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Density Based Light Control System Using Microcontroller

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ABSTRACT

In present, vehicular traffic is increasing throughout the world, especially in large urban areas. As the number of road user's increase constantly and current resources & infrastructures being limited; a smart traffic control will become a very important issue in the future. These needs have led to an ever increasing demand for an "intelligent" traffic control system. Therefore, optimization of traffic control to better accommodate this increasing demand is needed. Our project will demonstrate the optimization of traffic lights in a city using wireless sensors. Traffic light optimization is a tough problem. With multiple junctions, the complexity increases as the state of one light node influences the flow of traffic towards many other nodes. We proposed a traffic light controller that allows us to control and study different situations of traffic density. We sense the density of traffic using infra-red sensors. The key role behind the implementation of the "Traffic density based light control system" is to make use of an AT89C51 controller which performs processing of the real time data provided by the infra -red sensors, eventually controlling the traffic flow via the LED traffic lights.

***Keywords*:** Infra-red Sensors, LED's, 89C51 Microcontroller, Digital Display.

I.INTRODUCTION

In the past, the researchers had gone through different types of technologies. Brief surveys of various solutions of the traffic congestion problems are presented. RFID & GSM is mentioned in the Road Traffic Congestion Monitoring and Measurement using Active RFID and GSM Technology [8]. In this system active RFID tag, wireless coordinator, wireless router, GSM modems and monitoring station software are used. Here the wireless devices are mounted on either sides of the road and they collect the data from the active RFID tags. Through GSM, monitoring station will collect all the data and respond to the corresponding traffic signal. WSN was presented in the Priority Based Traffic Lights Controller Using Wireless Sensor Networks. In this a wireless sensor network is being used. To define the direction of any emergency vehicle, system uses a fuzzy logic and

by collecting all the information the central monitoring system gives the corresponding appropriate response. The traffic lights that are in widespread use today do not do much intricate reasoning when deciding when to change the lights for the various road users waiting in different lanes. How long the signal stays green in one lane and red in another is most often determined by simple timing that is calculated when the crossing is designed. Even though today's methods are robust and work well when the traffic load is distributed evenly across the lanes in the intersection, the systems are very inefficient because they are unable to handle various simple situations that arise throughout the day. Unnecessary waiting time in the signal can be avoided by determining in which side the green signal should be large during the traffic. This research is to design such a system which works on the traffic density and manages the signal lights according to the sensed density of the traffic through the infra-red Sensors . The timing of the signal lights will vary with respect to the varying density of the traffic, Hence Improving the light system and reducing the traffic congestion and other related problems.

II.PROBLEM STATEMENT

Traffic congestion is increasing on the road day- by- day. As a result of which, two main issues arises. The issues are no traffic, but still need to wait Heavy traffic jams. These problems occur due to fixed control on traffic. This research will aim to control the traffic according to the density, but in manner of programming which is already fixed in the system.

III.RESEARCH OBJECTIVE

The main purpose of introducing this smart traffic system is that for every minute the vehicles at the junction will be dense and the traffic lights shall be changed to each side for some fixed time. Even though there are no vehicles at particular side, the traffic signals will glow for a given fixed time. Due to that there is time wastage & vehicles on the other side have to wait for the time to complete the process. So to reduce the wastage of time, we can implement the system that controls the traffic based on the heavy flow of vehicles at any particular side. With this system, we shall count the number of vehicles at each side at the junction and give path to the particular side which has denser traffic and keeping the other side stopped.

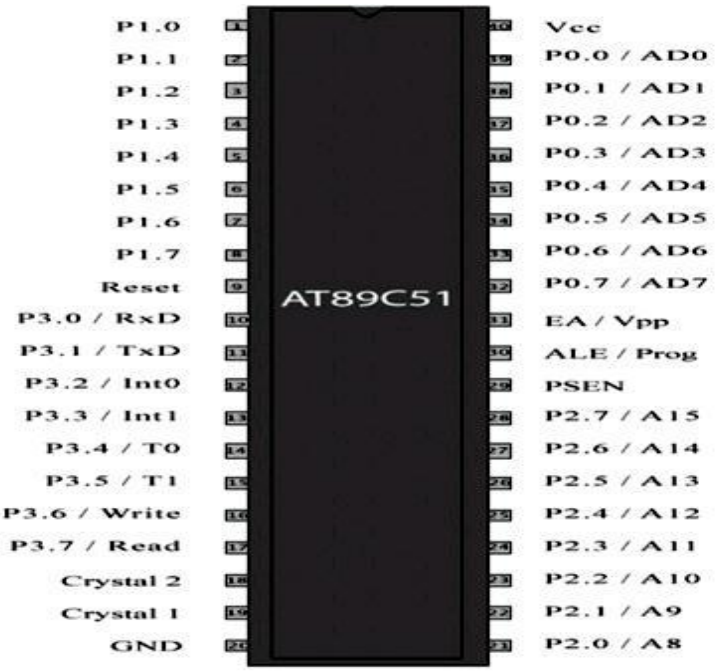
IV.LITERATURE REVIEW

Currently the vehicle problem is increasing and Traffic congestion is a severe problem in many modern cities all over the world. To overcome the problem, we have come up with the idea of Density based traffic light control system. Traffic research has the goal to optimize traffic flow, as roads have been overloaded with the increasing number of vehicles. There are several models which give solutions for traffic simulation. In our research we have focused on controlling the traffic lights on the bases of traffic density. Nowadays congestion in traffic is a serious issue. The traffic congestion can also be caused by large Red light de-lays, etc. The delay of respective light is hard coded in the traffic light and it is not dependent on traffic. Thus I propose multiple traffic light control system. The system tries to reduce possibilities of traffic jams, caused by traffic lights, to an extent. The system is based on microcontroller. The micro-controller used in the system is AT89C51. The system contains

