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REAL TIME DENSITY BASED INTELLIGENT TRAFFIC CONTROL SYSTEM

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ABSTRACT- The paper is aimed at designing a density based dynamic traffic signal system where the timing of sign will change naturally on detecting the traffic thickness at any intersection. Gridlock is a serious issue in many urban areas across the world and in this way the time has come to move more manual mode or fixed clock mode to a mechanized framework with dynamic capacities.

The point of our venture is to foster a Density Based Traffic Signal System utilizing PIC microcontroller. In this framework, we will utilize IR sensors to gauge the traffic thickness. We need to mount three IR sensors for every street; the distance between these sensors will rely upon nature of traffic on a specific intersection. These sensors will detect the traffic on that specific street. Every one of these sensors are interfaced to the PIC microcontroller. In light of these sensors,controller detects the traffic and dynamically set up the time delay of signals. One more application adds here by using RFID Card reader to detect the emergency vehicle and give the green path signal to pass safely.

Index Terms- Traffic signal system, traffic density, PIC microcontroller, IR sensor, RFID card

I. INTRODUCTION

In today's high speed life, we have to face many problems one of which is traffic congestion, Traffic congestion becomes a serious issue in our day to day activities. Traffic congestion will be also much more widely increasing. Controlling traffic signal proficiently continuously has pulled in numerous analysts. Usefulness of individual and society goes down as heaps of time is squandered in the traffic light. High limit of vehicles, the deficient foundation and the impossible conveyance of the flagging framework are principle explanations behind these turbulent gridlocks.

Traffic lights are mostly evolved to guarantee the right progression of traffic, The project is pointed toward planning a thickness based unique traffic light framework where the circumstance of sign will change consequently on detecting the traffic thickness at any intersection. Gridlock is an extreme issue in many urban

areas across the world and hence the time has come to move more manual mode or fixed clock mode to a mechanized framework with dynamic abilities. Present day traffic flagging framework is fixed time based which may deliver wasteful on the off chance that one path is operational than the others. To enhance this difficult we have made a structure for an insightful traffic signal framework. Now and again higher traffic thickness at one side of the intersection requests longer green time when contrasted with standard allocated time We,therefore propose here a mechanism in which the time period of green light and red light is assigned on the basis of the density of the traffic present at that time. This is achieved by using IR(Infrared sensors). Once the density is calculated, the glowing time of green light is assigned by the help of the microcontroller (PIC). The sensors which are present on sides of the road will detect the presence of the vehicles and sends the information to the microcontroller where it will decide how long a flank will be open or when to change over the signal lights. In subsequent sections, we have elaborated the procedure of this framework.

II. LITERATURE SERVEY

Automatic traffic monitoring system and traffic surveillance are important for road usage and better traffic control. There are various methods are available for traffic management, because it has become serious issues nowadays In recent years, surveillance systems and video monitoring [1] have been widely used for traffic control. Historically, there exist several vehicle detectors such as radar, ultrasonic, and microwave detector. But these sensors are expensive, with less capacity and difficult to maintain, difficult for installation and implementation and extra maintenance charges be there. Radar sensors are affected by metal barriers near road [2, 3]. In mathematical modeling [1, 4] parameters of a vehicle are designed mathematically using the geometric positions of camera, sunlight and vehicle and compared with values obtained using video. The manual dependencies between intersections lead to a complicated derivations with fault parameters. These parameters are hazardous and most of the problem is because of the variance of these parameters with time.

