
Density based traffic control system implementation using Arduino micro-controller board

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Abstract

This paper gives the design of the density-based traffic control system implementation using Arduino micro-controller board. Traffic congestion is a 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 an increasing demand in systematic quick automatic system. This paper 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 this project is ARDUINO. The system contains Ultrasonic sensors (trigger and echo) which will be mounted on the either side of the road on poles. It gets activated and receives the signal as the vehicles passes close by it. The work presented here is the mini-project work of the second sem students of electronics & communication engineering department of Dayananda Sagar College of Engg., Bangalore.

Keywords—Arduino Mega 2650, LEDs, Ultrasonic sensors.

1. Introduction to the mini-project work

The project is aimed at designing a density based dynamic traffic signal system where the timing of signal will change automatically on sensing the traffic density at any junction [1]. Traffic congestion especially at road intersections has become an issue for which road traffic users contend with daily. But conventional traffic light system is based on fixed time concept allotted to each side of the junction which cannot be varied as per varying traffic density [2]. At some times, priority of traffic light needs to be changed based on a greater number of vehicles waiting in same road. In today's high-speed life, traffic congestion becomes a serious issue in our day-to-day activities. It brings down the productivity of individual and thereby the society as lots of work hour is wasted in the signals [3]. High volume of vehicles, the inadequate infrastructure and the irrational distribution of the signalling system are main reasons for these chaotic congestions [4]. It indirectly also adds to the increase in pollution level as engines remain on in most cases, a huge volume of natural resources in forms of petrol and diesel is consumed without any fruitful outcome [5]. Therefore, in order to get rid of these problems or at least reduce them to significant level, newer schemes need to be implemented by bringing in sensor based. This project aims to improve the efficiency of traffic light system using Arduino based model [6]. The traffic determination is done by Ultrasonic sensors on each path. Using the details provided by the sensor we can guide the traffic signal to work efficiently with the traffic flow. The traffic density on each road determines the change of the timing of the signal [7]. The road

with the least traffic is assigned with the red signal and the one with the most traffic is assigned the green signal. In this project we imply the use of Ultrasonic sensor to work accordingly with Arduino to provide a better and efficient traffic light control system. Our project aims at reducing traffic congestion and unwanted long time delay during the traffic light switch over especially when the traffic is very low [8].

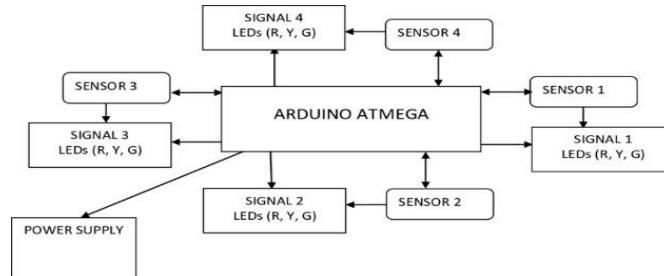


Fig. 1 : Overall block diagram implementation of the proposed mini-project work



Fig. 2 : Arduino micro-controller board used in the project work

2. Proposed methodologies adopted

As we all know that traffic congestion is a major problem from a long time and traffic administration is also trying to overcome this serious problem from a long time. So as a result, one solution has been deduced which is controlling the traffic on time delay. The basic idea of this paper has been taken from the fore-said concept. According to that idea the traffic signal switches after a certain interval of time [9]. The time interval is controlled by any microcontroller. This was a very basic step towards the optimization of traffic on road but this was not up to the mark. So, to control the traffic in a smarter and efficient way this project has been made by modifying the previous idea [10].



Fig. 3 : LED's used in the mini-project work



Fig. 4 : Ultrasonic sensors (transducers) used in the mini project work

3. Examination of the many papers (Literature Survey/Review)

A large number of researchers had worked on the chosen topic till date. Some of the base papers which are used for the proposed mini-project are as follows. In 2017, Younis and Moayeri proposed

a system in which a dynamic traffic light control (DTLC) placed at the road intersections to collect traffic data [1]. It includes few protocols to handle congestion and facilitate efficient traffic flow by proposing low-overhead algorithms [2][3].

4. Conclusions / Conclusive Remarks of the Survey

The design of the density-based traffic control system implementation using Arduino micro-controller board to ease the traffic congestion was presented in this paper. In this research, Using IR sensors and Arduino, we investigated the optimization of traffic light controllers in a neighborhood [18] [19] [20].

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