

DESIGN OF INTELLIGENT TRAFFIC CONTROL AND MONITORING SYSTEM

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ABSTRACT—Now a day's Traffic congestion and tidal flow management were recognized as major problems in modern urban areas. The purpose of this project is to implement an automated system for clearing the traffic for ambulances to help the people who met with accidents and it can also clear the traffic by using IR sensors which is placed on the road. It will clear the traffic by given priority to the largest vehicle containing to the path. So according to this project, it has two types of sections. First one is, to allow the ambulance when it comes to the traffic zone. Another one is, to monitor the vehicle strength on the road. The traffic signal receives the information and takes the control action according to the priority. If both are occurred at the same time, the priority is goes to the ambulance. Each and every section is designed around a microcontroller as a control unit. By this project we can implement an automatic traffic clearing system for ambulance and can provide smooth flow of vehicle during traffic.

Keywords—PIC; RF Transmitter and receiver; Traffic light Control Unit, Vehicle Network; GSM module; IR Sensors;

I. INTRODUCTION

The traffic signal system is probably the most important kind of transportation facility in operation today, considering the perspectives of both safety and efficiency. Two-thirds of all miles driven each year in the U.S. are on road ways controlled by traffic signals. In some urban areas, signals at busy intersections control the movement of more than 100,000 users per day. The signal system also has a great impact on energy and the environment. The more times a vehicle stops, the larger the level of pollutants that it emits. And, twenty percent of the oil used by automobiles traveling along urban arterials is consumed while waiting at a red light at a signalized intersection. According to a 2007 report from the National Highway Traffic Safety Administration, 20 percent of all motor vehicle fatalities in the United States each year occur at an intersection. Between 1997 and 2004, this figure represented 76,162 lost lives. In addition, tens of thousands of drivers, cyclists and pedestrians are injured each year in traffic accidents at intersections.

II. GLOBAL SYSTEM FOR MOBILE COMMUNICATION

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a sub scripmtions to a mobile operator, just like a mobile phone. A GSM modem can be a dedicated modem device with a serial, USB or Bluetooth connection, or it may be a mobile phone that provide GSM mobile capabilities. A GSM modem could also be a standard GSM mobile phone with appropriate cable and software driver to connect to a serial port on your computer. SMS client and server is a application software which is used for sending and receiving messages (SMS).



Figure 1. GSM modem

III.RF MODULES

An **RF module** (radio frequency module) is a (usually) small electronic circuit used to transmit and/or receive radio signals on one of a number of carrier frequencies. RF modules are widely used in electronic design owing to the difficulty of designing radio circuitry. We design a circuit for an application which requires radio communication and then "drop in" a radio module rather than attempt a discrete design, saving time and money on development. In this project we use two modules. They are RF transmitter and RF receiver. RF transmitter will transmit the RF signal which is placed at the ambulance. Then RF receiver receives that transmitted signal which is placed at the traffic light controller. When the both RF

signals match, it will glow the green light.

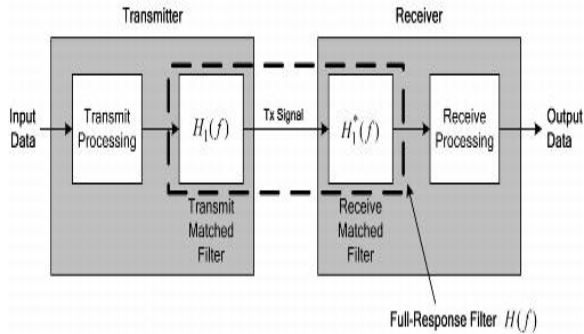


Figure 2. RF transmitter and receiver

IV. PIC (peripheral interface controller)

The PIC micro was originally designed around 1980 by General Instrument as a small, fast, inexpensive embedded microcontroller with strong I/O capabilities. PIC stands for "Peripheral Interface Controller". General Instrument recognized the potential for the PIC and eventually spun off Microchip, headquartered in Chandler, AZ to fabricate and market the PIC micro. **It has many advantages, they are given below;** It is a RISC (Reduced Instruction Set Computer) design, only thirty seven instructions to remember, its code is extremely efficient, allowing the PIC to run with typically less, program memory than its larger competitors, it is low cost, high clock speed.

V. Definitions and Problem Description

The problems of typical conventional traffic light Controller are mentioned below:

A. Heavy traffic jams:

With increasing number of vehicles on road, heavy traffic congestion has substantially increased in major cities. This evening, after office hours. The main effect of this matter is increased time wasting of the people on the road. The solution for this problem is by developing the program which different setting delays for different junctions. The delay for junctions that have high volume of traffic should be setting longer than the delay for the junction that has low of traffic.