Several techniques are designed for traffic congestion detection that is based on sensing [6].Another approach is that measure the traffic density based on the number of occupied fraction of road based on RF signals which was placed on road side. This method was inefficient because significant manual work was required at different roads [5]. A lot of innovations have been made for predicting the density of the traffic based on image processing [7, 8]. But these techniques require the good images whose quality is weather dependent, especially with the rain and the fog. Algorithms to model the various states of the traffic such as fuzzy
logic were used. Traffic signals operating on fixed signal timing delays cannot be used properly to control the traffic congestions. When the traffic density increases more than a limit on a particular road, it needs larger green light duration to reduce the traffic flow. The major problem of the existing traffic light system is that the transition timing slots are fixed in software and unnecessary waiting time when no vehicles are present on opposite route. Since the vehicle to stand in a proper line due to which many of the traffic occurs. Our system uses PIC microcontroller that is interfaced with IR sensors [9]. Three IR transmitters and the IR receiver are placed on each road. When an automobile passes between the IR sensors, the photodiode is activated and the object is detected counter is incremented. The collected information about the traffic density of each roads of a

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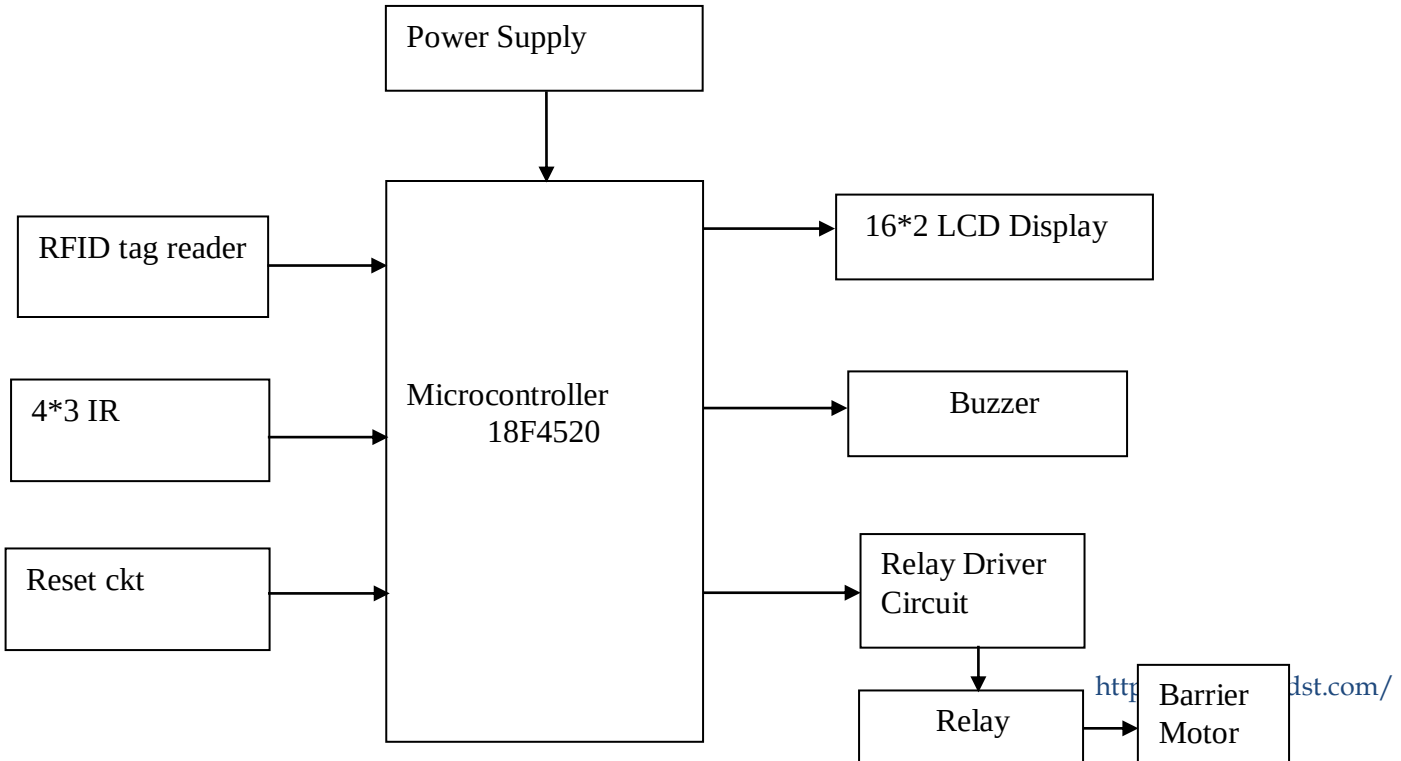
_+‘ junction is analyzed in order to change dynamically the delays of green light. Traffic density is measured as —low, medium and high‖. Based on this density varies the traffic signal duration for a particular way. LCD display is used to display the waiting time. The entire procedure will repeated in a cyclic manner for every road.

