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A Review on Density based Traffic Light System

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***Abstract*- With the increase in human population in cities and therefore number of vehicles, traffic control signals have been playing significant role in managing traffic flow in cities. It provides safety and convenience to both drivers and pedestrians. However, traditional traffic control signals fails in time management, as it allocates equal time slots to each road it is managing. This creates unnecessary waiting for drivers, which could not be endurable in every case, as being in time, is important to everyone. Therefore, here we proposed density based traffic control signal, which allocates different time slots to each road according to vehicle density on it and therefore doing time management function. This system also comes with RF signal override control in case of emergency vehicles such as fire brigade, ambulance, etc. So this is also a priority based system. This system, therefore, offers advantages over ordinary traffic control signal.**

Keywords: **Density Based Traffic, traffic control signals, safety and convenience**

I. INTRODUCTION

Now a day's one of the major problems faced in any metro city is traffic congestion. Getting stranded in between heavy traffic is a headache for each and every person driving the vehicle and even to the traffic police controlling the traffic. One of the oldest ways of handling traffic was having a traffic police deployed at each junction and manually controls the inflow of traffic through hand signaling. However this was quite cumbersome and then came the need for a different type of control - using Traffic Control Signals. Conventional Traffic signal started playing important role in cities, but as time passed, with increase in population in cities, this system became less efficient in traffic management. This called the need of traffic control signal which works more efficiently. So density based traffic control signal is proposed which allocates time for each road depending on the density of traffic on it. And also the project aims to provide signal override for emergency vehicles through RF signal. It happens when there is an

emergency situation like ambulance, fire brigade stuck in the traffic. This project therefore happens to be the perfect solution in high population cities.

This circuit makes use of IR sensors to measure the density of traffic. These sensors are interfaced with microcontroller of 8051 family which in turn allocates time for each road according to the output of IR sensors through traffic signal. For the emergency override it uses RF transmitter and receiver.

II. SYSTEM ARCHITECTURE

The above figure shows Density Based Traffic Control Signal System.

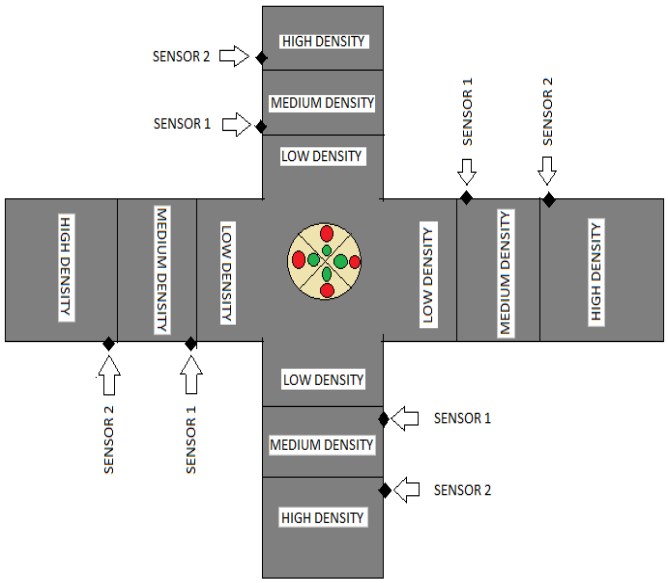

Fig. Overview diagram of Density Based Traffic Control Signal with Emergency Override

Fig of:2.1 Density Based Traffic Control Signal System.

- **Working principal**

Traffic light optimization is a complex problem. With multiple junctions, the problem becomes even more complex, as the state of one light influences the flow of traffic towards many other lights Changes, depending on the time of day, the day of the week, and the time of year. Roadwork and accidents further influence complexity and performance. As the number of road Users constantly increases, and resources provided by current infrastructures are limited, intelligent control of traffic will

become a very important issue in the future. However, some limitations to the usage of intelligent traffic control exist. Avoiding traffic jams for example is thought to be beneficial to both environment and economy, but improved traffic-flow may also lead to an increase in demand. There are several models for traffic simulation. In our project we focus on optimization of traffic light controller in a city using IR sensor and developed visual monitoring using microcontroller. Traffic light optimization is a complex problem. Even for single junctions there might be no obvious optimal solution. With multiple junctions, the problem becomes even more complex, as the state of one light influences the flow of traffic towards many other lights. In this paper, we propose three approaches, the firstly - to give authority to ambulances to pass the respective lane without delay, secondly – allow smooth passage of vehicles with maximum priority (VIP cars, POLICE cars), and thirdly – control traffic density of cross-roads by increasing the green light time. The project is a replica of a four way lane crossing of real time scenario. In the first part, concentrated on problems faced by Ambulances, RFID concept is used to make the Ambulance's lane Green and thus providing a stoppage free way for the Ambulance. IR transmitter and receiver are used to make the vehicles' lane Green and thus preventing traffic congestion. IR transmitter and receiver are used 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

III. COMPONENT AND DATASHEET

This chapter explain about the Hardware that is being used in the paper.

- **Controller Module (89c51)**

The AT89C51 is a low-power, high-performance CMOS 8-bit microcontroller with 4K bytes of in-system programmable Flash memory. The device is manufactured
Using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pin Out. The on-chip Flash allows the program memory to be reprogrammed in system or by a conventional nonvolatile memory programmer.

