



TRAFFIC SIGNAL MANAGEMENT AND CONTROL SYSTEM BASED ON DENSITY OF VEHICLES

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Abstract : Most urban regions have significant challenges due to road traffic. Solving this problem is crucial given the daily increase in automobile traffic. Although recent research has looked at the use of current, widely used technologies for traffic congestion and detection control, none of them offer an automated system that manages traffic depending on observed level of congestion. Given the rate of constantly increasing traffic in urban areas, the purpose of this article is to provide an efficient plan for managing the flow of traffic on the roads that is totally automated and error-proof. We review the most popular and commonly used methods for traffic monitoring and congestion control in this study, along with its shortcomings, and we also provide an alternate model for the same that makes use of RFID technology. The fundamental Most urban regions have significant challenges due to road traffic. The approach employed for traffic management in this case is to detect and regulate congestion by utilizing a decision-making algorithm that chooses how the traffic signal runs depending on the data obtained from RFID devices, which is a problem given the increasing number of vehicles on the road each day.

Keywords: paramount, congestion control, RFID technology, RFID devices

1 INTRODUCTION

By maximizing the traffic flow at intersections and other road junctions, traffic signal management and control systems play a crucial part in tackling this problem. Using the vehicle density as a basis for traffic signal management and control is one strategy. The main objectives of the density-based traffic signal management system are to enhance traffic flow and maximize the performance of transportation networks. This technology can decrease the number of vehicles waiting at red lights and eliminate delays by altering the timing of traffic signals based on the density of vehicles, which will result in faster travel times and less congestion. A technology-driven strategy called density-based traffic signal management uses sensors and algorithms to modify the depending on the volume of traffic when to turn on the lights.

2 OBJECTIVE AND SCOPE

An ultrasonic sensor connected to an Arduino controller is used in this project. Based on the number of vehicles detected using ultrasonic sensors, the LED's will turn on (Red or Green). In this illustration, emergency vehicles are represented by RFID tags. The green LED will illuminate anytime an emergency vehicle approaches indicating which side the vehicle is approaching from. On will turn on the red led. A notice will be sent to the closest police station if a stolen car is found.

2.1 PROBLEMS IN THE EXISTING SYSTEM

We have ultrasonic sensors and LED's in an existing system. The red led will illuminate if the road is vacant and the green led will glow if the ultrasonic sensor detects anything, making it simple to move traffic.

Drawbacks: Not a sophisticated or accurate method

2.2 OBJECTIVES OF THE PROPOSED SYSTEM

In this project, an Arduino controller is connected to an ultrasonic sensor. Based on the number of vehicles detected using ultrasonic sensors, the LED's will turn on (Red or Green). Here, we're simulating emergency trucks with RFID tags. When an emergency vehicle approaches, a green LED will glow to indicate which side the vehicle is approaching from. LED red will turn on. A message will be sent to the closest police station if a stolen car is found.

3 METHODOLOGY

The below block diagram shows the implementation methodology:

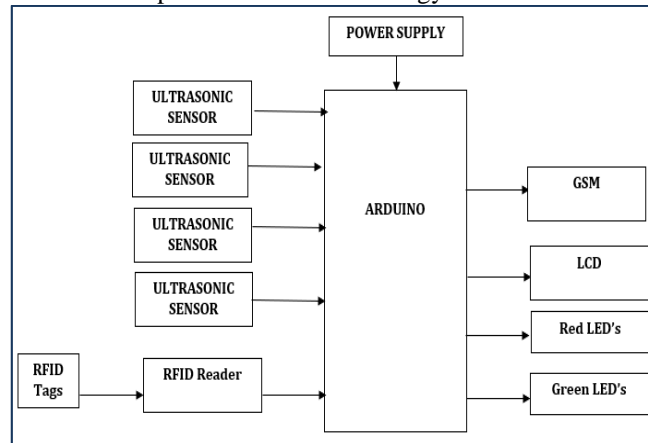


Fig 1: block diagram

3.1 ARDUINO UNO:

The Uno with Cable is a micro-controller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs); 6 Analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

3.2 ULTRASONIC SENSOR:

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear).

3.3 RC522 RFID READER:

The RC522 RFID module based on [MFRC522 IC from NXP](#) is one of the most inexpensive RFID options that you can get online for less than four dollars. It usually comes with a RFID card tag and key fob tag having 1KB memory. And best of all, it can write tag, so you can store your some sort of secret message in it.