III. PROPOSED METHODOLOGY

In this paper, we are using IR sensors & PLC microcontroller to reduce traffic congestion problem and design an intelligent traffic control system.The proposed system consists of a traffic light controller that manages the traffic lights of a “+” junction of bidirectional roads. The proposed system consists of a PIC microcontroller which does all the function according to program interfaced. Power supply is given to the microcontroller and the IR sensor on both the side of the road sense the density of traffic and gives the information to PIC microcontroller. The controller provides output signal to traffic light, barrier gate and buzzer which act accordingly.If the density is more in any lane then data is collected by IR sensors is given to the control room so the operator may reduce scheduled time and turn GREEN signal in particular lane and the motor activates the barrier to open and when RED signal is given the barrier is made to close, so traffic control is enhanced.Buzzer is provided to alert the people regarding the signal and the closing of barrier gate. Here are three IR sensors are mounted on either sides of each road. The distance between each IR sensors depend on the nature of the traffic density. These IR transceivers are used to detect the vehicles passed through it.
One more application adds here by using RFID Card reader. There are The STCS (Smart traffic control System) is comprised of a group of two RFID readers, separated by a long way , in each direction of a road crossing and have a central computing system (CCS) to regulate all of them. As a vehicle passes by a reader, it tracks the vehicle through the RFID tag affiliated to the vehicle and fetches its electronic product code (EPC) data. The EPC consists of the vehicular identification number (VIN). The VIN is an industry standard and every automobile features a unique VIN.



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4*3 LED for signal

Fig. 1 Architecture of the proposed system.

Through a table look-up procedure the VIN could also be matched against individual vehicle records and every one details like type, weight, length, registration, pollution control status, and therefore the owner's identification are often retrieved. The data obtained is then sent immediately to the CCS by wireless or wired channels, as found convenient at that location. The CCS contains a central database processing system (CDPS) for processing vehicular data and a choice making section (DMS) for controlling the traffic signals. Here RFID card is used to detect the emergency vehicle like, ambulance, fire fighting vehicles, blood donation vehicles,etc. When ambulance or any other emergency vehicle detect, signal will open immediately and gets green to pass the Ambulance.

