Online Accessible Traffic Control System for Urban Areas Using Embedded System Technology

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Abstract—During recent years traffic congestion is become a serious problem in almost all cities. Due to the high density of traffic, pedestrians find it difficult to cross the road. Even though several advanced strategic plans are introduced to regulate the traffic but due to lack of provision for on-road pedestrian crossing, rate of accidents become very high. One such provision is given is elevated path for pedestrian to cross the road, but the elderly person finds it difficult to use. Hence an idea is proposed to help the elderly people by giving provision for on-road pedestrian crossing at high density traffic areas like near schools, hospitals, markets, etc. which reduces the accidents rate also. To implement this, here an additional time delay is introduced in the traffic signal for pedestrian crossing in addition to vehicle crossing in all possible direction. Additionally, provision is given to track the vehicle which violates the traffic rules and to clear the traffic for emergency vehicles. All the above said three parameters can be simulated by using PROTEUS software.

Key words: RF transmitter and Receiver, LCD display, GSM, Time delay, Pedestrian crossing

I. INTRODUCTION

Traffic control is an outdoors occupation, night or day for long hours in all weathers, and is considered a dangerous occupation due to the high risk of being struck by passing vehicles. Safety equipment is vitally important. Fatigue is a big issue, as tired TC’s may forget to watch their traffic, or may inadvertently turn their “Stop bats” to the “Slow” position. Many drivers are annoyed by the disruption to their route, and some are sufficiently antisocial as to aim at traffic controllers. Other drivers simply don’t pay enough attention to the road, often from using their mobile (cell-) phones, or because they are tired from a night shift at work. Not a few are exceeding the posted speed limit.

As the number of road users constantly increases, and the resources provided by current infrastructures are limited, hence intelligent control of traffic will become a very important issue in the future. However, some limitations to the usage of intelligent traffic control also exist.

Reducing traffic congestion has become a major issue within urban environment. Consider a scenario of highly congested area where many vehicles such as personal transport, public transport and emergency vehicles (Ambulance, Fire brigade, VIP cars and other rescue) have to wait for long for the change of traffic signals at intersection points. Existing traffic light systems have timers that are set at regular intervals. This leads to the wastage of precious time especially in case of rescue vehicles for emergency conditions. In this existing system, RFID based traffic control system is used to clear the signal only for emergency vehicles, but the disadvantage of using this will increase the waiting time, because the reader sense the signal only when the vehicle crosses it, and at the same time for pedestrian crossing fly over was only implemented.

To overcome the drawbacks of existing system, for emergency vehicles RFID is replaced by RF transmitter and receiver and for Pedestrian crossing separate timing is provided. Additionally, if anyone violates the traffic rules, their vehicle number is captured by using camera and the information will be transferred to the control station using embedded technology.

II. LITERATURE SURVEY


G.Monika and N.Kalpana et al proposed an idea of monitoring and controlling the traffic system based on density of the traffic. Here IR sensor is used to analysis the density of the vehicle and it is processed by 16F877A controller. Additionally vehicles which break the traffic rules during stop signal is observed by using OCR techniques and the information will be forward to the nearby police control room.


K.Vidhya and A.Bazila Banu et al describes the design to develop a density based dynamic traffic signal system. The density of the vehicle is given as an input by comparing four side of the image. The image are captured using the camera and it is converted into grey scale image for calculating the number of vehicles and corresponding signal timing will be changed. The above functions by using the Raspberry pi controller.

C. Road Traffic Congestion Monitoring And Measurement Using Active RFID And GSM Technology (2011 14th International IEEE Conference)

Koushik Mandal and Arindam Sez et al propose a method for calculating the waiting time in order to find the traffic congestion in the road through simulation. Here the probe vehicle is used for collecting real time traffic data using RFID tag.This information is then forwarded to the PC for further processing.


Mrs. Ashwini Sawant and Rishi Hemdev et al simulated a framework for an automatic and dynamic traffic light control system. During traffic congestion the green signal timing are increased or decreased based on the density of the
vehicles. This density of the vehicle is achieved by using IR sensor. Omni vision camera is used for monitoring traffic violation


A. Ms Promila Sinhmar implemented a multiple traffic light control and monitoring system. The microcontroller used in the system is 89V51RD2 which is aMCS-51 family. The density of the vehicle is measured by using IR transmitter and IR receiver. According to the density the microcontroller is used to change the time delay in traffic system.


