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# Density Based Traffic Signal Using Arduino and RFID System

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**ABSTRACT:** ***Because of increased usage of automobiles such as cars, bikes, etc. In current era, it became very hazardous in controlling traffic. Because of this, the signalling systems works with longer time delays. This problem can be solved by the following design. Traffic signal with a delay of 1000ms have been designed. To monitor and control the traffic based on density at the crossings or four-side lane or roads system using Arduino mega 2560.***

**Keywords:** ***Traffic signals, ultrasonic Sensors, Arduino Mega 2560 Microcontroller, Light Emitting Diodes.***

## 1. INTRODUCTION:

In Most cities, traffic is being a ridiculous problem. To subdue the traffic, many techniques are taken into concern. We have also presented our technicality by designing the density-based traffic signal system using Arduino Uno ATMega 328P. We have used eight LED's, four ultrasonic sensors, one Arduino Uno which acts as the microcontroller and eight 220 ohms resistors. To measure the traffic density, the ultrasonic sensors are used i.e., each ultrasonic sensor counts the number of vehicles that are passing through which is called as traffic density and the Arduino Uno is interfaced with the four IR sensors. The Arduino Uno has 28 pin configuration and also consist of 14 digital I/O pins (out of 14 pins, 6 can be used as PWM outputs), 16MHz crystal, six Analog inputs, power jack, ICSP header, USB connection, reset button. Here three different colour light emitting diode i.e. red, green and yellow are used, as per the traffic conditions. Green signal is given with extra delay(density delay) to the particular road which covers more number of vehicle than the normal delay, each signal goes with minimal time delay(normal delay) ,whenever each signal gets turn it checks for density delay, if there it goes extra time accordingly green .We have designed the system with a delay of 1000 ms In this project. The microcontroller detects the traffic Based on the sensors output and the signals are given according to it and so the traffic can be controlled by the delay.

## 2. PRESENT TRAFFIC SIGNALLING SYSTEM:

After many improvements in today's digital hegemony Traffic control in India is a serious problem. In many places of India present manual traffic control system is used. To assure that those who operate motor vehicles understand the rules of the road a comparable and matching education program is required, through driver-licensing authorities and also the actions that they are required or advised to take when a particular control device is in use. Every traffic control device is governed by standards of the design and usage; for example, stop signs always octagonal in shape and have a red background. Design standards allow the motor to operate quickly and consistently along the road and perceive the sign in the visual field. Identification and in deciding on the appropriate course of action Standard use of colours and shape are used. In present circumstances, traffic lights are set on with fixed time delay in the different directions, following a particular cycle while switching from one signal to other signal creating unwanted and prodigal congestion on one lane while the other lanes remain less vacant. The system that we proposed identifies the density of traffic on each lanes

and thereby regulates the timing of the signals. provide an idea about the traffic density on a particular lane by the Ultrasonic trans-receivers count the obstructions and feed this response to a controller unit which makes the necessary decisions when it is required.

## 3. OPERATIONAL MODEL:

Changing delay of Traffic signals based on the number of vehicles passing through an assigned section of the road, Is the working principle of the model. At four sides of four-way road four sensors are placed, which counts the number of vehicles passing by the area covered by the sensors. In this model we are using ultrasonic sensors replacing traffic control system to design a density-based traffic signal system. These ultrasonic transmitter and receiver will be mounted on same sides of the road at a particular distance. The ultrasonic sensor will detect the vehicle as the vehicle passes through these ultrasonic sensors & will send the information to the microcontroller. The microcontroller counts the number of vehicles, and provide the glowing time to LED according to the vehicle's density, Then the LED will glow for higher time than average or vice versa. The traffic lights are initially running at a fixed delay of 1000 milliseconds, which in turn produces a delay of 1000+1 milliseconds in the entire process. Microcontroller is interfaced with LED's and ultrasonic sensors; this entire embedded system is placed at the junction. The total number of LED's are 12 and ultrasonic sensors required is 4. Ultrasonic sensor module consists of transmitter and receiver Therefore, these are connected to any two ports of the Arduino. Comparator output goes low else it gives high voltage i.e. +5v or 3.3v, When the sensor finds any object vehicles them.