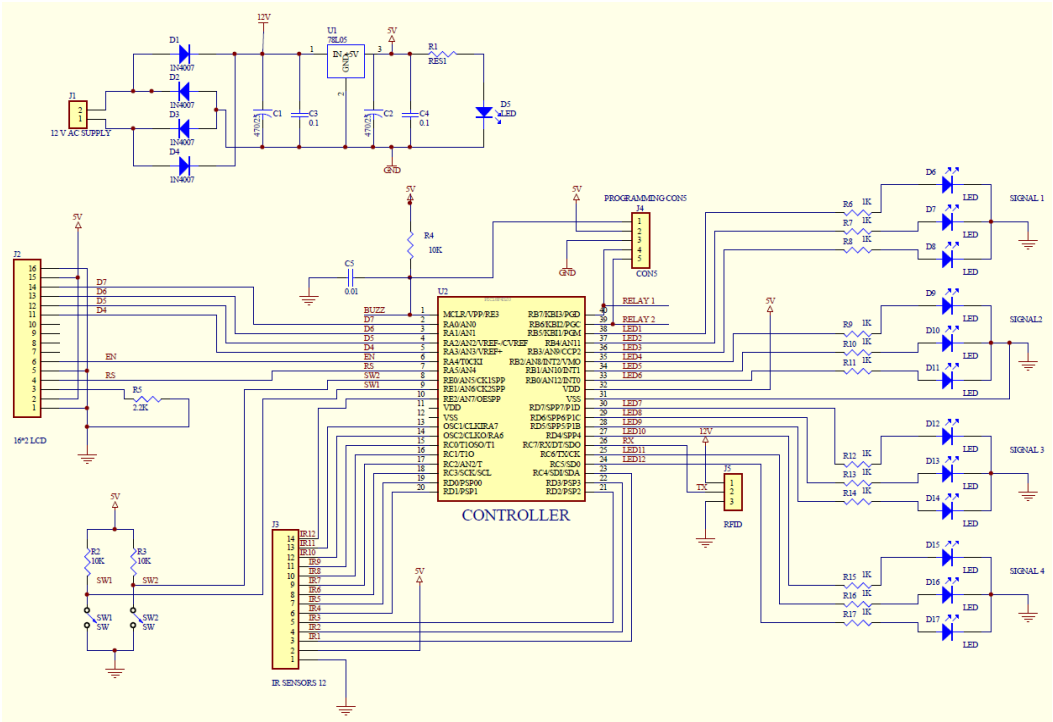

Fig.2- Circuit Diagram of the proposed system

A. PIC 18F4520 Microcontroller

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Fig. 3- PIC 18F4520

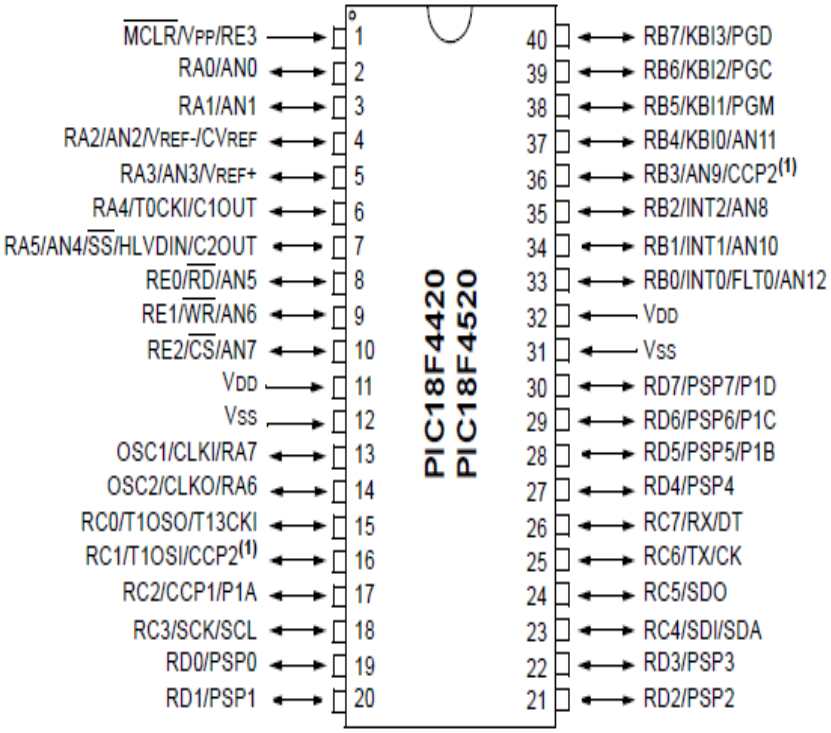

Fig 4-. Pin configuration of PIC 16F877A

Table 1. Feature of PIC18F4520

Features	PIC18F4520
Operating Frequency	DC — 40 MHz
Program Memory (Bytes)	32768
Program Memory (Instructions)	16384
Data Memory (Bytes)	1536
Data EEPROM Memory (Bytes)	256

