

Intelligent Traffic Control For Emergency Vehicles

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Abstract- Vehicle flow detection appears to be an important part in today's traffic system. In this paper, we propose an automatic traffic management system for vehicle detection. The increased traffic has led to long waiting time. Current signal have fixed amount of time. So, we need to change such type of system like if vehicle are not available in current green signal road then signal control automatically transferred to next signal. This system will also give preference to emergency vehicles and change signal accordingly.

Keywords- RFID reader, RFID tag, IR sensor, Bluetooth HC-05.

I. INTRODUCTION

This India is the second most populated country in the world. So that, it is difficult to control and maintain the road traffic. Sometimes, the condition even more critical due to migration of population from rural to urban areas. Therefore road accidents also increased to great extent. As a result, traffic makes difficult for ambulance to reach destination in that particular time. Hence, To avoid wastage of time, intelligent traffic control system is used [1]. Existing system involves a preset time interval setting for each road junction. It is based on some specific time interval, the vehicles are allowed to move at the junction where the traffic light green for specific time interval, but after specific time it comes to a stop when the traffic light turns red. Urban areas are facing several traffic congestion problems which needs to be solve and this is not possible by existing traffic system. An automatic traffic management system can solve these problems by continuously sensing traffic density at different signals and accordingly adjusting the timer for traffic lights on the side at which there is more vehicular density.

II. LITERATURE SURVEY

Most of the traffic system has been used the sensor to calculate current volume of traffic but it has the limitation that these methods based on counting vehicles and treats a emergency vehicles as the normal vehicle [3]. RFID(Radio Frequency Identification) based system has been solved this problem of traffic light control. With the help of this system can considered the priority of various types of vehicles and also considered the density of traffic on the roads by installing RF reader on the road intersection [3].

An intelligent traffic control system to pass emergency vehicles smoothly given in [4]. RFID tag has been equipped to each individual vehicle; hence it cannot remove or destroy. They have been used RFID reader and PIC16F877A system-on-chip to read the RFID tags attached to vehicles. During a specific duration, it counts number of vehicles that passes on a particular path. When an ambulance is approaching the junction, it will communicate to the traffic controller in the junction to turn ON the green light [4].

The effective use of wireless technology and high speed micro controller to provide smooth and clear flow of traffic for emergency vehicle to reach the destination on time given in [1]. This has been implemented by using ARDUINO, RFID reader for detecting the RFID tag placed in the ambulance. The information on detecting the emergency vehicle has been sent to the traffic system through RF transmitter and receiver system, for automatically controlling the traffic light until the emergency vehicle passes through. To estimate the congestion near the traffic, pair of IR sensors has been used and GSM has been provided this information to ambulance driver [1].

Traffic management by using IoT have been proposed in [5]. In this technical era, traffic congestion has become a major problem. There are several reasons for this traffic congestion. The population is one of the main reason of this traffic congestion. As a result of this, the number of cars, trucks, commercial vehicles is increasing annually; causes traffic congestion. Thus, it causes problems for the ambulance to reach the destination on the right time. Hence; the rapid growth of technology and engineering field the life of the mankind has got automated. To serve the purpose of the human, this automation is the process of making the electronic device to communicate between themselves. The one of the major field that concentrate on the automation is Internet of Things creatively called as IoT. This system is based on the IoT and cloud to save the human life at critical situation. The communication between the traffic signals and the ambulance has been established by this system. so that the traffic signal could respond to the arrival of the ambulance and respond according to that. When the traffic signals have been changed its states according to the position of the ambulance it could able to make a free way for the ambulance. Thus this system acts as a life saver [5].

III. PROPOSED SYSTEM WORK

The given fig. 2 shows the block diagram of proposed system. The PIC18F4520 microcontroller is the heart of the given proposed system. The system also comprises power supply, RFID tag, RFID reader, an IR(Infrared) transmitter, an IR receiver, Bluetooth HC-05, and LEDs (Light emitting diodes) for traffic signals.

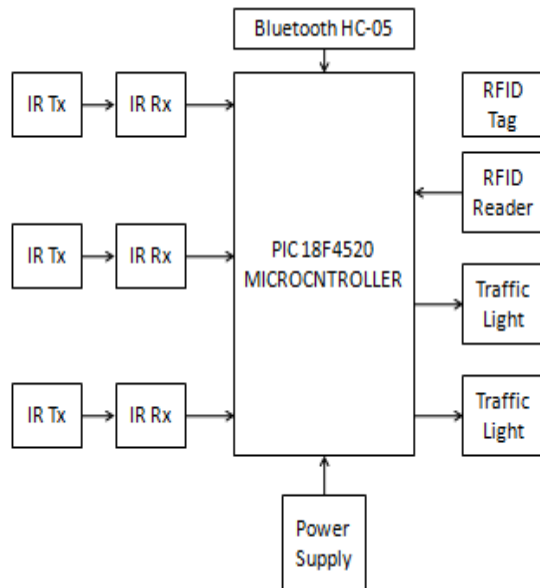


Fig.2 Block diagram of intelligent traffic control system

PIC 18F4520:

