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Smart Traffic Automation System

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***Abstract*: Everybody is growing rich each day and owning a car, to every available family has turned out to be an obsession. Hardly few people realize that all this and more increases the stress put on traffic. Thickly congested roads are a daily sight in most metropolitan cities. Commuters, including children and employees, spend hours each day stuck in long and never ending traffic jams. The pity is that very often, one can find the green light shining on empty roads, wasting the precious time of many other people. The worst scenario is that of an ambulance, with a person battling death, stuck in a traffic jam and the red light shining on that road.**

***Keywords*: Automation system**

1. Introduction

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. High volume of vehicles, the inadequate infrastructure and the irrational distribution of the signaling system are main reasons for this chaotic congestions. 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.

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 automation.

Background – In the present scenario the vehicle problem is increasing and Traffic congestion is a severe problem in many modern cities all over the world. Traffic Control is achieved by the use of a system of hand signs by traffic police personnel, traffic signals, and markings. We have come up with an exclusive idea for a dynamic and automatic traffic light control expert system combined with a simulation mode.

Traffic research has the goal to optimize traffic flow, as the roads have become overloaded with increasing number of vehicles and resources are limited. Traffic light optimization is a big problem. Even for single junction there is no optimal solution. The problem becomes even more complex with multiple junctions, as the state of one light is responsible for the flow of traffic of that road only. The Proposed system is to identify the density of traffic on individual lanes and thereby regulate the timing of the signals timing based on the closed simulations by signal based. Ultrasonic trans-receivers count the obstructions and provide an idea about the traffic density on a particular lane and feed this response to a controller unit which will make the necessary decisions as and when required. We propose three approaches: In the first approach - to take data/input/ from ultrasonic receivers. In the second approach - to process the input data using Microcontroller and finally display it on the traffic light signal to control the Closed Loop System. In the third approach - to process the received data and estimate the traffic time according to the vehicles arrived in that respective lane.

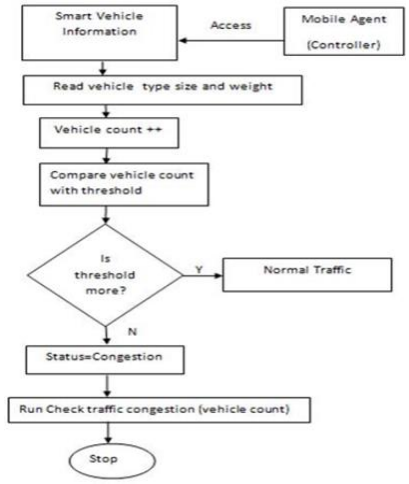

Fig. 1. Data flow diagram

Connect the ultrasonic sensor to the servo motor where servo motor is placed on the signal pole Each lane is divided into n sectors based on the topology of the road (Here n=3). With the help of servo motor we can measure the distance of the particular sector by rotating the ultrasonic senor to desired angle (angle is determined by sector range).

By this distance we can manage to find the density of the traffic in a particular lane and the signal duration is calculated accordingly. Repeat the same process for the other signals except for the signal which is green. By comparing the values from all the signals dynamically traffic is controlled in an efficient way.

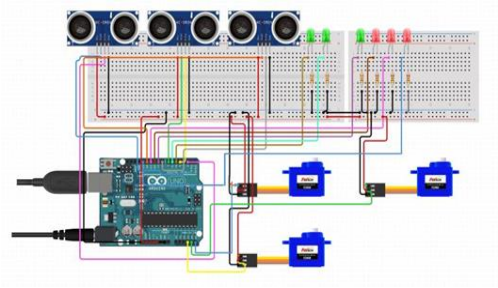

Fig. 2. Circuit diagram

Implementation – An implementation is a realization of a technical specification or algorithm as a program, software component, or other computer system through computer programming and deployment. Many implementations may exist for a given specification or standard.

Embedded C Programming – Embedded C Programming Language, which is widely used in the development of Embedded Systems, is an extension of C Program Language. The Embedded C Programming Language uses the same syntax and semantics of the C Programming Language like main function, declaration of datatypes, defining variables, loops, functions, statements, etc. The extension in Embedded C from standard C Programming Language include I/O Hardware Addressing, fixed point arithmetic operations, accessing address spaces, etc. Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension.ino. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom right-hand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor. Versions of the Arduino Software (IDE) prior to 1.0 saved sketches with the extension .pde. It is possible to open these files with version 1.0, you will be prompted to save the sketch with the .ino extension on save.

#include <servo.h> //Servo library. It contains all the library data and functions for working of embedded microcontroller systems

In this paper, we focus on the use of Ultrasonic Sensor and wireless N/W in traffic control. A lot of scope can be gained in this idea, and intelligent traffic control attracted several governments and commercial companies. Our main aim is to provide more secure roads with less travel time. Such improvements will lead to health benefits, economy, and the environment.

Unlike all others system for measuring traffic density where sensors are placed on the road here we are installing ultrasonic sensors above the road on the footpath and railings in between the roads. The advantage of this technique is that the ultrasound will not pass below the vehicles and conveying a wrong message to controller is to be avoided.

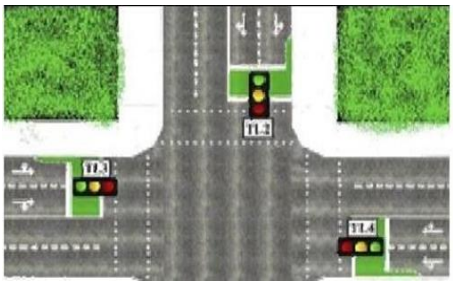

Fig. 3. Model Setup

After that this system will also work when there is excess of water flowing on road during rain or also above the sensors, because ultrasound can also travel in water or we say travels faster in water according to science of functionality. The chances of failing this technique is very less because this system overcomes all the possibilities that affects a signaling system

2. Conclusion

This paper proposes a much more practical approach that can be implemented in junctions with high density of traffic. The ultrasonic proximity sensors placed on either sides of the road will help detect the density of traffic on the particular side if the road and thus can be assured that each side gets a green signal only for the required quantity of time.

Conceptually, the road is divided into a low-density zone and a high-density zone. If a road has heavy density, the road is given an additional overall time. In case absolutely no density is detected, that side of the junction is skipped. This help save time. A gap of a few seconds after each green signal for pedestrians to cross will provide a safe environment for people to cross roads as well. The ultrasonic proximity sensors placed on the poles of the road will detect vehicles arrived at the junction. This model involves the cooperation of both the government and the manufacturers of emergency vehicles. Together, India can be made a vehicle friendly country.

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