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Interrupt Sources	20
I/O Ports	Ports A, B, C, D, E
Timers	4
Capture/Compare/PWM Modules	1
Enhanced Capture/Compare/PWM Modules	1
Serial Communications	MSSP, Enhanced USART
Parallel Communications (PSP)	Yes
10-B t Analog-to-Digital Module	13 Input Channels
Resets (and Delays)	POR, BOR, RESET Instruction, Stack Full, Stack Underflow (PWRT, OST), MCLR (optional), WDT
Programmable High/Low-Voltage Detect	Yes
Programmable Brown-out Reset	Yes
Instruction Set	75 Instructions; 83 with Extended Instruction Set Enabled
Packages	40-Pin PDIP 44-Pin QFN 44-Pin TQFP

Data Memory up to 4k bytesn Data register map - with 12-bit address bus 000-FFF
o Divided into 256-byte banks
o There are total of F banks
o Half of bank 0 and half ofbank 15 form a virtual (oraccess) bank that is accessibleno matter which bank isselected – this selection isdone via 8-bits
Program memory is 16-bits wide accessed through a separate program data bus and address bus inside the PIC18.
o Program memory stores the program and also static data in the system.
On-chip External
On-chip program memory is either PROM or EEPROM.
The PROM version is called OTP (one-time programmable) (PIC18C) The EEPROM version is called Flash memory (PIC18F).

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Maximum size for program memory is 2M n Program memory addresses are 21-bit address starting at location 0x000000

B. RFID TAG READER:

Fig 5-. RFID tag reader

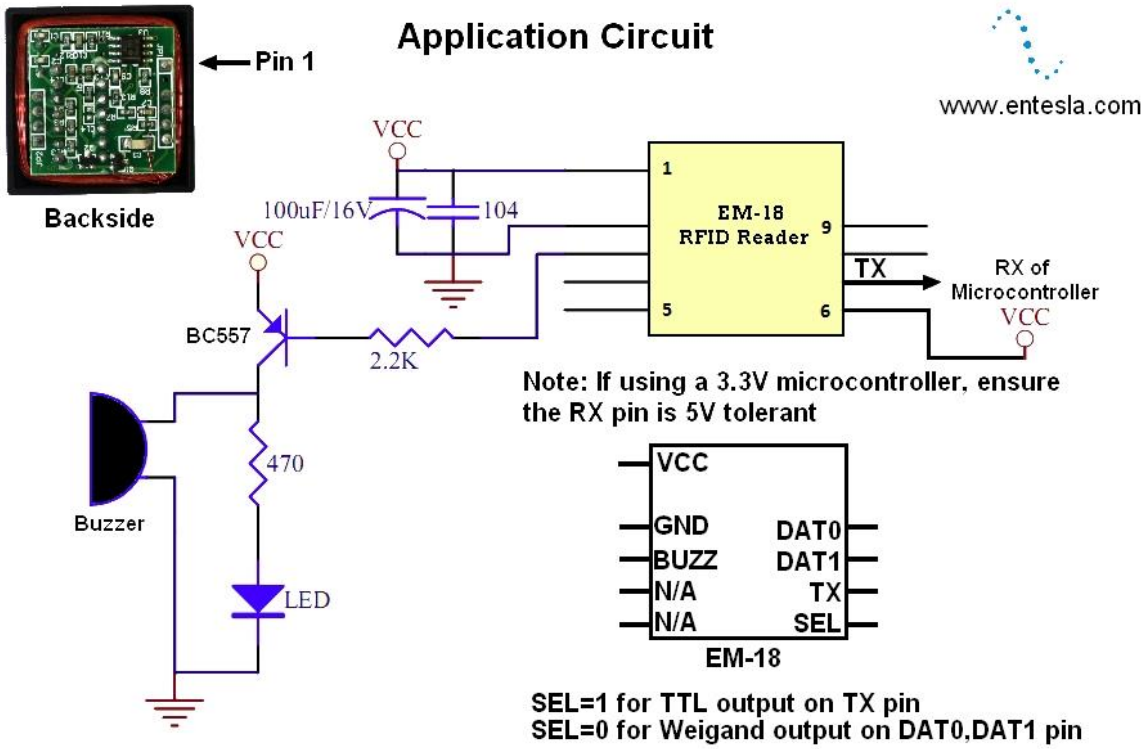

Fig 6- Application circuit of RFID tag reader

RF ID is Radio Frequency Identification which is used to make track of every physical object.The frequency of operation widely used at present are **LF –Low Frequency 125 KHz&UHF (Mifare) 13.5MHz**. In this post our focus is on 125KHz RF ID.

