

IMPLEMENTATION OF EMBEDDED BASED INTELLIGENT JUNCTION MONITERING SYSTEM

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ABSTRACT

Traffic congestion is the biggest problem faced by densely populated countries like India, China etc. To avoid this problem we have the traditional solutions like constructing flyovers, arranging traffic signals etc. In recent days implementing these solutions became very common and even though the problem of traffic congestion is not in control. We propose an intelligent traffic control system which focuses on the Automatic speed control of the vehicle, On board signal display, Barricade system, Traffic density control, Automatic braking system of the vehicle. To provide convenience of the user the traffic signal will be displayed on the driver console along with the signal pole. To avoid accidents and damage to the vehicle caused due to obstacles in the path automatic braking system is installed. Traditional methodologies focus on optimization of traffic light control for specific traffic density but dynamic adaption of signals according to the traffic seems to be the major problem. This paper therefore tries to address the above issue and hence we propose wireless sensor network based adaptive traffic light control system method.

Keywords: Automatic braking system, Barricade system, On board signal display, Traffic density control.

I. INTRODUCTION

As we know countries like India, china are not only developing in terms of infrastructure, urbanisation but also increase in traffic, population and many more problems. Addressing one such issue we propose an intelligent traffic control system. Increase of traffic has given rise to number of problems such as considerable traffic jams, which violates traffic rules etc. Improper control, management and traffic congestion results in long waiting time, more consumption of fuel and money etc. [1]. It is therefore crucial to have a very fast, economical traffic control system for developing countries. To improve secure traffic control of the present transportation system, employment of intelligent junction monitoring control system is necessary. The problems faced by traditional traffic signal controllers are lack of real timelessness, intelligence and human dependent etc.

With increase in population in cities there is a need of more number of vehicles for means of transportation, which leads to the complicated situation especially traffic jams. This is commonly observed in the morning and evening times in the peak hours. To overcome this problem, it must be resolved by setting the time delay for the traffic signals (RED, YELLOW, and GREEN) on the basis of density(The delay of the signal is set to low when

it senses the high traffic and vice versa) . Other scenario where people have to wait, even if there is no traffic due to the signal displayed at the junction. To solve this issue there is a need of intelligent traffic junction controller (by identifying the flow of traffic on each side of the road and control the signals consequently by setting time delay).

II. LITERATURE SURVEY

In transportation system, the critical issue is traffic in most of the cities of developing Countries. There is phenomenal expansion in more number of vehicles in recent years. In India there is a loss of Rs 60,000crore overdue to traffic jam [2]. This results in many of the intersections and arterial roads for operating over the size and average speed on few key roads at the central regions with lower speed of 10 Km/h at peak hour [3]. Traditional traffic jam requires a manual analysis of data, by the traffic control team to regulate the traffic signal duration at every junction. If the time given for a specific road has been exhausted, the red signal will be turned ON which indicates to stop the vehicle, followed by YELLOW signal that indicates the vehicle to get ready, and the next signal GREEN indicates that the vehicles should start moving, This lead to the drawback of traffic signal as the time duration of each signal is fixed [4].

In one of the recent works[5] use of wireless protocols and sensor networks for vehicular communication is discussed. Intelligent Traffic control system for ad hoc vehicular networks known as VANET was developed used various algorithms and the same was suggested for smart city framework.

In [6] An Intelligent Traffic system was developed to control traffic density and signals using a micro controller and IR Sensors, the author claims that the delay of Signal depends on traffic density and this reduces traffic jam. IR transceiver and a microcontroller were used for developing the prototype of the model.

In [7] author uses priority based traffic lights controller and implements Wireless Sensor Network based adaptive mechanism for traffic control. Here time manipulation mechanism is used for traffic signal control. Traffic Control over multiple intersection is also taken care. It is very crucial for such systems to be cost effective, efficient and adaptive. These parameters can be taken care by use of efficient algorithms.

III. PROPOSED SYSTEM

The control system contains 2 sections at traffic signal,

- Vehicle Part.
- Traffic Junction Part

In this work we have used RF transmitter and receiver which helps is automatically controlling the speed of the vehicle and also displays the traffic signal status on the display console of the vehicle. At the junction we have used 3X4 LEDS to show the traffic signals, 3 LEDS (i.e Red, Green and Orange) placed at each road of the junction as shown in fig 1. IR Transmitter and Receiver are used to measure the density of the traffic which in turn helps to dynamically operate the traffic signals. In the vehicular part there is RF receiver which will receive

the RF signal which is transmitted from the RF transmitter and it displays the signal in the automobile through the LED's as shown in fig 2. When the car is on free road a manual key is provided to adjust the speed of the car according to the requirement. When the car is present in the traffic junction the manual speed controller (Key) of the vehicle will be disabled and the automatic control function will be activated. Obstacle detectors are placed to identify any anomaly or obstacle present in path of the vehicle. If any obstacle is identified the vehicle automatically stops, DC motors are used to control the tyres of the car.