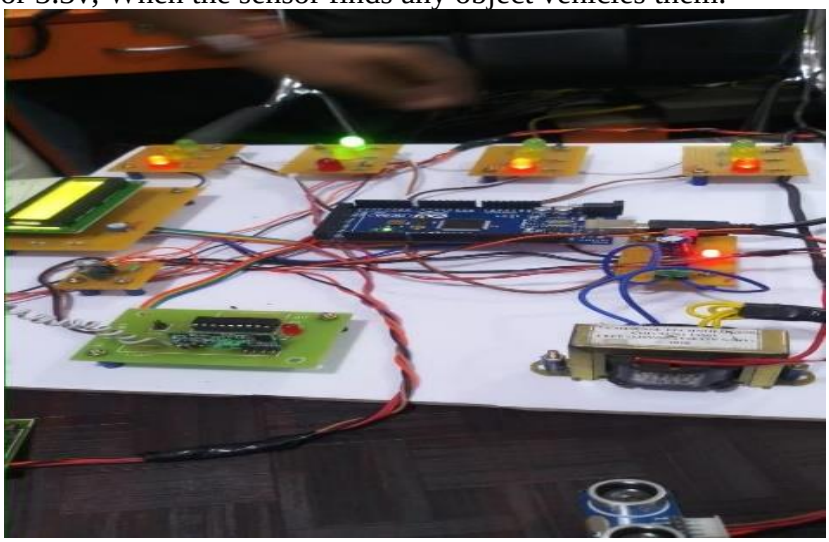


Fig 1: Operation model of Density Based Traffic signal using Arduino.

## 4. Steps that has been carried out for density monitoring and assigning extra time:

- ✓ let us consider signal 1,signal 2,signal 3,signal 4 works in order respectively.
- ✓ Each of the signals have a minimum time delay of 10 seconds for green light irrespective of density.
- ✓ For example(1),let us say density is more on the signal 3.The signal 1 glows green light for the minimum time of 10 seconds,then the signal 2 also does the same as signal 1,when it reaches signal 3 it glows green light for the minimum time of 10 seconds first,then it glows for the time equal to the density time it had,then it reaches signal 4 it glows for the minimum time delay of 10 seconds.
- ✓ For example(2),let us say density is more on the signal 3 and signal 4.The same process is carried like the example 1 except that the signal 4 glows for the extra time equal to its density time.
- ✓ Each time signal changes density is monitored on all sides and decides the time delay.


**Fig 2:Arduino Mega 256**

**5. Steps that has been carried out for RFID:**

- let us assume the signal 3 is glowing green light,suppose an ambulance want to pass the signal 2 .
- The ambulance has a RF transmitter containing 4 buttons mentioning the four signals respectively and the microcontroller present in the signal has been connected to the RF receiver.
- Now the ambulance driver can pass the signal 2 by pressing the button 2 in the RF transmitter button,then it changes the signal 2 green for the minimum time delay of 10 seconds.
- After 10 seconds green signal glowing on the signal 2,the previous process which has been carried out(that is signal 3 glowing green light )is resumed and then the normal process happens.

