

# DENSITY BASED SMART TRAFFIC CONTROL SYSTEM

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**Abstract-**The main aim of the project is to reduce this traffic problem to some extent by using digital technology. The project is to design and develop an adaptive traffic control system using microcontroller. Traditional traffic control system using a microcontroller we can develop a system with the help of detecting the traffic density to control the traffic at road intersection. The main theme of the project when the lane have density then the sonar sensor of those lanes sense the density and send the signal to arduino. Sensor will detect the density of vehicle of transmit it to a microcontroller which has base routing algorithm program for smart traffic system.

**Key Words:** Traffic congestion, microcontroller

## I. INTRODUCTION

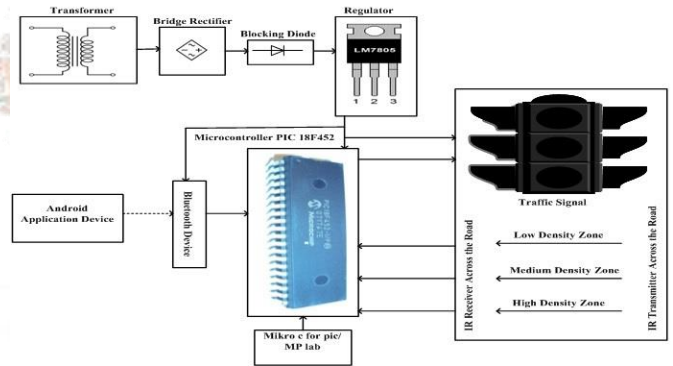
In this modern era of science and technology vehicle population which is widely known as traffic congestion has become one of the most problematic issues in all developing and developed countries. As this issue is getting severe day by day, there is pressing need to introduce advanced technology and instruments in order to improve the state of the art of present traffic control.

The concept proposed in this paper is related to the use of Wireless sensor network technology to sense presence of Traffic and also measure the density of traffic for an individual lane near any circle or junction and then able to provide signals about whether the vehicles should proceed or stop. [1] There is no requirement for implementation of any system in the cars or other vehicles, so the complete system can be planted in any traffic system quite easily which will be less time consuming and cheaper. Specifically, Sensors detects the density of vehicles for transmit it

to a microcontroller which has based routing algorithm programmed for smart traffic management.

## II. PROJECT DESCRIPTION

Due to the occurrence of traffic jam people of our country are facing different kind of problems almost everyday. So we tried to solve this problem with our creation. We made a system which will help to reduce traffic jam with the help of arduino and sonar sensors. The system will work automatically so that, There is no use of traffic police.



The further information and detail about this, Density Based Auto Traffic Signal Control System with Android Based Remote Override is available at website <http://microcontrollerlab.com>

Figure 1: Model of Circuit Diagram

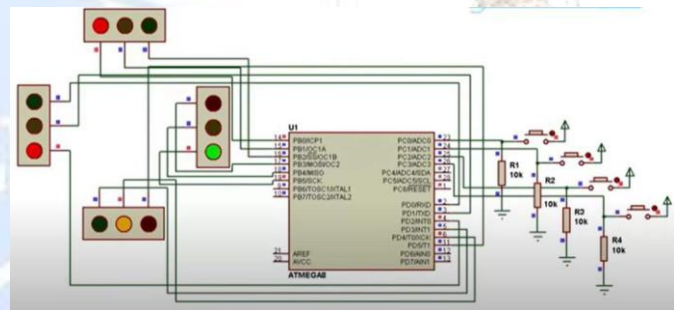


Figure 2: Implemented Circuit

### A. Block Diagram

In the system we used one arduino which was connected to the whole system. We wrote code for arduino to receive the signal from sonar sensors. If the density of lane one is high then it will be shown green signal to the lane 1 and the other lanes will be shown red light. There we also designed an emergency line for emergency case like ambulance, VIP etc.