Geetha.E and V.Viswanadha et al proposed a smart traffic signal controller, to minimize the traffic jams and provide the clearance for emergency vehicle. This system is based on PIC 16F877A microcontroller. IR sensor is used for measuring the density of the vehicle and RFID is used for monitoring the emergency vehicle.

G. An Adaptive Traffic Light Control Scheme and Its Implementation in WSN-Based ITS (IJSSIS, Volume 6, Issue 4, September 2013)

Binbin Zhou and Jiannong Cao et al presented an adaptive traffic light control scheme to adjust the traffic light based on the real time traffic detected including traffic volume, waiting time and vehicle density. This paper proposes an idea to implement this system using wireless sensor network based ITS.

III. PROPOSED SYSTEM

Fig 1 shows the block diagram of proposed system which comprises of Processor, IR sensor, LCD display, Camera and DVR. The proposed system controls three parameters namely, on load pedestrian crossing, emergency vehicle clearance and traffic rules violation.

For on road pedestrian crossing, the traffic signalling system will be working as usual based on the time delay logic but with an extra time slot provided for pedestrian crossing. The pedestrian signal control will be turned ON based on the density of the pedestrian in the one side of the road using IR sensor. According to the density level, time delay is given on each side of the road for pedestrian crossing. All the above said operations will be carried out continuously.

Fig 1: Block diagram of proposed system

If any emergency vehicle arrives at any side of the road it is detected using RF transmitter and receiver. A RF transmitter is placed in the emergency vehicle and RF receiver is placed in the signal pole at each side. The RF transmitter transmits the signal up to 200m .When the receiver receives the signal within this limit it displays the message as “EMERGENCY” in the LCD display for 5 sec in the specified direction to alert the people and then the signal on that side will be switched to green and others to red.

In order to avoid road accidents the third parameter is used to capture the people who violate the traffic rules. If any vehicle crosses the road while the red signal is ON it will be sensed using IR sensor. The sensed signal is send to the processor and it will capture the number plate of the vehicle using camera and the message will be sent to the control station for further action using GSM.

IV. RESULT

Proteus 8 is a single application software with many service modules offering different functionality like schematic capture, PCB layout, etc. The wrapper that enables all of the various tools to communicate with each other consists of three main parts are application framework, common database and live Net list.

The fig 2 shows the result of normal condition in the traffic system. For simulation purpose four side road signals are changed cyclically based on the given time of 5 seconds and it will be displayed in the LCD.
The simulation result for pedestrian crossing is shown in fig 3. It shows that at the time of pedestrian crossing all the road signals for vehicle crossing are in RED for the given time period of 5 sec and the message command will be display in the LCD display as “PEDESTRIAN CROSSING”.

Fig 4 shows the result for traffic clearance during the arrival of emergency vehicle. The output from the RF receiver (push button switch) is given to the PIC in order to change the corresponding road side signal. Here four switches are used to indicate the receiver which receives the signal in four different road directions. For example if switch 1 is pressed, the road 1 changed to green signal and others changed to RED signal. The LCD displays the command “EMERGENCY” in the display.

The simulation result for traffic violation is shown in fig 5. The vehicle which violates the traffic rules is monitored by IR sensor fixed in all four directions of the road and it is given to the controller. Based on the signal received by the controller the corresponding road number is displayed in the LCD and the vehicle number is captured by the camera. Here, for simulation purpose camera is replaced by rotating wheel.

This proposed method can provide a safe, secure and efficient way of public transportation system. This method gives the solution to avoid accidents during pedestrian crossing in highly congested area and to give priority for emergency vehicle to save human life. Here provision is also given to help the authority to find the people who violate the rules. Implementation of such a real time model will be greatly helpful to optimize the traffic control system in urban areas.

V. CONCLUSION

This proposed method can provide a safe, secure and efficient way of public transportation system. This method gives the solution to avoid accidents during pedestrian crossing in highly congested area and to give priority for emergency vehicle to save human life. Here provision is also given to help the authority to find the people who violate the rules. Implementation of such a real time model will be greatly helpful to optimize the traffic control system in urban areas.
This can further be improved by including few additional parameters like over speed, over load, mobile phone usage while driving can also be included for better performance.

REFERENCES