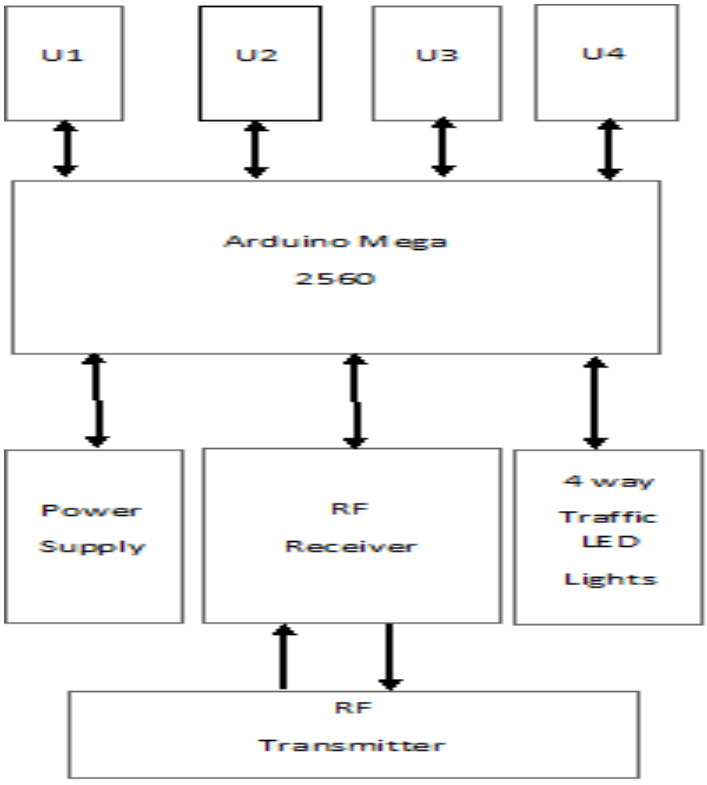
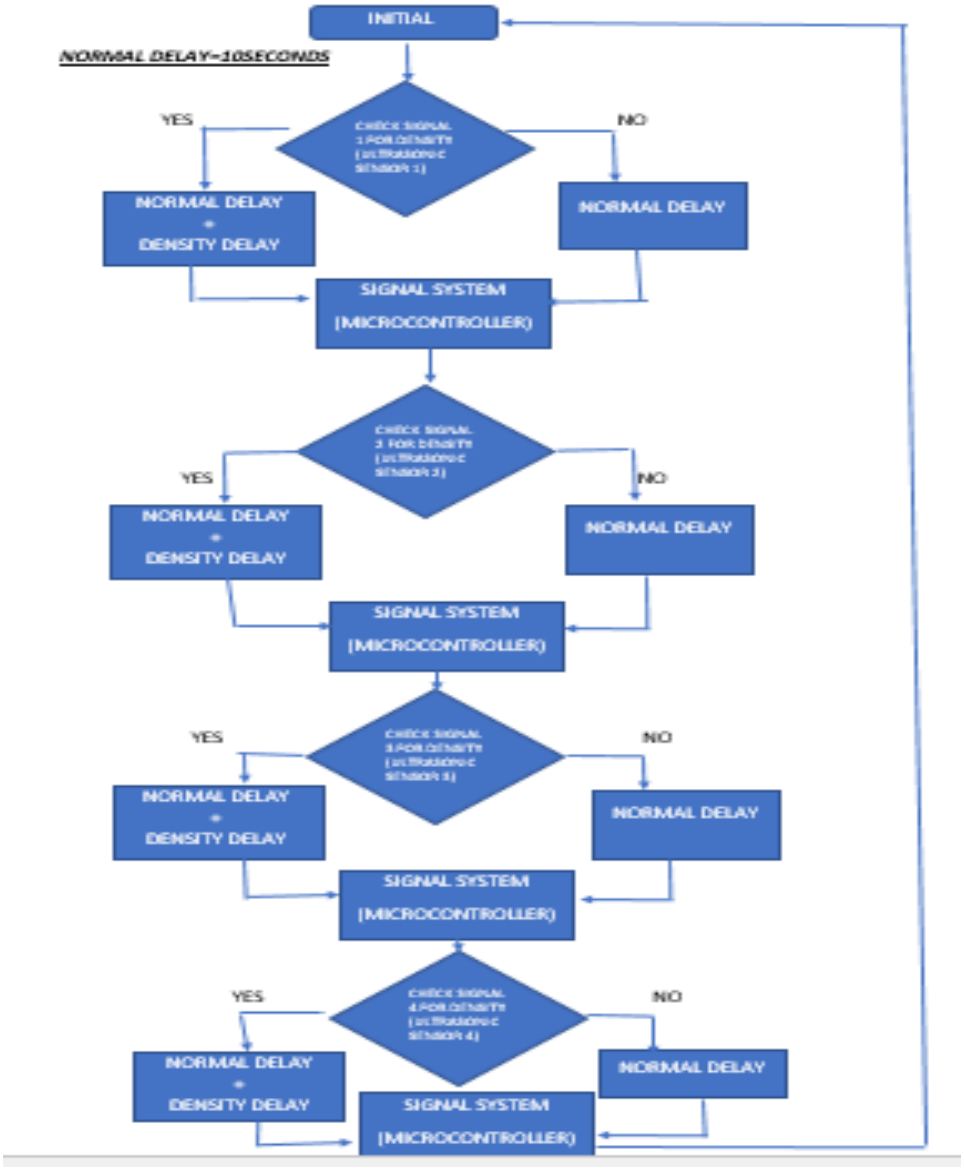