B. No traffic, but still need to wait:

At certain junctions, sometimes even if there is no traffic, people have to wait. Because the traffic light remains red for the preset time period, the road users should wait until the light turn to green. If they run the red light, they have to pay fine. The solution of this problem is by developing a system which detects traffic flow on each road and settings of signals accordingly. Moreover, synchronization of traffic signals in adjacent junctions is also necessary and

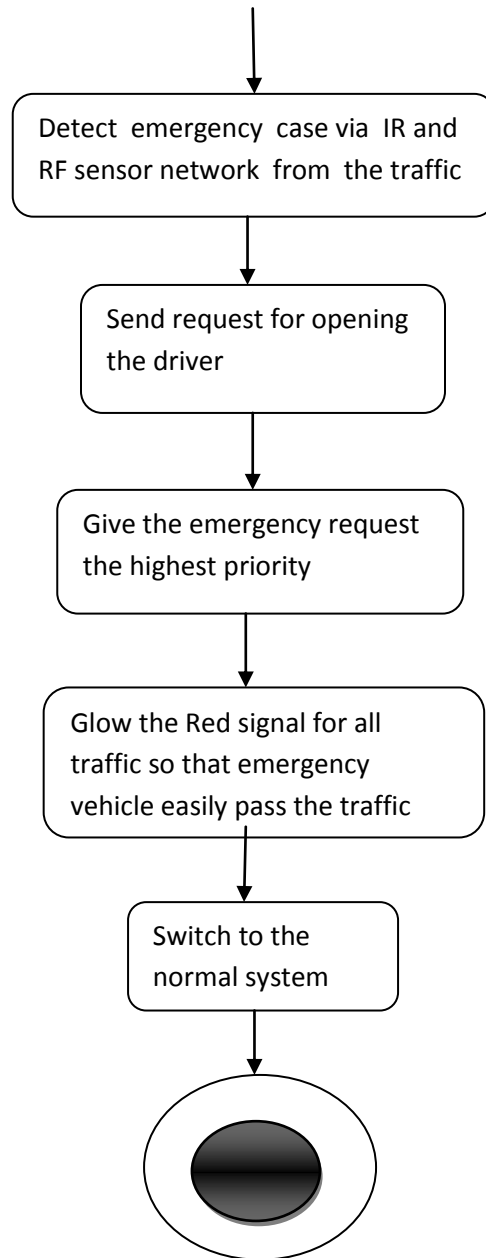
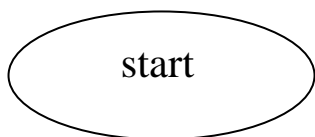


Figure 3. Flow chart

police will be stuck especially at the traffic junction. This is because the road user waiting for the traffic light turn to green. It is the critical problem because it can cause the emergency case. Become complicated and involving life.

D. When more than one emergency ambulance come:

When more than one emergency car came then most of the system fails. They give green signal to both which lead to traffic conjunction problem and also leads to accidents. In ITSC system, this problem solve by giving red signal to all traffic. So, only emergency cars will pass the signal for particular time period.

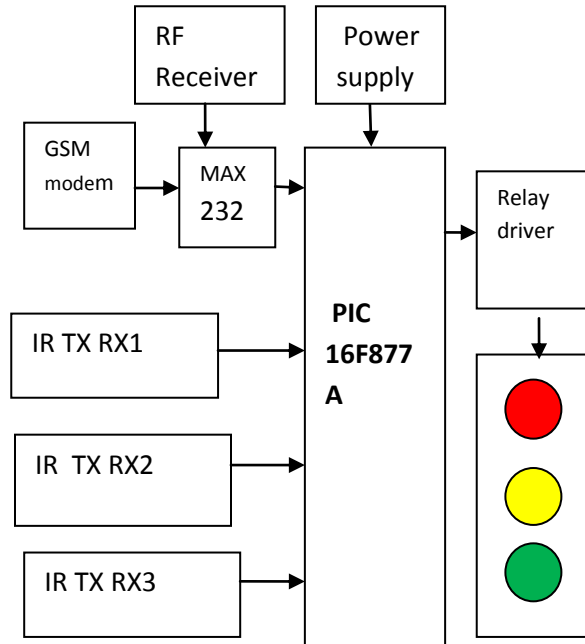


Figure 4. Block diagram of the project

C. Emergency ambulance stuck in traffic jam:

Usually, during traffic jam, the emergency vehicle, such as ambulance, fire brigade etc.

