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Intelligent Traffic Control System

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***Abstract*— Traffic congestion is the biggest problem faced by densely populated countries. It is often noticed that, in spite of being an emergency the ambulances have to wait at the signals till it becomes green and that can risk the life of the patient because it becomes important for an ambulance to reach the hospital while taking the patient there or to reach the spot where the patient is. So, our project focuses on this area.**

The project is a replica of a four way lane crossing of real time scenario. The first part, concentrates on the problems faced by Ambulances and priority vehicles like police jeeps and fire brigades, IR transmitter and receiver are used to make the Ambulance's lane Green and thus providing a stoppage free way for the Ambulance and other priority vehicles.

The other problem that is many times faced is that despite being a lot of traffic in one lane, people over there have to wait because of the red light of the signal and the other lane which has less traffic remains green. So in the second part, our project is concentrated on Traffic density control. For the traffic density control we have used IR transmitter and receiver to provide dynamic traffic control and thus increasing the duration of the Green light of the lane in which traffic density is high and hence, regulating traffic.

Thus, by this project we aim at solving the traffic problems and also the problems faced by ambulances and other priority vehicles like police jeeps and fire brigades during emergency.

***Index terms*- Traffic congestion ,traffic density, a replica, IR transmitter.**

I. INTRODUCTION

Traffic congestion is a severe problem in many major cities across the world and it has become a nightmare for the commuters in these cities. The Traffic congestion can also be caused by large Red light delays, etc. The delay of respective light is hard coded in the traffic light and it is not dependent on traffic. Therefore for simulating and optimizing traffic control to better accommodate this increasing demand arises. But due to heavy traffic, one can often see the Ambulances stuck in traffic for long durations thus causing danger to patient's life. So, our project aims to solve this problem of Ambulances. When an Ambulance arrives, its corresponding lane traffic light becomes green and all the others become red, thus paving traffic less way for the Ambulance and thus helping it to reach the hospital swiftly.

Now the project's second phase is focused on the traffic congestion problem in areas where traffic density is very high. We sometimes see that the lane in which the traffic is less is cleared earlier than the lane having more traffic. This problem gradually causes huge traffic jams. In this the system contains IR transmitter and IR receiver which are mounted on the either sides of roads respectively. Microcontroller controls the IR system and counts number of vehicles passing on road. Thus based on vehicle count, microcontroller defines different ranges for traffic light delays and updates those accordingly.

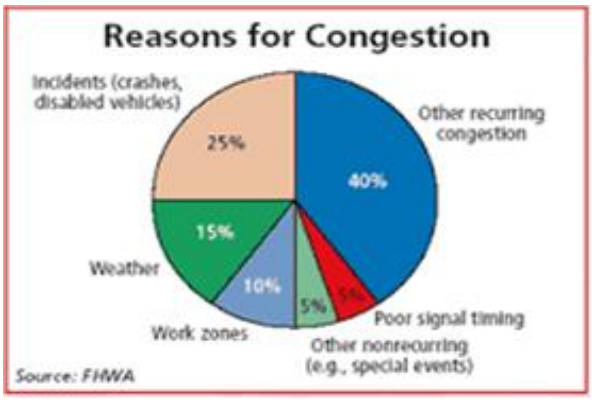


Fig. 1: Reasons for Congestion

II. TRAFFIC LIGHT CONTROL AND COORDINATION

The normal function of traffic lights requires sophisticated control and coordination to ensure that traffic moves as smoothly and safely as possible and that pedestrians are protected when they cross the roads. A variety of different control systems are used to accomplish this, ranging from simple clockwork mechanisms to sophisticated computerized control and coordination systems that self-adjust to minimize delay to people using the road. A traffic signal is typically controlled by a controller inside a cabinet mounted on a concrete pad.

Attempts are often made to place traffic signals on a coordinated system so that drivers encounter long strings of green lights (the technical term is progression). The distinction between coordinated signals and synchronized signals is very important. Synchronized signals all change at the same time and are only used in special instances or in older systems. Coordinated (progressed) systems are controlled from a master controller and are set up so lights "cascade" (progress) in sequence so platoons of vehicles can proceed through a continuous series of green lights.

III. COMPONENTS USED

A. Microcontroller

The Atmel AT89 series microcontroller is used. The Atmel AT89 series is an Intel 8051-compatible family of 8 bit microcontrollers (µCs) manufactured by the Atmel Corporation.

In the Atmel AT89 series the AT89C52 microcontrollers have been used.All four ports in the AT89C52 are bidirectional. Each consists of a latch (Special Function Registers P0 through P3), an output driver, and input buffer. The output drivers of Ports 0 and 2, and the input buffers of Port 0, are used in accesses to external memory.