**Fig 3: Four Way Traffic LED using Arduino**

## 6. ALGORITHM:

**STEP 1**: System is initialized.
**STEP 2**: Output of the ultrasonic sensor (signal 4) is given to the System.
**STEP 3**: The system checks the signal 1(compares with the output of signal 4
IF YES: DENSITY TRAFFIC MODE
NO: NORMAL TRAFFIC MODE (and waits for delay)
**STEP 4**: Forwards the output to next step.
**STEP 5**: The system checks the signal 2(compares with the output of signal 1)
IF YES: DENSITY TRAFFIC MODE
NO: NORMAL TRAFFIC MODE (and waits for delay)
**STEP 6**: Forwards the output to next step.
**STEP 7**: The system checks the signal 3(compares with the output of signal 2
IF YES: DENSITY TRAFFIC MODE
NO: NORMAL TRAFFIC MODE (and waits for delay)
**STEP 8**: The process is repeated from the First STEP.

## 7. Flow chart With Normal Delay 10 Seconds:



## 8. CONCLUSION:

As per the current circumstances we are in need a very economical and effective traffic management system in our country, a greater number of road accidents occurs each day in India. To solve this congestion and time delay in traffic that occurs unwantedly, a compatible system is designed by us. In the practical field application of this technology, chaos of traffic may be effectively reduced by distributing the time slots with required delay, supported the benefit of the vehicle load and the lanes of multi junction crossing. We have designed the model for the use of our society and checked the same work in laboratory scale, obtained good results.

## 9. FINAL OUTPUT:

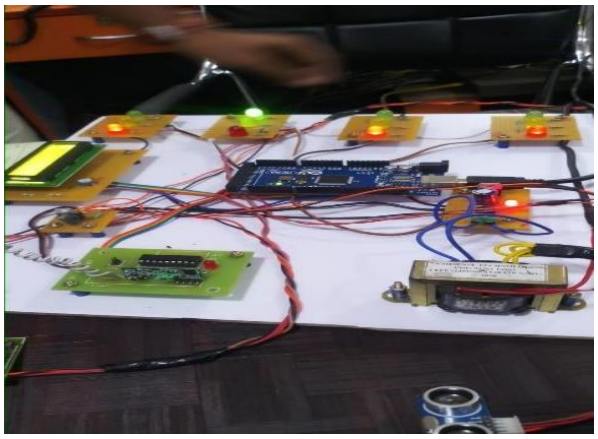


**Fig 4: Output of density based system With LED 2 Indicating**

## REFERENCES:

[1] Prof.AniketBhoyar, PranaliParkhi, Bharti Ingole, SupriyaRaut, “Novel approach for traffic control system”,volume-3, issue-3, 2016.
[2] K.Vidhya, A.BazilaBanu, “Density Based Traffic Signal System”, International Journal of Innovative Research in Science, Engineering and Technology,Volume 3, Special Issue 3, March 2014.
[3] Mohammad Shahab Uddin, Ayon Kumar Das, Md. Abu Taleb, “Real-time Area Based Traffic Density Estimation by Image Processing for Traffic Signal Control System: Bangladesh Perspective”, IEEE, 2015.
[4] M. A.A. Parkhi, Mr. A.A. Peshattiwar, Mr. K.G. Pande Intelligent Traffic System Using Vehicle Density. Yeshwantrao Chavan College of Engg., Nagpur. International Journal of Electrical and Electronic Engineers, 2016.
[5] Payal Gupta,Dhananjay V.Gadre, Tarun Kumar Rawat, “Real Time Traffic Light Control System(Hardware and Software Implementation)”. International Journal of Electronic and Electrical Engineering, 2014.
[6] Bilal Ghazal, Khaled ElKhatib “Smart Traffic Light Control System”. Conference Paper- April 2016.
[7] G. Kavya and B. Saranya, "Density based intelligent traffic signal system using PIC microcontroller", International journal of research in applied science & engineering technology (IJRASET), vol. 3, no. 1, pp. 205-209, Jan 2015.
[8] G. Monika, N. Kalpana and P. Gnanasundari, "An intelligent automatic traffic light controller using embedded systems", International journal of innovative research in science engineering and technology, vol. 4, no. 4, pp. 19-27, Apr. 2015