3.4 LED:

A light-emitting diode (LED) is a semiconductor light source that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons.

3.5 LCD:

The term LCD stands for liquid crystal display. It is one kind of electronic display module used in an extensive range of applications like various circuits & devices like mobile phones, calculators, computers, TV sets, etc. These displays are mainly preferred for multi-segment light emitting diode and seven segments. The main benefits of using this module are inexpensive; simply programmable, animations, and there are no limitations for displaying custom characters, special and even animations, etc.

3.6 GSM/GPRS:

GSM GPRS modules are one of the normally utilized correspondence modules in implanted gadgets. A GSM GPRS module is utilized to speak with the GSM/GPRS arrange by a microcontroller (or coordinated circuits). GSM is the Global Mobile Communication System and GPRS would be the General Packet Radio Service. A GSM GPRS MODEM consolidates a GSM GPRS module similarly as various fragments, for instance, correspondence interface, (for instance, Serial Communication-RS-232), control supply and a couple of pointers.

3.7 ARDUINO IDE:

Arduino IDE is an open source software that is mainly used for writing and compiling the code into the Arduino Module. It is an official Arduino software, making code compilation too easy that even a common person with no prior technical knowledge can get their feet wet with the learning process. It is easily available for operating systems like MAC, Windows, Linux and runs on the Java Platform that comes with inbuilt functions and commands that play a vital role for debugging, editing and compiling the code in the environment.

4 RESULTS AND DISCUSSION

The project's end product is this. We have developed a strategy for setting up a mechanism to regulate traffic on the roads. The foundation of our system is the use of RFID technology and ultrasonic sensors. Because to the ongoing increase in the number of cars and other vehicles on the road and the unpredictability of events that could generate traffic, our project has a future scope.

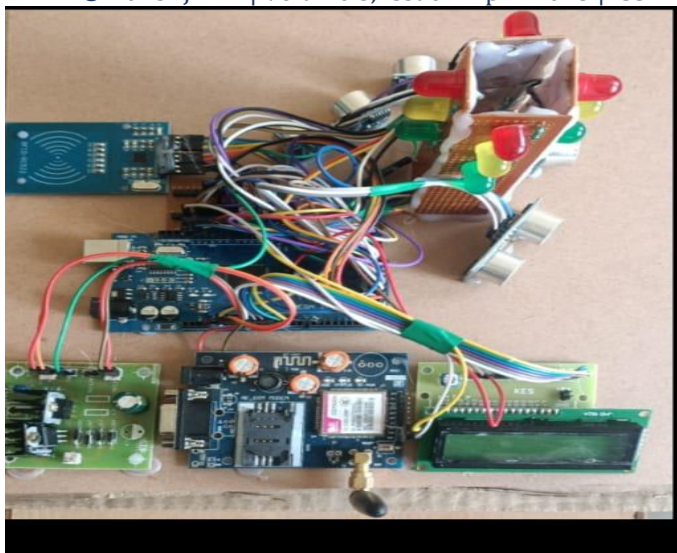


Figure 2: Model

5 FUTURE SCOPE OF THE PROJECT

There is a lot of potential for employing vehicle density as a crucial component of the management and control of traffic signals. Cities may enhance traffic flow and safety for cyclists, pedestrians, and vehicles by integrating real-time traffic data into traffic signal management. This may lessen the need for vehicles to stop completely at traffic lights, enhance traffic flow in locations with large traffic volumes, and lessen congestion during peak hours.

6 CONCLUSION

We have developed a strategy for setting up a mechanism to regulate traffic on the roads. Our solution is built on the idea of tracking automobiles with RFID technology and ultrasonic sensors, then using the information gathered to monitor and control traffic. Even though there are numerous strategies for managing traffic that are now in use and many more that are being developed, this area of study will always be relevant because of the ongoing rise in the number of cars on the road and the unpredictability of events that can generate traffic.

ACKNOWLEDGEMENT

We would like to express our profound gratitude and respect to the Internal Guide and External Guide. For their thoughtful consideration and leadership, which have helped the Project succeed. Being taught by a faculty with such depth of knowledge and expertise in analyzing and resolving contemporary issues is something to be proud of. Along with technical proficiency, students also learnt about the need of "accuracy in documentation." For seminar preparation, external and internal guides also provided us with current project subjects, which I used to better prepare my presentation for the project review. In order to fully utilize the lab resources to complete our dissertation work, we would like to express our sincere gratitude to Dr. B. Saroja (H.O.D., department of Electronics and Communication Engineering).

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