Project Title:

Adaptive Traffic Control System With Emergency Service

INDEX

INTRODUCTION

In the present scenario, people are short of two things - one is time and the other money. In this project, we are focusing on the time aspect, by saving the time which is often wasted in traffic jams. Traffic jam is a line or lines of stationary or very slow-moving traffic which is often seen at traffic posts of metropolitan cities. Also, vehicles have to wait for a long time to move out of the jam. Sometimes it becomes congestion in traffic. This happens in the transport network due to the increasing vehicles and overuse of roads. Often it is due to slow speed, longer trip time, and increased queues of vehicles. Therefore, traffic jams are becoming a major issue mostly in all cities.

Problems arising due to Traffic Jam

Traffic jams have a tremendous impact on the life of people. It is one of the most serious problems in metropolitan and overcrowded cities that people have to deal with daily life, thus affecting them psychologically. It also negatively affects the work, education, and personal life of people and finally to the progress of the country.

Let us discuss some major problems that arise due to high traffic:

- Traffic is one of the major problems in cities and has made the lives of people really difficult. Obviously, it results in non-productive activity.

- People experience delays in their important work. This may even result in personal as well as professional losses.

- It is also the main cause of wastage of fuels and air pollution.

- It increases stress and frustration among motorists and passengers.

- Emergency services are also hampered due to the time wasted at traffic posts. An ambulance which may require a short time to reach the patient may get stuck in a traffic jam and hence the situation may get complicated.

PROBLEM STATEMENT AND OBJECTIVE

PROBLEM STATEMENT:

Traffic is a major issue in populated countries like India. Also, emergency vehicles like ambulance, police vehicles have no special provision in case of heavy traffic.

- • The present-day traffic control system provides no management for emergency vehicles.

- • Also, the present adaptive traffic control systems use video data analysis and inductive loop detection which have demerits like high installation and maintenance costs.

- • We propose a cost-effective technology using RFID and ultrasound technology.

So the objective of this project is two-fold:

OBJECTIVES:

- ● To avoid traffic jams by developing an adaptive traffic control system.
- ● The system will also have proper provision for emergency vehicles.

SOLUTION

In this application, the number and type of various vehicles are being detected by using a proper arrangement of ultrasonic sensors. Vehicles have to pass through a frame and with the help of ultrasonic sensors we can detect the different types of vehicles by analyzing their height and width through ultrasonic sensors. Thus by detecting the number and type of various vehicles we can change the duration of the traffic light.

Emergency Vehicles can be detected using RFID Reader. Each vehicle has an RFID tag with a unique code that can be used to detect the vehicle.

FEATURES

It will have features for

- Proper traffic management depending on vehicle density
- Special provision for emergency vehicles

COMPONENTS USED :

- Lora module(SX 1278)

- Arduino Mega(2560 R3)

- Ultrasonic Sensor(HS-SR04)

- RFID Reader(13.56 MHz)

- RFID Tag(13.56 MHz)

- Led light and its stand

- Case for covering

- Jumper Wires

SYSTEM DESIGN:

Pre analysis:

- Maximum green light duration=90 sec for 15 cars occupying 75 meters

- Hence we place Rfid scanner at a distance of 100 meters from the cross-section

- The number of vehicles that can cross the barrier in 90 seconds(max time for 1 green signal), in our example let's say it is 15 cars.

- 4 wheeler truck equivalent to 2 cars
- 8 wheeler truck equivalent to 3 cars

Calculating the number of vehicles :
Case 1: if the number of vehicles is more than 15 then the green signal is set for max time.
Case 2: if the number of vehicles is less than 15(let us say 'x') then the green signal is set for $(x/15)*90$ seconds:

Now, If an emergency vehicle is encountered on path 1

Case 1: path 2/path 3/path 4 is green

1. The green light will be changed to Yellow light (for path 2/3/4)
2. The time is calculated for an ambulance to cross the path (let's say that 'y' number of vehicles were scanned before the ambulance) then the time required For the ambulance to cross is $(y/15)*90$ seconds.

