Embedded Traffic Control System Using Wireless Ad Hoc Sensors

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Abstract: This paper deals with designing an embedded traffic control system using wireless ad hoc sensor. In this paper we discuss the details regarding the information about how the ad hoc sensors are used, how they are addressed, where they are located and how it is communicated to the central processing unit. It includes implementation of the central processing unit which is used to collect information on vehicle density from the sensors and open the traffic with respect to the density of the vehicle (traffic).

Key words: Embedded System • Ad Hoc Sensors • Traffic Control System

INTRODUCTION

The purpose of a traffic signal is to provide the orderly movement of traffic by assigning right-of-way at intersecting streets. But gridlocks and accidents happen in many places as the vehicle population increased with respect to the population. The reasons for major gridlocks are improper transport system and traffic control. Also the people have to wait in the signal for long time in the conventional traffic system we have.

In this case revising the transport system is needed. The solution involves embedding the Wireless Ad Hoc Sensor with the Central Processing Unit. Using this traffic flow can be controlled with respect to vehicle density in the road. The vehicle densities of each road are compared to priorities the road and traffic flow is opened accordingly.

Existing System: The conventional traffic system which is used nowadays depends on the timers where the vehicle density is not taken into account. So the people need to wait for their turn to move irrespective of vehicle density on roads. For example, consider a junction which has four roads in four directions. There is no problem if the vehicle density is equally distributed. If it happens to be the case where the vehicle density in one side of road is larger when compared to all the other three, we can’t let the traffic in denser area to move and evacuate immediately using the conventional traffic signal techniques where it allows traffic to flow with the use of timer which deals with a specific time and neglects the traffic density.

Proposed System: Here in the system that we propose works by analyzing the traffic in roads and gives priority to the high traffic density. (i.e.) it makes the high traffic to move first.

In the Fig 1. Given above three density zones are shown. The three density zones are low, medium and high. In each zone an ad hoc sensor is placed. Each sensor will check the presence of the vehicle in the zone using infrared technology and then ad hoc sensor sends the data to master ad hoc.

To locate the sensor, each sensor of different zone is addressed by user and that address is fed to the master ad hoc sensor. This master ad hoc sensor will arrange the data from various sensors in an 8 bit data format as shown in Fig 2.

Where H1, H2, H3 and H4 are high density zone status bits and M1, M2, M3 and M4 are medium density zone status bits.

Architecture: The density of the traffic is determined and the present condition (whether the reception is there are not) is sent to the Intel 8255 which is interfaced with the MSC8051 microcontroller using Ad hoc sensors. Each Ad hoc sensor is addressed individually and the median Ad hoc sensor will arrange the data with respect to address of ad hoc sensor in 8 bit format and the data. Then the data is received to a specific location using various 8255 control words. The controller is programmed in such a manner that the priority is set for the four roads and then the signal is given to vehicle with respect to priority. The road which has high vehicle density is open first. Then again the density is checked and process repeats.

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Fig. 1: Various Density Zone Diagram

H1  H2  H3  H4  M1  M2  M3  M4

Fig. 2: 8 Bit Data Format

Flow Chart: The Fig. 4 shows the flowchart of the system. The flowchart is used to set the road priority with respect to vehicle density. In the flowchart counter is a microcontroller register used to represent the road number.

MATERIALS AND METHODS

The simulated input and output using KEIL simulator are shown in Fig 5 and Fig 6. Intel 8051 microcontroller is used here to show the simulated output of this system. The 8bit data having the information about the road density is given to the parallel port 0 of the microcontroller. It shows that the road 2 and road 3 has high traffic density, road 1 has medium traffic density and road 4 has low traffic density. The output is shown in the data space. The road number is stored according to the priority order.

Simulated Input and Output:

Input:

Output:

RESULTS AND DISCUSSION

In the existing system the road in which the traffic is very high will need to stay for long time. Even there is no vehicle in a road. The vehicles in other roads need to wait.
until timer finish counting. But in proposed system we can set less time low density road and high time for high density area. Thus time can be optimized.

CONCLUSION

By implementing the above idea traffic signals system can be equipped with wireless technology which in turn avoids spreading wires across roads. Also an effective traffic clearing system can be established. This system can be implemented at an expense of more consumption of power due to the usage of number of wireless sensors. This can be reduced by implementing various non-conventional energy sources.

REFERENCES