3.1 Microcontroller

The microcontroller nuvoton W78E052 is a high performance, low power consuming CMOS 8 bit microcontroller with 4 Kilobytes of flash programmable and Erasable read only memory. Atmel nonvolatile, high density technology is used for manufacturing this microcontroller. Reprogramming of the microcontroller is allowed with the help of on chip flash and conventional nonvolatile program memory. In the transmitting system Microcontroller is used for checking and processing of the signals received from the different monitoring devices. Once the interrupt is generated it transmits particular signal. At the receiving side the microcontroller is used for detecting the incoming signals from the transmitter.

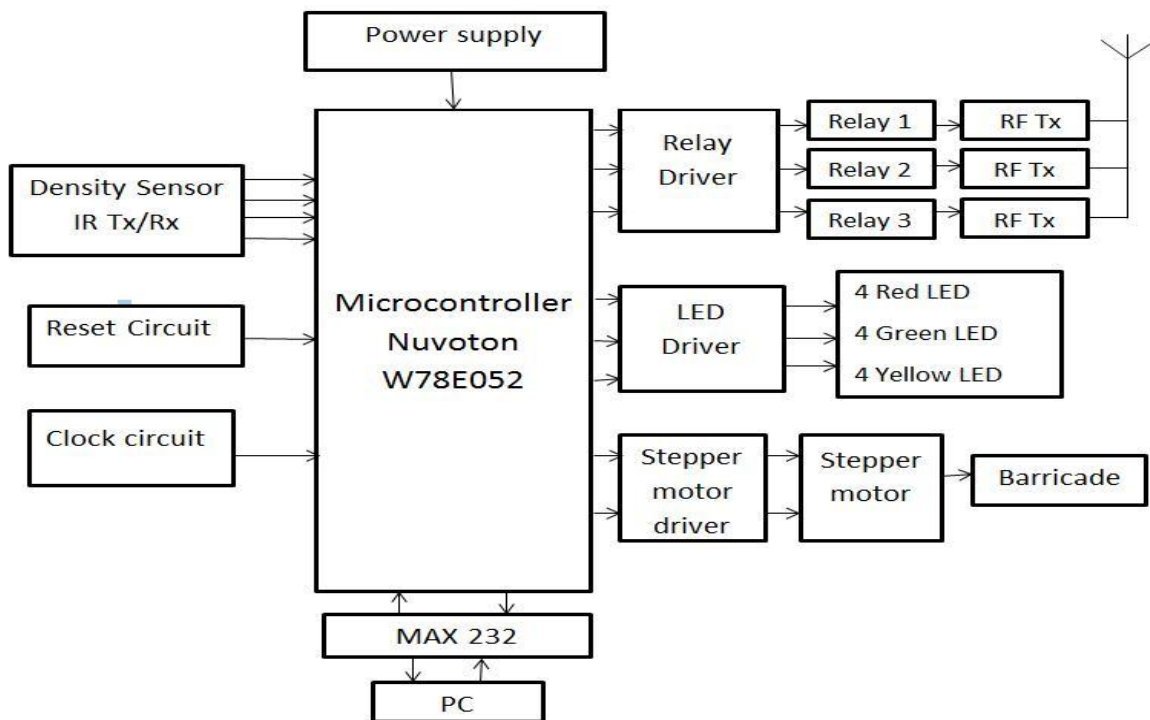


Fig.1: Junction Part

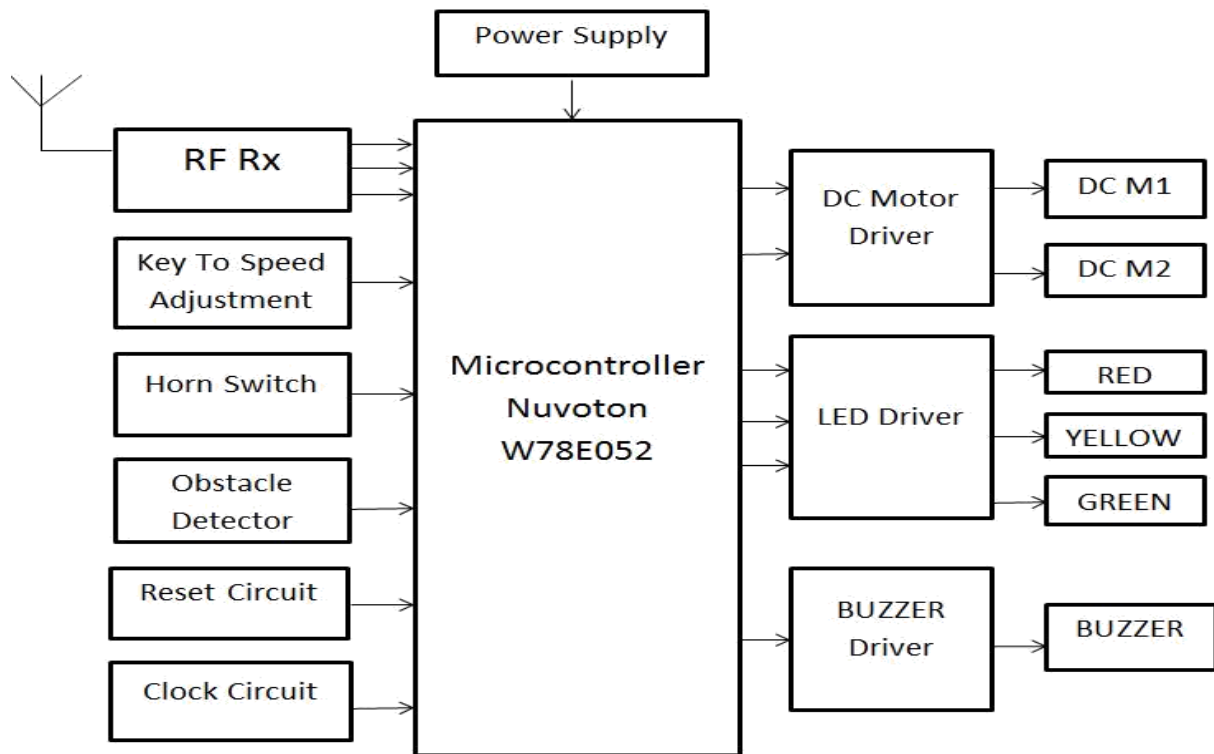


Fig.2: Vehicle Part

3.2 IR Sensors

The IR Transmitter (TSAL6200) is fixed. This IR LED generates uninterrupted infrared rays.

The IR Receiver (TSOP1738) is fixed. This receiver receives uninterrupted infrared rays from the IR transmitter.

3.3 RF Transmitter and Receiver

In RF Transmission, we have relay drivers which has IC ULN2003A and a RF Transmitter. The load for the power transistor in the Darlington pair is given to the relay switches which can be operated manually or automatically. The relay switches are used for switching different type of signals in RF Transmitter. We need four sets of relay drivers and respectively four Darlington pairs for controlling it. The RF Transmitter has the range of 100 meters of radius and operates at the frequency of 433MHz.