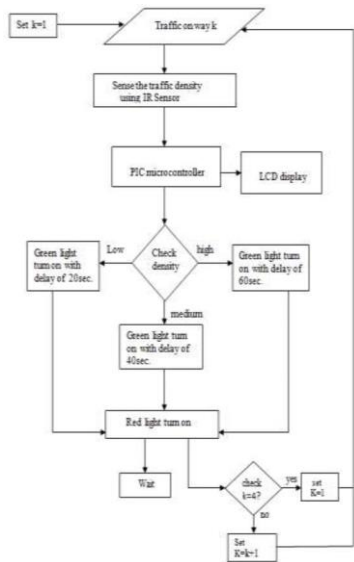


Figure 4: Flow Chart of the System [9]

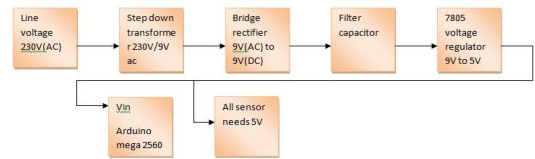


Figure 7: Power Supply Block Diagram

For power supply of the system line voltage of 230v (AC), step down transformer (TRAN-2p2s), Capacitor, voltage regulator (78L05), Bridge rectifier (2W005G) etc these components were used. 230 volt Ac supply was considered as the line voltage for the system.. At last stage, 78L05 is used that is known as voltage regulator which's function is to convert 9v (DC) into 5v (Dc). This 5 V (DC) was used as the Vin supply for Arduino mega 2560 and Vcc for all sonar sensors.

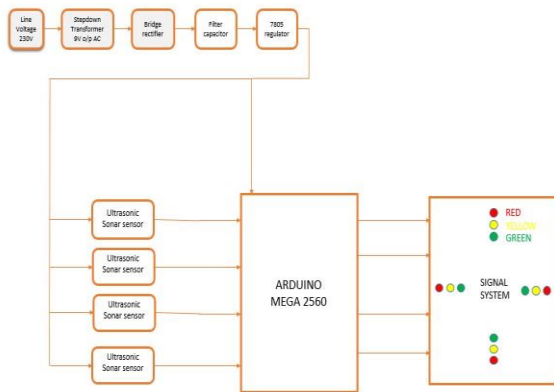


Figure5:Operational block diagram of the traffic control system

Microcontroller (Arduino mega 2560), Ultrasonic sensor or Sonar Sensor, LEDs (Red, Green, Yellow), Ac voltage source (Vsine), step down transformer (TRAN-2p2s), Capacitor, voltage regulator (78L05), Bridge rectifier (2W005G) etc are the components that were used in the Circuit design of the system.