C. IR SENSOR

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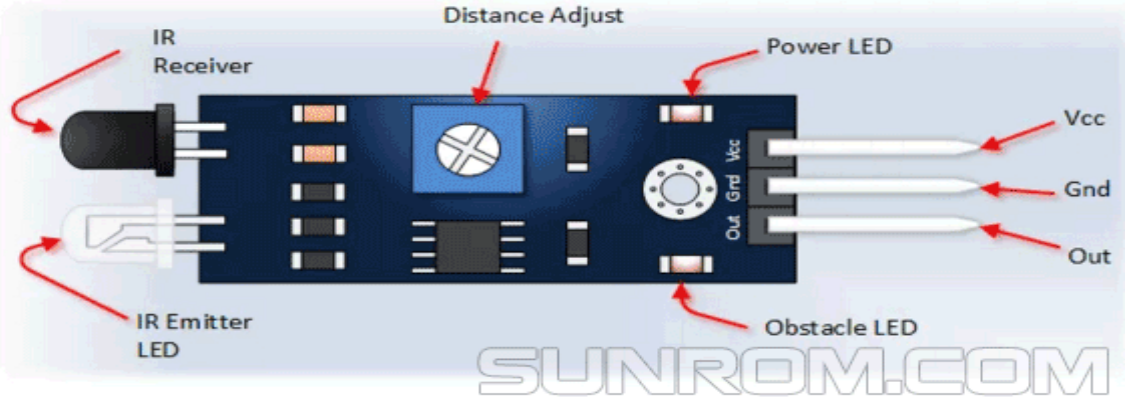
Proximity Sensor are used to detect objects and obstacles in front of sensor. Sensor keeps transmitting infrared light and when any object comes near, it is detected by the sensor by monitoring the reflected light from the object. It can be used in robots for obstacle avoidance, for automatic doors, for parking aid devices or for security alarm systems, or contact less tachometer by measuring RPM of rotation objects like fan blades. Digital low output on detecting objects in front.



Pin, Control Indicator	Description
Vcc	3.3 to 5 Vdc Supply Input
Gnd	Ground Input
Out	Output that goes low when obstacle is in range
Power LED	Illuminates when power is applied
Obstacle LED	Illuminates when obstacle is detected
Distance Adjust	Adjust detection distance. CCW decreases distance. CW increases distance.
IR Emitter	Infrared emitter LED
IR Receiver	Infrared receiver that receives signal transmitted by Infrared emitter.

Fig 9- IR sensor and Pin description

Features

- IR transmitter
- Ambient light protected IR receiver
- 3 pin easy interface connectors
- Indicator LED & Power LED
- Distance 2cm to 30cm
- Can differentiate between dark and light colours
- Active Low on object detection

- 3.3 to 5V operation

D. **16*2 LCD DISPLAY**

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

A **16x2 LCD** means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.

IV. CONCLUSION

There is urgent need of proficient traffic the executives framework in our country, as India meets with 384 street mishaps consistently. To decrease this blockage and undesirable time delay in traffic and crisis administrations progressed framework is planned here in this task. With field use of this technology, the rankling confusion of traffic can be successfully channelized by dispersing the time openings dependent on the value of the vehicle load in specific paths of multi intersection crossing.Wehavesuccessfullyimplementedtheprototypeatlaboratoryscalewithremarkableoutcome.Thenextstepforwardistoimplementthisschemaisreallifescenarioforfirsthandresults,beforeimplementingitonthelargestscale.Webelievethatthismaybringarevolutionarychangeintrafficmanagementsystemonitsapplicationinactualfieldenvironment

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