Working Operation: Initially 230 V AC supply is reduced to (0-9V) with the help of a step down transformer having a capacity of 500mA. This low voltage is rectified with the help of bridge rectifier. The ripples are minimized with the help of capacitor filter to get a smooth DC supply. The rating of the chosen capacitor filter is 1000µF. The regulated DC voltage is obtained by using a regulator IC 7805. Another capacitor filter of rating 10µF is connected at the output of regulator IC to eliminate the voltage oscillations at the output due to the large voltage oscillations at the input of the regulator. Then transmitter section will transmit the radio frequency signal which is placed into the ambulance. This will be received by the RF receiver. When the RF signal matching is occurs, the lights will turn to green for a particular path. IR module consists of IR transmitter and IR receiver. If the IR sensor sense the vehicle strength, which is placed along the traffic zone. The IR transmitter transmits the signal to the IR receiver at all times. When the traffic queue will high it cuts the IR signal transmission. At that time, control unit automatically knows and will give priority to that road for fast transmission.

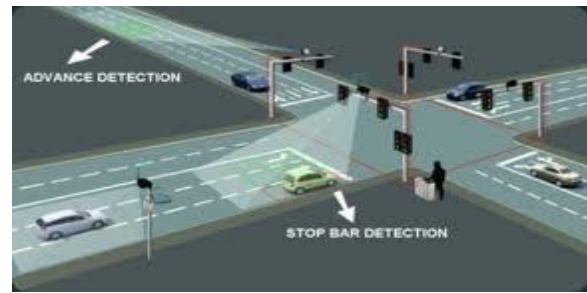


Figure 5. Traffic section

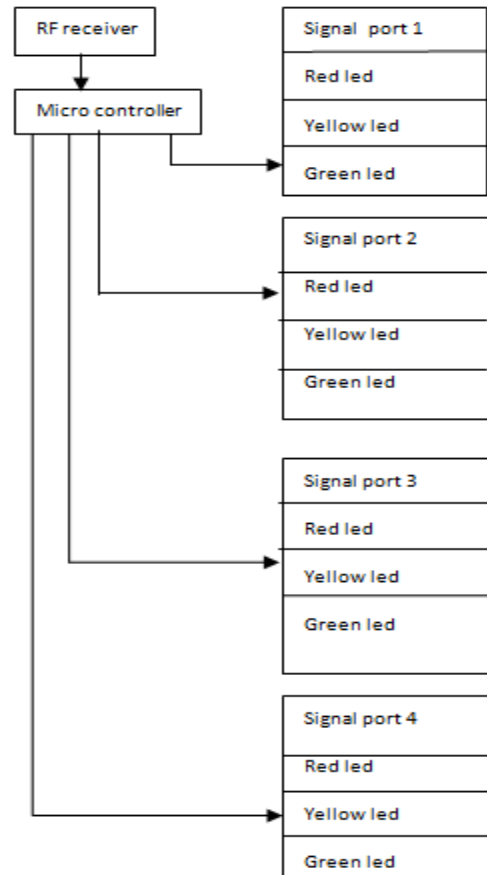


Figure 6. Diagram of traffic control

IV. EXPERIMENTAL RESULTS:

The results are obtained after carrying out the experimentation by using the following hardware components. The component includes GSM modem, PIC Controller, Relay Circuit, RF Module, IR sensors and LCD Display and control unit which lead to traffic conjunction problem and also leads to accidents. In ITSC system, this problem solve by giving red signal to all traffic and only emergency cars will pass the signal for particular time period.

V. CONCLUSION AND FUTURE WORK

In this paper, an evolutionary approach to estimate the traffic volumes of road networks has been proposed, in

which real time traffic information is not provided. Genetic algorithm was used to estimate the unknown traffic volume for such road section whose traffic information not available. Present work considered a simple road sections under static environments. In future work, we will use real dynamic road section to estimate the unknown traffic volumes and apply to real traffic when more than one emergency car came then most of the system fails. They give green signal to.

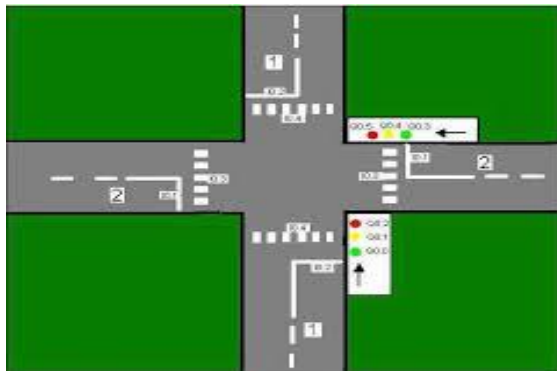
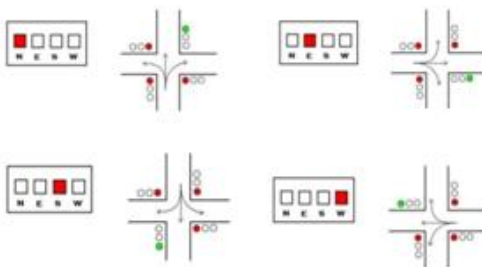


Figure 7. Priority of the traffic light

PICTORIAL REPRESENTATION



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