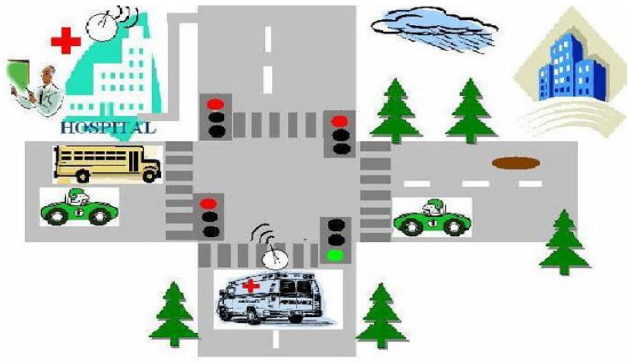
There are lots of traffic signals in a single city itself, so the design from the economical perspective is also important. As 8051 microcontroller is easy to use as well as an economical product it is well suited for this model.

B. Passive Infrared Sensors

In our project passive infrared sensors are used. A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. All objects with a temperature above absolute zero emit heat energy in the form of radiation. Usually this radiation is invisible to the human eye because it radiates at infrared wavelengths, but it can be detected by electronic devices designed for such a purpose. An individual PIR sensor detects changes in the amount of infrared radiation impinging upon it, which varies depending on the temperature and surface characteristics of the objects in front of the sensor.

IV. WORKING

The project mainly focuses on providing a clear pathway for an emergency vehicle. So basically, IR receivers will be mounted at a specific distance from the signal (E.g. on the divider, on a street light pole etc.), where it can detect the IR transmission waves coming from the emergency vehicle when the vehicle comes in close proximity. The transmitter mounted on the emergency vehicle will be formed by a bunch of IR transmitters combined in a circular shape. The signal of the lane in which the emergency vehicle is coming becomes green after a specific delay but the signal on other lanes turns red right away. The delay is provided so that the emergency vehicle can reach near the signal and the crossroads will be cleared from the traffic of other lanes. So the possibility of accidents will be reduced to a great extent.



The same concept of IR can be used for solving traffic congestion problems near the traffic signals. Depending on the width and traffic density near a traffic signal the traffic density can be divided into three categories: Low, Medium and High. And the signal timing on that road can be modified according to the traffic need. IR sensors can be place on the dividers and when a vehicle comes and stops near the sensor the sensor will keep on monitoring the vehicle. If the vehicle is there for more than a specific time implies the vehicle is steady. If the sensor in the low zone is activated then the signal timings need not be modified but if the medium zone or high zone is activated then the green signal timing will be increased depending on the traffic zone density-timing algorithms. So ultimately the side of the road on which traffic is more will get a higher priority and more time for clearance by increasing green signal timing on that road and solving the traffic congestion problem to some extent.

V. PROGRAMMING

A. In-system Programming

In-system programming (ISP), also called In-Circuit Serial Programming (ICSP), is the ability of some programmable logic devices, microcontrollers, and other embedded devices to be programmed while installed in a complete system, rather than requiring the chip to be programmed prior to installing it into the system. The primary advantage of this feature is that it allows manufacturers of electronic devices to integrate programming and testing into a single production phase, and save money, rather than requiring a separate programming stage prior to assembling the system.

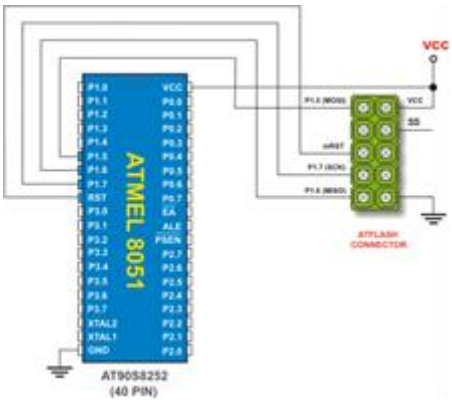


Fig. 4: ATMEL 8051

B. KEIL

Tools developed by Keil endorse the most popular microcontrollers and are distributed in several packages and configurations, dependent on the architecture. Keil offers a variety of evaluation boards, USB-JTAG adapters, emulators, and third-party tools, which completes the range of products. In addition to that Keil is easy to use programming software.

VI. FUTURE SCOPE

[1]. This project can be enhanced in such a way as to control automatically the signals depending on the traffic density on the roads using sensors like IR detector/receiver

module extended with automatic turn off when no vehicles are running on any side of the road which helps in power consumption saving.

[2]. Data transfer between the microcontroller and computer can also be done through telephone network, data call activated SIM This technique allows the operator to gather the recorded data from a far end to his home computer without going there.

[3]. Traffic lights can be increased to N number and traffic light control can be done for whole city by sitting on a single place.

VII. ADVANTAGES OF PROJECT

[1]. Ambulance service will no longer be affected by traffic jams.

[2]. One time investment cost.

[3]. A modernized way of controlling traffic.

[4]. Help traffic police in easy control of traffic.

Conclusions

Thus, our project with the use of various technological components solves the problems of various emergency services quite quickly and also regulates traffic in a modernized way, thus saving a lot of time and creating fewer casualties.

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