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EFFICAX TRAFFIC SIGNALLING SYSTEM

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ABSTRACT

Traffic signaling system with a fixed timer has become the major problem today because it does not switch according to traffic density and thus it causes heavy traffic congestion, fuel loss, and wastage of money. Thus, we need an effective traffic signaling system that switches according to the traffic density. In which the priority will be given to the road on which there is more traffic.Efficax traffic signaling system will switch signals automatically according to the traffic density. The system will be based on real-time traffic monitoring. The Control system can automatically adjust the switching time of the traffic signal.

The system will consist of sound sensors that will sense the sound produced by the vehicles i.e the ignition sound to measure the traffic density. The algorithm design and processing are done with Arduino, because of its simplicity and economy. Input taken from the sound sensor will be given to Arduino. After measuring the traffic density and processing in Arduino the output is given to the TM1637 4-bit display counter which will switch according to the traffic density at each lane.The density of the traffic is calculated and the timer displayed is shifted dynamically. Thus, the sensors help in keeping the count of the vehicles entering the road and subsequently allotting the time delay by accurately giving priority to each road. However, the limitation of the sound sensor is that it recognizes all types of sound production at the junction. We need to filter out the required sound.

1. INTRODUCTION

In India, population growth is significant. The number of vehicles increases with the increase in population. This results in a major problem in heavy traffic congestion. Traffic congestion is a condition on road networks that occurs as use increases and is characterized by slower speeds, longer trip times, and increased vehicular queuing. Due to high traffic density, the waiting time at signals is increased. The crossing time (time is taken to cross a signal) will also be increased. Further, traffic congestions lead to fuel consumption, an increase in wait time, and also the wastage of money. Specifically, traffic congestions result in high pollution levels which affect the health of the local people, commuters, and animals. Traffic signaling system with a fixed timer has become the major problem today because it does not switch according to traffic density and thus it causes heavy traffic congestion, fuel loss, and wastage of money. Thus, we need an effective traffic signaling system that switches according to the traffic density. In which the priority will

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be given to the road on which there is more traffic.Efficax traffic signaling system will switch signals automatically according to the traffic density. The system will be based on real-time traffic monitoring. The Control system can automatically adjust the switching time of the traffic signal.

2 Problem Definition

Today's traffic signaling system is a major problem in many major citiesthe number of vehicles increases with the increase in population. This results in a major problem of heavy traffic congestion. The existing traffic signaling system has a fixed counter time given to each side of the junction which cannot be varied as per varying traffic density. Due to high traffic density, the waiting time at signals is increased, the crossing time (time taken to cross a signal) will also increase which leads to heavy traffic congestion which gradually leads to fuel loss and wastage of money.

Most of this is due to the bad timing cycle in the countdown timers. The timer is set equally both to the high-density lanes and low-density lanes. Many times it happens that even if there is low traffic density still everyone has to wait. They do not vary according to the traffic intensity. Due to this waiting time increases.

The system is designed by using sound sensors which will be placed by the roadside.The sensors can detect the density of vehicles from their ignition sound

2. Literature Survey

1. **U. G. R, M. D. M Shetty, and V. Kamatar [1]**

In this project, the author used an Ultrasonic sensor and RFID-based system which manages and regulates the traffic signals at junctions when the emergency vehicle arrives by aligning easy passage out of the traffic congestion. Ultrasonic sensor-based smart traffic control system proposes a solution to the traffic congestion problem. The density of the traffic is calculated and the timer displayed is shifted dynamically. Thus, the sensor helps in keeping the count of the vehicles entering the road and subsequently allotting the time delay by accurately giving priority to each road.

2. **Ishant Sharma, Dr. Pardeep K. Gupta[2]**

The paper deals with the feasibility of the provision of inductive loop detection-based traffic signals in place of existing pre-timed traffic signals. It can be concluded that by replacing the pre-timed traffic signals with the automatic traffic signals capacity is being increased is also being improved. An inductive loop is used for detecting the density of vehicles and assigning the green time for the approach lanes to clear off the traffic.

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3. **Dhere Shubham, Phapale Ajay, Sakure Sumit, Ghuge Ganesh [3]:**

In this paper, the author used IR sensors to sense the traffic density, and Arduino Mega is used as a microcontroller that provides the signal timing based on the traffic density and depending upon the value of sensor output is given to the microcontroller, to take the decision. The Arduino Mega is used in the system takes control of all. IR sensors are used to identify how long-distance traffic is there.

4. **Ravish, Roopa & Shenoy, Datthesh & Rangaswamy, Shanta[4]:**

In this paper, the proposed technique first collects vehicle data on the road and then suggests an appropriate signal to be turned ON. This is implemented using the NRF24L01 transceiver module, LEDs, and Arduino Microcontroller.

5. **K.Priyadharshini, S.K.Manikandan[5]:**

Has proposed a model of traffic signal based on dynamic time allocation by using PIR (proximity Infrared sensors). Once the density is calculated, the luminous period of the green signal is assigned with the help of the microcontroller (Arduino). The sensors which are placed on each side of the road at a particular distance will detect the numbers of the vehicle passing that lane and sends the information to the microcontroller based on the information it will decide which lane is to be free or when to revolutionize over the signal lights.

