the road having large density and remaining has to wait. This process repeat continuously every time based on density. All timing information and details are shown by the LCD. Street light will be ON immediately in the road whenever vehicals are present. Remaining street lights will be OFF. The piezoelectric sensors placed on the roads converts energy into charge and is given to battery. All these functions are carried out with the help of Arduino device in which the code is embedded.

**V. CONCLUSION**

This project tries to introduce a new way for traffic control based on traffic density which is efficient one. Since Arduino is used, processing of information takes less time. also equipment setup is easy since the device is compatiabile. Unlike other processor and controllers, programming is easy for Arduino. As this work consists of different implementations for various limitations, this can be considered as efficient project with less cost and perfect operation.

## **VI. FUTURE SCOPE**

Higher versions of Arduino can be used for reducing processing time. while tracking vehical density, if number of vehicals on any side is always less, it can be neglected and the waiting time on the road will be high. For future expansion this can be considered.

## **VII. REFERENCES**

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