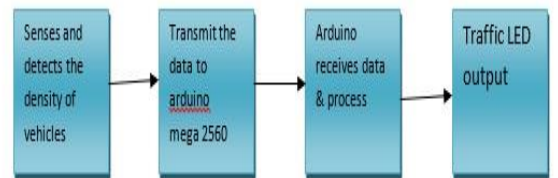


Figure 7: Operational block diagram of HC-SR04

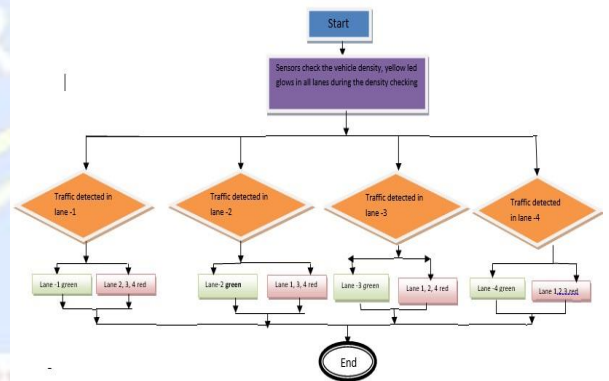


Figure 8: When Traffic is Detected in One Particular Line

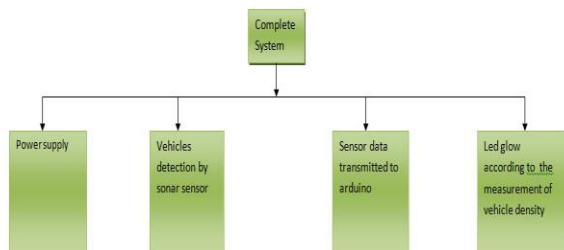
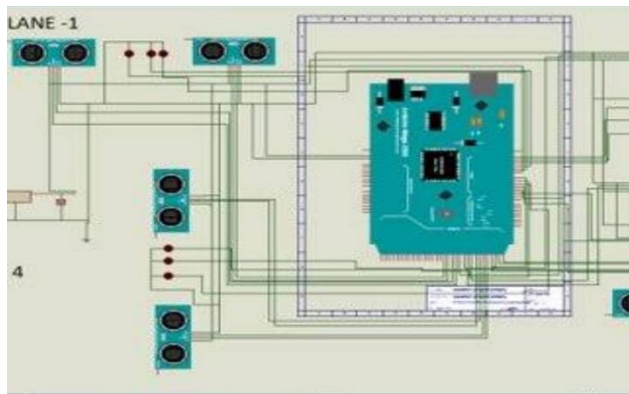


Figure 6: Operational Methodology of the Project

The operation of this system is divided into different sectors. Combining all of the functions the operation gets completed.

According to the flow chart, it can be understood that this logic operation will be performed when the traffic is detected only in a particular lane. First of all the sonar sensors of every lane will sense the presence of traffic and measure the density of traffic. If the circumstances are like that sensors detected traffic density only in one lane among four, only the lane with traffics will be shown Green light, and the rest of the lane will shown Red signal.

### III. IMPLEMENTED CIRCUIT



### IV. RESULTS AND FINDINGS

As we know our system will work automatically with the help of microcontroller and the sensors used on the board. The system will measure the density of traffics in a road and will control the traffics automatically to take care of occurring jams.



There are three lights in the system-Red, Yellow, Green. When it takes signal from Arduino that, the density of Road-1 is high then it will show Green light to Road-1 and other roads will see Red light for a given time duration. When the density will be checked the lanes will see yellow lights for a while. We also give an emergency line in our project, for which the traffic light always will show Green light.

### V. DISCUSSION AND LIMITATION

This system can not differentiate in between traffic and human being or any other things. If the sensors detect obstacles, no matter whether it's a vehicle or passers by or any other thing the system can not detect the variation.

As it can be seen that the system is operating in the process we expected it to. Traffic with higher density always gets more priority. Otherwise the congestion will start getting heavier. On the contrary in case of equal density on multiple lanes the system will treat all lanes with same priorities. As it was mentioned earlier about the emergency route, that also works fine as our goal.

### VII. CONCLUSION

Considering the increasing number of traffic congestion now a days it was intended to develop smart system using the modern technologies. Basically, That was the main inspiration behind this project. Though the goal of this project is to build a design or a prototype so that using this methodology something big can be achieved to reduce this

problem in our day to day to life. Specially for the busy cities this system can be a possible solution to decrease traffic congestion. The importance of traffic police on the roads is not negligible but this automated system can make their duty easier than ever.

### ACKNOWLEDGEMENT

Then we would like to express our gratitude to our supervisor Mr. Tawsif Ibne Alam, Assistant Professor, Faculty of Engineering, American International University-Bangladesh for his proper guidance, motivation in every turn, huge amount of support during the project. Completing this project would not be possible without his assistance and supervision. We express our gratitude to our external supervisor Dr. Mir Mohammad Nazmul Arefin, Assistant Professor, Faculty of Engineering, American International University-Bangladesh, for his support and advices we found our new features to aid in this project.

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