IV. RESULTS

Dynamic Traffic signal timing based on traffic density was achieved. Also automatic speed control of the vehicle in case of traffic jam was achieved with the help of nuvoton microcontroller. This helps in reducing accidents and damage to the vehicle. Manual control option is also taken care when the car is on free road.



Fig.3: Experimental setup of Junction Part

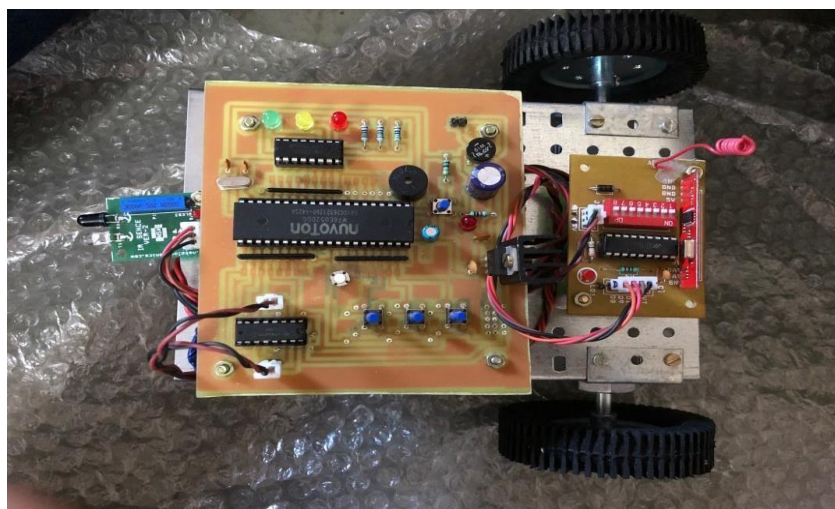


Fig.4:Experimental setup of vehicle part

V. CONCLUSION

The traffic in urban areas are becoming more complex leading to congested roads, by using the advances in technologies we need to implement the traffic monitoring system which helps to minimize traffic problem and accidents. The control of traffic system using microcontroller in which we have tried to control the Density of the traffic, Speed of the vehicle, Barricade system, Vehicle safety and Automatic barking system along with

traffic signal display is implemented within the vehicle to reduce damage to the vehicle, driver, passenger and pedestrian at restricted zones which eliminates the traffic violation made by the drivers and makes the environment eco-friendly with low cost. The implementation of the system results in solving the problems at Traffic junction as well as in Accident Zones .The limitation of this system were more number of sensors that has line of sight, and which requires long duration of time to implement the control system in real-time, will be taken care into consideration in future implementation.

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