It is a 40 pin low power microcontroller, Flash program memory is 32 bytes with EEPROM Data Memory 256 bytes. SRAM Data Memory is 1536 bytes. It consists of One 8-bit / Three 16-Bit timers, 36 I/O pins, 10-bit Thirteen Channels Analog-to-Digital (A/D) converter, 10-bit Two PWM functions, External Oscillator up to 40MHz and Internal Oscillator is 8MHz. The power supply unit is one of the most important one.

RFID tag:

RFID tag is a micro chip combined with an antenna. A passive RFID tag is a device which doesn't have a battery by its own, it receives the energy from the RFID reader [6]. In this proposed system, RFID tag is embedded bottom of the vehicle such that it is visible to human eyes.



Fig.3 RFID tag.

RFID reader:

RFID reader is a device that is used to interrogate the tag. This reader also contains an antenna which emits the radio waves. In the proposed system, reader is installed on the road. The reader reads the unique identification number (UID) present on the tag, whenever tag enters the frequency range of reader and sends the unique identification number to the micro controller [6].

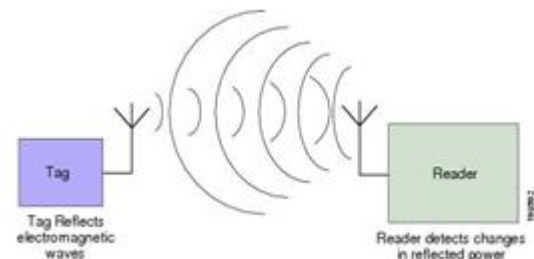


Fig. 4 Working of RFID tag with reader.

Bluetooth HC-05:

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Bluetooth HC-05 device has VCC, GND, TXD, and RXD pins and it is also connected with the Microcontroller.



Fig.5 Bluetooth HC-05

IR sensor:

IR Transmitter and receiver are used to control any device wirelessly. It is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, the

resistances and these output voltages, change in proportion to the magnitude of the IR light received. The transmitter section includes an IR sensor, which transmits continuous IR rays to be received by an IR receiver module. An IR output terminal of the receiver varies depending upon its receiving of IR rays.

Therefore, it has been sent to an amplifier circuit (LM358 IC) and the output of the amplifier is sent to the microcontroller board [1].

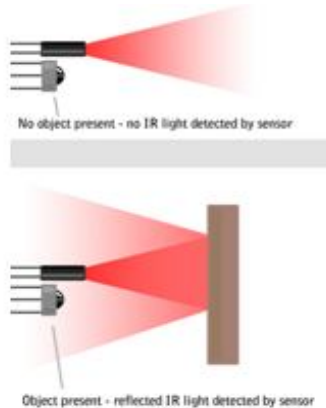


Fig.6 IR sensor

IV. WORKING OF MODEL

The Working Of This System Consists Of Two Modules:

A. Ambulance Clearance:

In this model, the system used RFID reader, RFID tag, Microcontroller, IR transmitter and receiver system for automatically controlling the traffic signal when the emergency vehicle is detected. Initially the traffic signal works normally. When an emergency vehicle crosses the path the RFID tag positioned at the vehicle get driven by the antenna that enables to receive electromagnetic power from the RFID reader. The RFID reader has been detected the ID and transmitted the information through wireless communication using the IR transmitter and receiver system. On receiving the information at the receiver system, the controller controls the traffic light. The traffic light turns to green signal until the ambulance passes the traffic junction. Thus the emergency vehicle can pass the junction without any delay and could reach the destination on time.

B. Congestion estimation:

This proposed system includes the estimation of congestion in a signal junction. In order to find congestion three IR sensors have been used. Low sensor, medium sensor and high sensor have been taken. The system detects in number of vehicles that is present in the region between these

three sensors. Low sensor indicates that low traffic density, medium sensor indicates that medium traffic density and so on for high sensor. This information has been sent to microcontroller. Hence, time interval changes according to that low, medium and high densities of vehicles.

V. CONCLUSION

Traffic management is most common problem in urban areas. The increased traffic has lead to long waiting time, fuel wastages, slower speed, and increased vehicular queuing. The traffic flow shows the traffic state in fixed time interval and helps to manage and control the traffic especially when there is a traffic jam. The system is capable of detecting the emergency cases vehicles such as ambulance through using a RFID technology.

This system will definitely help to traffic congestion control and to give the way to the ambulance when there is heavy traffic on the road.

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