IR transmitter and IR receiver which are mounted on the either sides of roads respectively. The IR system gets activated whenever any vehicle passes on road between IR transmitter and IR receiver. Microcontroller controls the IR system and counts number of vehicles passing on road. Microcontroller also store vehicles count in its memory. Based on different vehicles count, the microcontroller takes decision and updates the traffic light delays as a result. The traffic light is situated at a certain distance from the IR system. Thus based on vehicle count, microcontroller defines different ranges for traffic light delays and updates those accordingly. In this system IR sensors are used to measure the density of the vehicles which are fixed within a fixed distance. All the sensors are interfaced with the microcontroller which in turn controls the traffic signals system according to density detected by the sensors if the traffic density is high on particular side more priority is given for that side .The sensors continuously keep sensing density on all sides and the green signal is given on priority basis, where the sensors detect high density. The side with next priority level follows the first priority level. By using this system traffic can be cleared without irregularities and time delay when there is no traffic on the other side can be avoided.

V.PROTEUS CIRCUIT

This is the complete circuit diagram of the system. On the left you can see push buttons acting as IR sensors. Each pair of push button is numbered according to the road they are sensing. On the right side the signals are given which are interfaced with the port 1 of the controller .Below is the LCD interfaced with the microcontroller which will show weather the signals are operating normally or for the dense case.



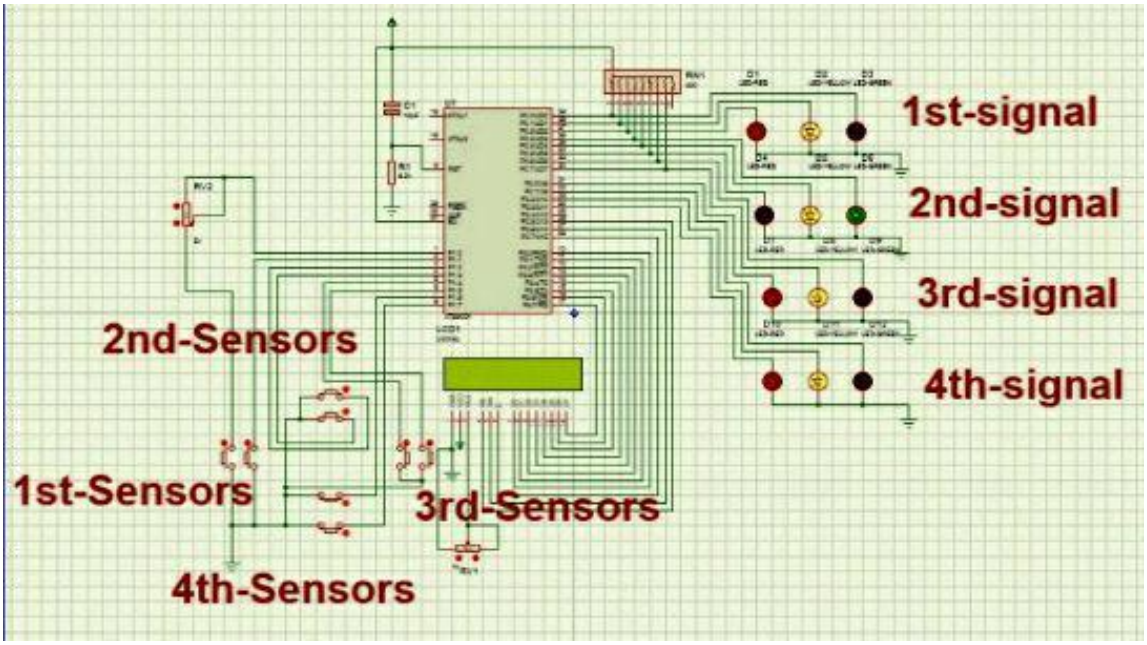


Figure 1 (a)

VI.RESULTS &ANALYSIS

Results include the successful operation of the traffic control and monitoring system. The system contains two IR transmitter and IR receiver for traffic density measurement which are mounted on the either sides of roads respectively. The IR system gets activated whenever any vehicle passes on road between IR sensors. When one sensor will be ON at that time density will be less when two sensors will be ON at that traffic density is medium when all 3 sensor will be ON at that time density will be high. Microcontroller controls the IR system and counts number of vehicles passing on road. Based on different vehicles count, the microcontroller takes decision and updates the traffic light delays as a result.

VII.CONCLUSION

In this research we have worked on Congestion problem for such special areas which have dense traffic density. The system works on traffic related problems such as traffic jam; un reasonable latency time of stoppage of vehicle, emergency vehicles or forcibly passing, etc can be solved. By using this system configuration we try to reduce the possibilities of traffic jams, caused by traffic lights. Number of passing vehicle in the fixed time slot on the road decide the density range of traffics and on the basis of vehicle density calculation, microcontroller decide the traffic light delays.

VIII.FUTURE SCOPE

The Future scope includes Profiling of the traffic by storing the data and managing the traffic lights according to the collected data. The Profiling can also be used for Traffic study and the variation in traffic density throughout the day, week, month or a year. Further, we can optimize this system for the emergency Vehicles such as Ambulance. The Traffic data collected can be used to locate different routes for a specific daily vehicle to avoid the congestion problem [20].

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