By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S51 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications. The AT89S51 provides the following standard features: 4K bytes of Flash, 128 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, two 16-bit timer/counters, a five vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89S51 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes.

The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and

Interrupt system to continue functioning. The Power-down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until the next external interrupt or hardware reset.

- **Port 0**

Port 0 is an 8-bit open-drain bi-directional I/O port. As an output port, each pin can sink eight TTL inputs. When 1s are written to port 0 pins, the pins can be used as highimpedance inputs.

Port 0 may also be configured to be the multiplexed loworder address/data bus during accesses to external program and data memory. In this mode P0 has internal pull-ups.

Port 0 also receives the code bytes during Flash programming, and outputs the code bytes during program verification. External pull-ups are required during program verification.

- **Port 1**

Port 1 is an 8-bit bi-directional I/O port with internal pull-ups. The Port 1 output buffers can sink/source four TTL inputs. When 1s are written to Port 1 pins they are pulled high by the internal pull-ups and can be used as inputs. As inputs, Port 1 pins that are externally being pulled low will source current (I_{IL}) because of the internal pull-ups.

Port 1 also receives the low-order address bytes during Flash programming and verification.

- **Port 2**

Port 2 is an 8-bit bi-directional I/O port with internal pull-ups. The Port 2 output buffers can sink/source four TTL inputs. When 1s are written to Port 2 pins they are pulled high by the internal pull-ups and can be used as inputs. As inputs, Port 2 pins that are externally being pulled low will source current (I_{IL}) because of the internal pull-ups.

Port 2 emits the high-order address byte during fetches from external program memory and during accesses to external data memory that use 16-bit addresses (MOVX @ DPTR). In this application, it uses strong internal pull-ups when emitting 1s. During accesses to external data memory that use 8-bit addresses (MOVX @ RI), Port 2 emits the contents of the P2 Special Function Register.

Port 2 also receives the high-order address bits and some control signals during Flash programming and verification.

- Port 3

Port 3 is an 8-bit bi-directional I/O port with internal pull-ups. The Port 3 output buffers can sink/source four TTL inputs. When 1s are written to Port 3 pins they are pulled high by the internal pull-ups and can be used as inputs. As inputs, Port 3 pins that are externally being pulled low will source current

(I_{IL}) because of the pull-ups. Port 3 also receives some control signals for Flash programming and verification.

- RST

Reset input. A high on this pin for two machine cycles while the oscillator is running resets the device.

- ALE/PROG

Address Latch Enable output pulse for latching the low byte of the address during accesses to external memory. This
Pin is also the program pulse input (PROG) during Flash programming.

In normal operation ALE is emitted at a constant rate of 1/6 the oscillator frequency, and may be used for external timing or clocking purposes. Note, however, that one ALEpulse is skipped during each access to external Data Memory.

If desired, ALE operation can be disabled by setting bit 0 of SFR location 8EH. With the bit set, ALE is active only during a MOVX or MOVC instruction. Otherwise, the pin is weakly pulled high. Setting the ALE-disable bit has no effect if the microcontroller is in external execution mode.

1) PSEN

Program Store Enable is the read strobe to external program memory.

When the AT89C51 is executing code from external program memory, PSEN is activated twice each machine cycle, except that two PSEN activations are skipped during each access to external data memory.

2) EA/VPP

External Access Enable. EA must be strapped to GND in order to enable the device to fetch code from external program memory locations starting at 0000H up to FFFFH.
EA should be strapped to V_{CC} for internal program executions.

This pin also receives the 12-volt programming enable voltage (V_{PP}) during Flash programming, for parts that require 12-volt V_{PP}.

3) XTAL1

Input to the inverting oscillator amplifier and input to the internal clock operating circuit.

4) XTAL2

Output from the inverting oscillator amplifier.

- **IR SENSOR AND LEDS**

An infrared sensor is an electronic device used to detect the objects. It is used to measure an object heat or its motion. The IR sensor emits or receives the infrared radiations that are invisible for the human eye. The working is simple: when IR radiation of the LED reaches the photodiode, the output voltages change according to the magnitude of the IR light (5v or 0v).

It is universal that the black color absorbs the entire radiation incident on it and white color reflects the entire radiation incident on it. It consists of an IR LED, a photodiode, a potentiometer, an IC Op-Amp and an LED. IR LED emits infrared light.

The Traffic lights consist of three universal colored lights: the green light allows traffic to proceed in the indicated direction, the yellow light warns vehicles to prepare for short stop, and the red signal prohibits any traffic from proceeding.

- **LCD display**

Liquid Crystal Display (LCD):16x2 LCD used in the implemented to display data over 2 lines, each of 16 characters. Actually, two types of registers are used to configure the LCD; the command registers and control registers. Other aspects are LCD initialization, clearing the screen, setting the cursor position, and controlling display. While the data register holds the ASCII code of the characters that are appeared on the display.

CONCLUSION

This proposed system provides time efficient system by avoiding unnecessary waiting at traffic signal junction due to use of density based controlling. It is priority based system as it provides Emergency override and therefore avoiding any possible damage.

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