SMART TRAFFIC CONTROL BARRICADE SYSTEM

Ashwini R Malipatil [1],Dr.K.Somasundaram[2],Ashwini M[3], Divyashree C Y[4] and Kusuma N[5]

Information Science and Engineering, Rajarajeswari College of Engineering

[1]patilashwini.cs10@gmail.com, [2]soms@gmail.com, [3]ashustart2199@gmail.com, [4]divyagowda2260@gmail.com, [5]kusu.1898@gmail.com

ABSTRACT: At present traffic management is a big challenge and plays a vital role in moving the vehicles from one corner of the city to the other. This system not only controls the traffic signals but also it reduces violating traffic rules and accidents. Here when the red light signal is ON there will be a servomotor which pops up barricade from ground level. It applies one special condition in the road by placing a barricade before the zebra crossing which will stop the vehicles when the signal red light is ON. The barricade will automatically pops up on the vehicle stopping mark, when the signal leaves it pops down to the ground. For ambulance, it is having a special feature that there will be an RFID tag which can sense about its arrival. For this reason the RFID reader is fixed to road. During the red signal, when the ambulance needs to pass at that time RFID reads the tag and changes red light to green light in traffic signal through GSM where RFID reader card number is stored in control system. So the barricade will pop down to ground and the other three ways are stopped with red signal light so that the ambulance can easily pass through the way by these one can save someone's life. This project work is carried out by using IOT technology.
Keywords: Arduino, Barricade, GSM, LCD, RFID reader, RFID card, Servomotor.

1. Introduction

In these big cities there is a constant increase in traffic jams. The recent approaches to the traffic signal management is not able to properly avoid traffic overloading. Traffic management is the biggest problem and even uncontrollable in the today's society. There is a need for safety on road and clearing way for emergency vehicles are highly difficult. The existing solution to this problem is

not having the proper solution hence, to improve the traffic system there having a solution that is "Smart Traffic Control Barricade System".

The main idea of this proposed work is to reduce the number of accidents due to jumping of signals and smooth and fast move of emergency vehicle like ambulance in road rage. The traffic barricade system will manage smartly with the traffic signals and make driver not to violate traffic rules at any cost. However, it is not possible for the traffic police to maintain the smooth traffic controls of moving of vehicles at every signal. As compared to number of traffic police are than the traffic signals.

Our smart traffic control barricade system will significantly reduce the workload of the traffic police and provide more efficiency to transportation. This type of situation is handled by designing technology called Internet of Things (IoT) which specifies that traffic system is controlled in one place. This IoT provide more options and easy to implement any number of sensors and pins usability is also gives. Hence one can develop there project with flexible working condition.

The people who are not following any of the traffic rules, which may reason for road accidents and leads to death of a person. And it is very common that vehicles which crosses even in the red signals because of their motive is to save the time and fuel without wastage it.

A survey states that every hour 17 people die in India due to road accidents. This result in increase with deaths due breaking the rules of traffic, drink and drive, crossing the roads during the signal is green.The requirement of the people as a point of luxury and comfort tend to buy the own vehicles which increase the congestion.

The existing system uses the microcontroller which does not provide the pins reusability when it is needed. But our system uses Arduino Uno which is the higher version of microcontroller and hence provides the pins reusability by shorting the sensors pins which are only required. This proposed work needs the contribution of people to provide coordination and help vehicles such as ambulance to pass. Therefore this system is developed in order to make better in the condition of the traffic system and help the ambulance or fire engine can arrive at destination as soon as possible. Thus, this could reduce the number of deaths due to accidents or loss of properties in the emergency situations.

2. Related Work

Dr B Prakash [2] use PIC microcontroller and power supply is given to PIC microcontroller and IR sensor are placed on both sides of the road to measure the density of traffic and gives the information to microcontroller. The controller controls the barricade, traffic lights and buzzer. If the traffic density is more, then the signal converts to red signal and motor makes the barricade to close and when the green signal comes barricade opens to allow the vehicle to pass.

[3] Arvinthkumar U uses system which depicts the framework where IR sensors are incorporated with an Arduino to work which measures the movement

thickness through IoT (Internet of Things) based to clear the activity for emergency vehicles by giving a catch to rescue vehicle so the activity gets cleared on that side. The information got from sensors ate refreshed at time to time to the server utilizing GSM.

Nipun Sharma [6] contain GSM, GPS, Zigbee, SIM300 and RFID reader. Zigbee is mainly used for safety system for communication. This paper work with IR sensor which reads the data from RFID tag, IoT and wi-fi module that are been done through Internet and traffic signals are under control by driver of emergency vehicle in which these are associated with wi-fi.

[7] Bilal Ghazal's model which combines different application technologies like cloud computing, apps and machine learning. The emergency vehicle drivers are provided with android apps. They will give with the details of condition after reaching the injured place. This details will be stored in Google Cloud Service. This app is implemented with GPS (Global Positioning System) service to track the hospital staff in emergency vehicles. GPS will return the shortest distance hence, the driver will receive the nearest hospital and route which emergency vehicle is moving makes the traffic signals to clear and driver can move the vehicle without stopping.