case 2: path 1 is green

1. The time is calculated for an ambulance to cross the path (let's say that 'y' number of vehicles were scanned before the ambulance) then time required for the ambulance to cross is $(y/15)*90$ seconds
2. time for the green light will be changed to $(y/15)*90$ seconds.
3. Then the normal cycle will continue
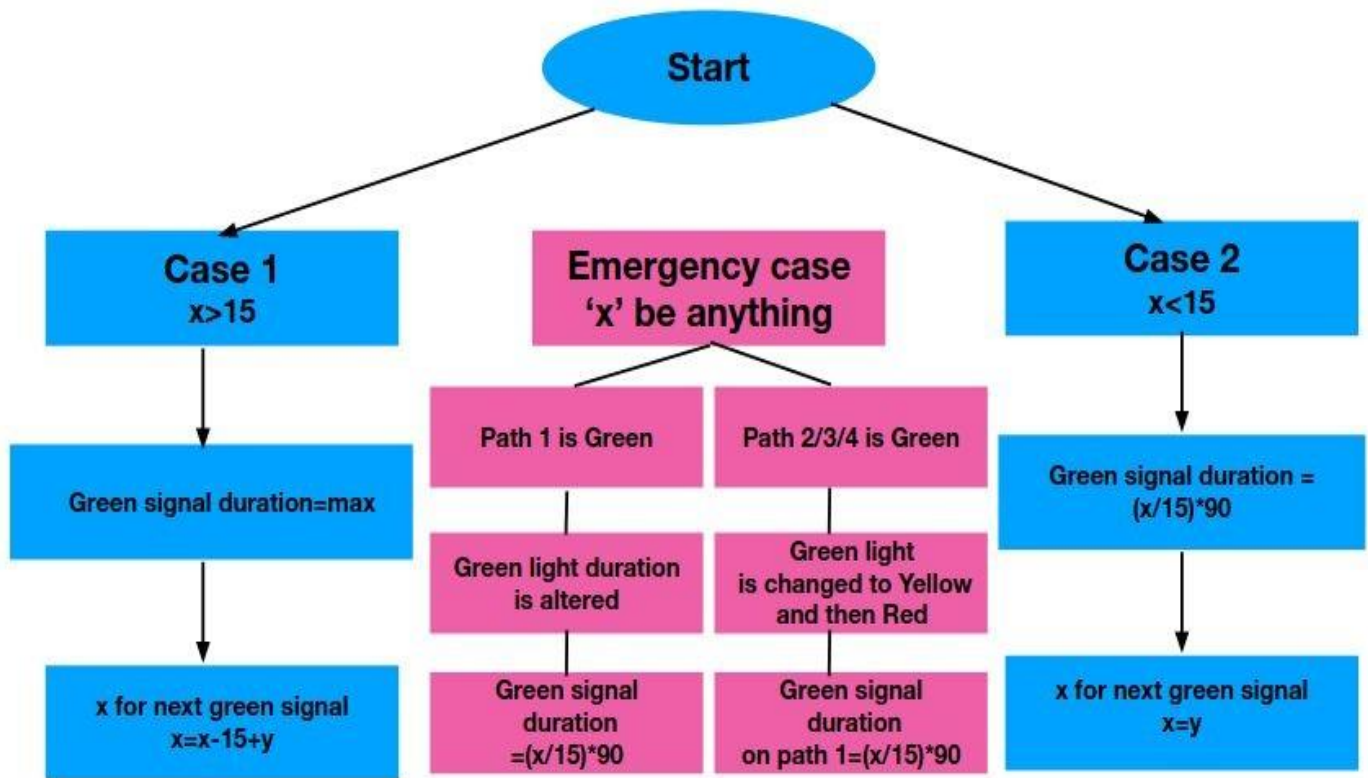
x=Number of vehicles to cross