6. **V. Vaidhehi, S. Somarajan, S. Paul, and J. Arora[6]:**

The authors focus on the volume-based traffic control system with IR sensors, a touchline sensor, and a laser sensor. The output of sensors is given to the microcontroller. In this very model, the system adjusts itself based on the amount of traffic on road.

3. Proposed System

Efficax Traffic Signalling System has been specially designed to overcome the problem of traffic congestion on road due to the existing traffic signaling system. The system will switch the traffic lights and counter automatically according to the traffic density. In which the priority will be given to the road on which there is more traffic and will have a longer green signal. It will reduce traffic density to avoid congestion, fuel consumption, and excessive delay due to the time allocated by the traffic signals. Sensors based on a smart traffic control system propose a solution to the traffic congestion problems. The density of the traffic is calculated and the timer displayed is shifted dynamically according to traffic density on each lane.

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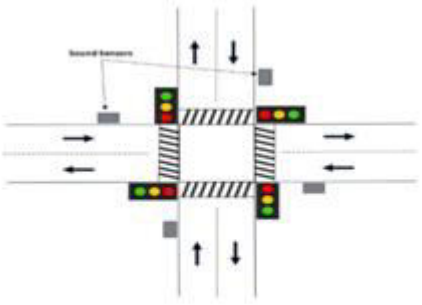


Fig. No. 1 Proposed System

The system is designed by using sound sensors which will be placed by the roadside.The sensors can detect the density of vehicles from their ignition sound.

Arduino mega microcontroller is used for allotment of signal and also able to manage the signal timing based on calculated traffic density

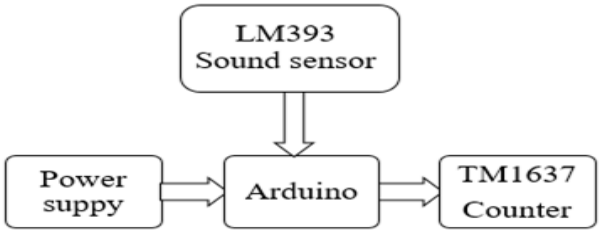


Fig. No. 2 Block Diagram

We are using a 5V-1A DC adapter as a power supply which will provide a 5V supply to the Arduino Mega 2560 Board. Sound sensors are used as input which will sense the sound produced by the vehicles to measure the traffic density and its output will be given to Arduino for processing.The counters TM1637 are connected to the Arduino and the output of Arduino will be given to counters that will switch according to the traffic density.

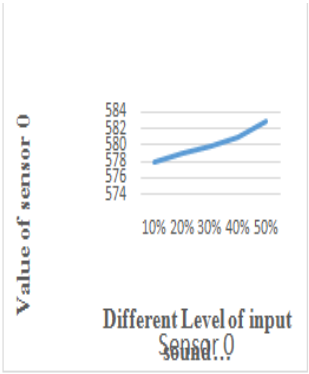
4. Working:

Sound sensors will first sense the sound produce by the vehicles. For sound sensors, at the A4, A5, A6, and A7 pin we are supplying the analog data from Arduino, GND, and VCC is taken from Arduino. After receiving traffic sound as input the sensor will show the respective density of traffic. After receiving input from the sensor, TM1637 will act as a timer and show the optimum count of the timer according to the traffic density.

To do so we need to have the value of sensors for different levels of the input sound. So according to that value of the sensor, the counter value will get sets and switches accordingly. Thus for demonstration we have assumed a continuous beep as noise and observed the different values of sound sensor we get for different levels (%) of noise i.e. continuous beep.

Given below is the observation of the above-said demonstration.

Different level of an input sound (in %)	Value of Sensor 0
10%	578
20%	579
30%	580
40%	581
50%	583



1 Graph obtained for sensor 0

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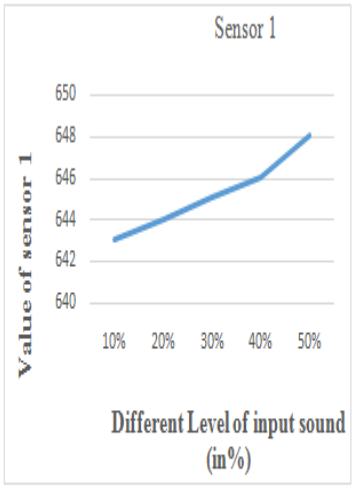
Different level of aninput sound (in %)	Value of Sensor 1
10%	643
20%	644
30%	645
40%	646
50%	648



Graph obtained for sensor 1

Fig. No. 4 Graphical Representation

5.FUTURE SCOPE

Though the prototype model worked very efficiently with remarkable outputs, the real-life situation is going to be way more challenging and demanding. A few challenges that should be taken into account are listed as follows

• we can work on bringing more accurate/ optimistic results. Since we are using a sound sensor to record the density of traffic signal but it can also sense undesirable sound (i.e., raining sound, the sound of the horn, and sound of a vehicle coming from another lane). • Next is the influence of stray signals that may alter the reading of sensor receptors and lead to conveying false information to the microcontroller.

• Periodic checking of the accuracy and precision is a must for the efficacious operation of this model prototype.

Further, we can optimize this system for the emergency Vehicles such as Ambulance.

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