3. Contribution

Our aim is to improve the traffic situations from jumping of roads during the red signals and provide an easier way by clearing the road for the ambulance, this work is succeed by the IoT. Providing of flexible barricade which help reducing jumping of signals and accidents also helps the ambulance to pass the way by detecting the RFID card by RFID reader although GSM sends the message of barricade closing before the red signals appears to riders. This provides the fast and smooth way of handling the traffic signals and emergency vehicles.

4. Proposed System

The system consists of Arduino Uno which maintains the traffic lights and servomotor which controls the movement of barricade from ground level to certain height. It also having RFID reader and RFID card in which RFID card is given to ambulance driver and it is scan by the RFID reader. The same data is collected in the control station and when the RFID reader detects the RFID card the data through GSM is sends to control station and indicates to clear the way where the ambulance is stuck in traffic.

The Aurdino Uno board which controls the traffic lights and barricade during the traffic signal and also for emergency vehicle like ambulance which need to pass. The servomotor is used to control the movement of barricade, through GSM a message is passed to all the vehicle riders that the red signal is going to come that means the barricade is moving from ground to certain level. Thus the riders will be intimated of barricade coming up before only, hence there will not have any clashes or accidents when the vehicles unexpectedly moves on the barricade.

When the red light turning to green light the barricade will be moved to ground level. Therefore these flexible movement of barricade will reduces the jumping of signals and thus people has to follow the traffic rules.

During the passing of an ambulance the RFID tag or card is given to the individual ambulance and when it is passing that way during red signal the RFID reader scan the RFID card number and sends to Control Station where the data of all card numbers are provided through the cloud.

Once the card number matches with the stored database then the ambulance passing way is converted from red signal to green and all the other three lanes are turned to red signal. Hence the ambulance need not wait for green signal to come.
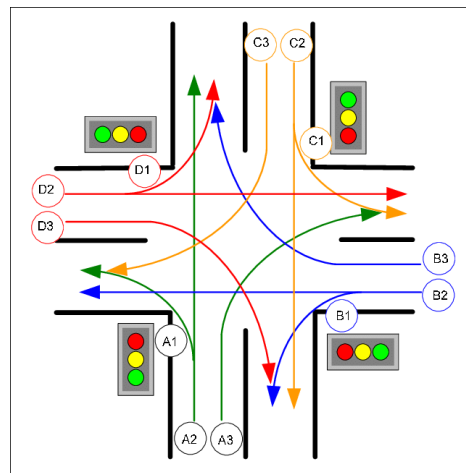
System Design and Architecture:

Figure 1: Working model design

Fig.1 shows the working design of this system. In the system the sensors are placed at all the four lanes with some particular space between each of them. These sensors receives the reflected rays and sends to Arduino which stores the collected information.The received data from sensors in Arduino are used it to set the signals according to passing of emergency vehicles like ambulance and update the data in the control station.

In this design architecture we mainly have 6 components:

1.ARDUINO
2. RED LED, YELLOW LED, GREEN LED
3. RFID TAG
4. RFID CARD
5. LCD
6. GSM

- **ARDUINO**

  Arduino is a open-source electronics platform and a mini-computer that can be used as a development tool for different software and hardware based projects. The Arduino belongs to a family of microcontroller. Arduino Uno is having 14 digital I/O pins and 6 analog input pins, it provide more option and stronger foundation for those who are starting in this platform. It support like microcontroller by connecting to pc through USB cable and power supply is

  provided.

Figure 2: Arduino

- **LED**

  LED (Light Emitting Diode) is a semiconductor which provides high-brightness other than ordinary incandescent bulb, hence it is used to display the traffic light operation and signal. The LED which we are using are green led, yellow led and red led.

- **RFID TAG**

  RFID tag (Radio Frequency Identification tag) is a component that uses radio frequency waves to collect data from an RFID card and used to track particular objects**.**

- **RFID Card**

  RFID card have some barcodes which helps to identify the particular object. These card detected from RFID tag and are used for tracking system.

- **LCD Display**

  LCD (Liquid Crystal Display) is an optical device which uses liquid crystal. Its property is not emits light directly but using the reflector for generating the images or data on screen. Arduino Uno which produces data of RFID barcode with simple code. LCD display is used for exhibits the data that is sends to sensor.

Figure 3: LCD sensor

- **GSM**

  GSM (Global System for Mobile communications) is an open digital cellular technology which is used to send the message to the control station.