y=Number of arriving vehicles

SIDE PANEL ANTENNA SETUP

This is Ultrasonic Sensor

Path 1

Path 2

Path 3

Path 4
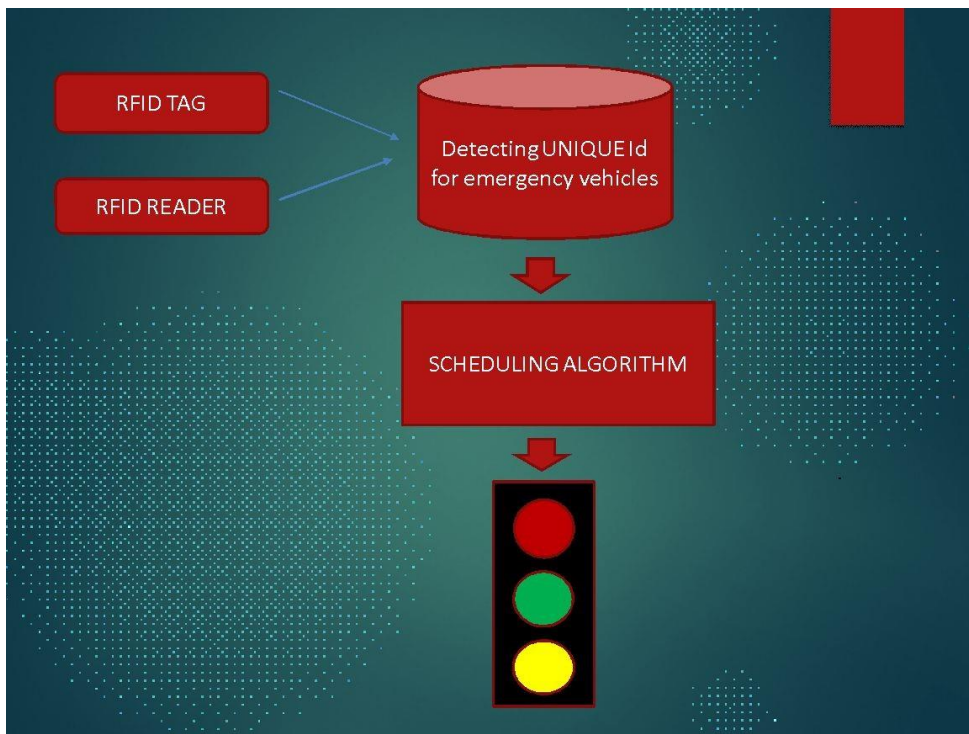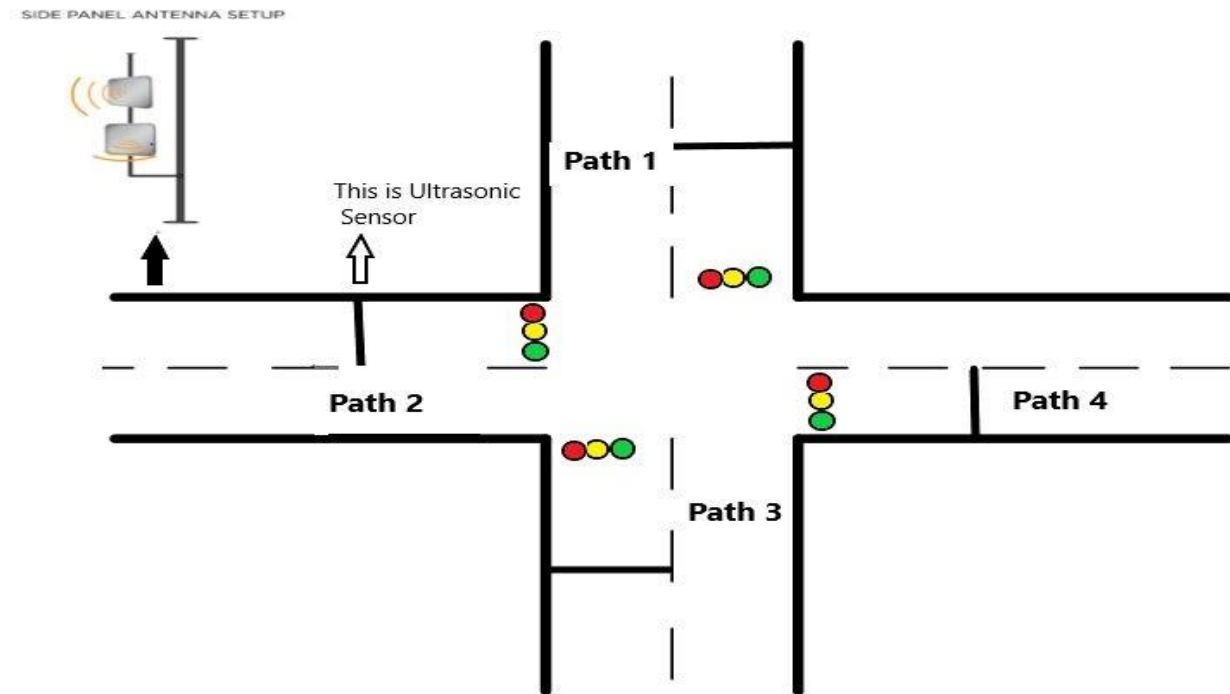
BENEFITS

- Reduced waiting time for vehicles during traffic will be managed.
- Emergency Vehicles like ambulance and police vehicles will not have to wait during traffic jams in case of emergency.
- It will also help pedestrians to cross the road in heavy traffic.

Future scope:

- Use of Rfid for counting number of vehicle
- Introducing database to keep a track of the vehicles which have passed through crossing/junction.
- Formation of a green path for ambulance or other emergency vehicles by creating an open path from the destination to source through interconnection of the traffic posts with the help of LoraWAN.

Marketing:

- Can be implemented in smart cities for better and efficient control of traffic.
- Handling emergency vehicles in a better way

CONCLUSION:

Traffic jams are becoming a serious issue in various countries. It is one of the most serious problems in big cities that people have to deal with in daily life. Since most ofthe people have to deal with it on a daily basis they may get psychologically affected. It also negatively affects work, education and personal life of people and finally to the progress of the country.
This Application is very useful for common people who are wasting a huge amount of time in traffic. It will also save various lives because emergency vehicles will not have to wait for hours in heavy traffic.

References

Github link: https://github.com/ankit9437/Traffic-Management-System

Youtube link: https://www.youtube.com/watch?v=0-kDXX-bqEM&feature=youtu.be