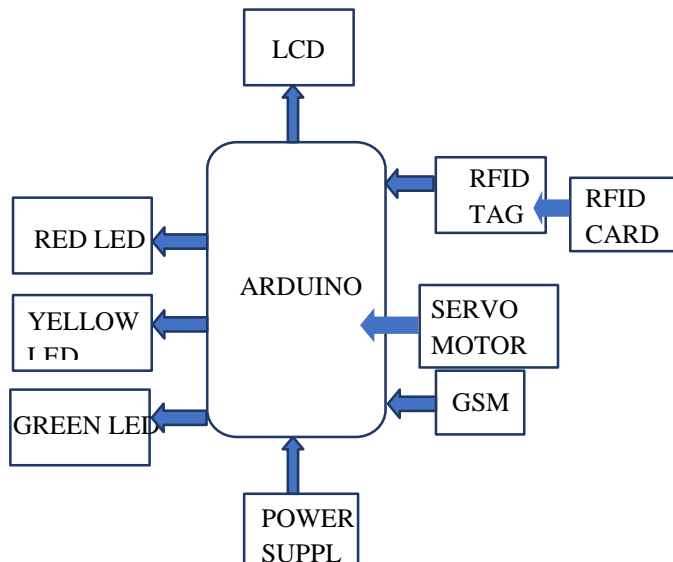**The schematic diagram of this work are follows:**

Figure 4: Schematic Diagram of the Design

Fig.4 shows the schematic representation of model. It contains the Arduino board which controls the different sensors like LCD, (Red, Yellow, Green) LEDs, RFID tag, RFID card, servomotor, GSM, power supply. Arduino is provided with power supply to operate. Arduino which receives the data from traffic lights and display message in LCD accordingly. Servomotor which is used for movement of barricade, RFID is used to detect the ambulance and GSM is used to send the occurrence of ambulance to control system during red signal.

5. Conclusion

The introduction to smart barricades minimizes manual effort of the traffic police, as the signal can be monitored and traffic can be controlled using the sensors and by measuring the density of traffic. It does not allow drivers to violate traffic rules as there is a smart barricades to monitor them by this number of road accidents can be reduced to a large extent.

Emergency vehicle like ambulance need to reach the destination within time. If the ambulance stuck in traffic and spending a most of their valuable time in waiting, many people's life will be in danger. The green light will be signaled automatically and barricades are popped to the ground to give way for the ambulance and all other three ways will be signaled red. When the ambulance passes the signal continues from where it has stopped.

6. Future Work

The proposed system works well for Indian traffic and it can be implemented with any devices. FC (Fitness Certificate) for the vehicle has to be reduced and the maximum period has to be only 20yrs. i.e., this rule has to come under vehicle motor act. In case of any violation in traffic jumping or without helmet or zebra crossing or any violation caused, severe action has to be to control traffic violation. The main future work in this system is the adoption of GSM (Global System for Mobile Communication) it gives the information to Control Station about the presence of ambulance in a crowded traffic signals.

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Authors

Prof Ashwini R Malipatil received her Bachelor of Engineering degree from Appa Institute of Technology, Kalburgi, and Affiliated under VTU Belagavi, Karnataka, India in 2009 and Master of Engineering degree from PDA Institute of Technology, Autonomous and Affiliated under VTU Belagavi, Karnataka, India in 2012. She is currently working as an Assistant Professor in the Department of Information Science and Engineering, RajaRajeswari College of Engineering, Bangalore, India. Her research interests include Internet of Things, Wireless Network security. She is a lifetime member ISTE, New Delhi.

Dr.K.Somasundaram is having about 24 years of experience in the industry and teaching. He served in various positions in the industry and Teaching. He is currently serving as Professor in Computer Science and Engineering department at Chennai Institute of Technology, Chennai. He published about 95 papers in International journals and presented 32 papers in refereed national and International Conferences. There are eight scholars are completed their research under his guidance and four PhD scholars are doing their research. He has guided more than 23 M.E., thesis. He is a life member of Institution of Engineers (India), IETE, CSI, ISTE and CEng(IEI). His area of interest includes Data Mining and Data Analytics, Wireless Sensor Networks, Grid/Cloud computing and Internet of Things.

Ashwini M completed her Bachelor of Engineering in Information Science and Engineering from Visveswaraya Technological University, Belagavi in 2020. She has undergone Internship at Live wire in 2019. She has successfully completed the Global Accelerator Showcase of UC BERKELEY Executive Education. She is one of the organizing committee members of International Women's Day Celebration on 8th March 2019 organized by Rajarajeswari Groups of institutions, Bangalore. It is recorded in the Limca Book of Records.

Divyashree C Y completed her Bachelor of Engineering in Information Science and Engineering from Visveswaraya Technological University, Belagavi in 2020. She has undergone Internship at Livewire in 2019. She is one of the organizing committee members of International Women's Day Celebration on 8th March 2019 organized by Rajarajeswari Groups of Institutions, Bangalore. It is recorded in the Limca Book of Records

Kusuma N completed her Bachelor of Engineering in Information Science and Engineering from Visveswaraya Technological University, Belagavi in 2020. She has undergone industry Internship at Livewire in 2019. She has participated in the Global Accelerator Showcase of UC BERKELEY Executive Education. She is one of the organizing committee members of International Women's Day Celebration on 8th March 2019 organized by Rajarajeswari Groups of institutions, Bangalore. It is recorded in the Limca Book.