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Automated Traffic Density Control With Emergency Service System

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***Abstract*—** Traffic jam is vehicles move in slower motion because there are more vehicles than the road capacity. This makes Traveling time longer and increases queuing and waiting time in traffic. Our proposed System control the traffic jam by survey the traffic density, efficiency and provide emergency services In this proposed project. A method is implemented for detecting the traffic congestion with the help of a monitoring system by using sensors providing emergency services, if any emergency situations like an accident, vehicle Malfunctioning happens. [1]The first module involves in the smart signal pole which scans the volume of the traffic, then as per the traffic volume signal timing will be increased or decreased accordingly. [2] The second module involves when traffic volume is increased to high an emergency alert message is triggered in a display, by seeing this alert message traveller can choose the alternate way for his destination. [3] Third module emergency condition like accidents panic button is provided by triggering this button manually an emergency message will be sent to Ambulance, Traffic Police, this helps to clear the traffic as early as possible.

***Keywords*—**Smart signal pole, traffic congestion / traffic volume, panic button, emergency message.

I. INTRODUCTION

1.1 Introduction to traffic jam:
Traffic jam is a situation on road transport lanes that occurs as usage increases and represent by slower speeds and increases vehicular queuing. The familiar example is the substantial use of roads by vehicles in present-day as shown in figure 1 below. When Traffic volume is high, it reduces the movement of the traffic flow and this indicates the Traffic Jam.

Figure 1: Traffic Jam.

1.2 Controlling Traffic based on density:
The traffic is disciplined by sensing the density of vehicles present in all lanes. Sensors are being implanted at a certain distance from signal poles. In this system, sensors will sense the volume of the vehicle on all the lanes for each and every period. [1]Assuming the traffic volume is less in the lane -1(signal pole B1) and the vehicular volume in the lane – 2(signal pole B2) is more and then the vehicle passing time (green signal) is automatically increased for lane-2. Once the traffic is cleared, the flow time is set to default.

1.3 Additional features to present system:
In the current traffic system, the signals are manually controlled by a policeman during emergency and high-density situations [2]. In order to change the existing control system we have developed an automatic signal control system which provides facilities like alert message to the neighbouring traffic police if the traffic is not cleared after 2 consecutive green signals, it is considered as emergency situation then the alert message is indicated in the display. Also panic buttons provided for services like ambulance, police and fire service.

1.4 Alert message through LCD:
When the traffic volume is high and there is a provision to approach an alternate way, an alert message will be displayed in the preceding junction with the help of LCD display [3].

II. RELATED WORK

[1]The traffic signal is a serious issue in our country; this is caused by a huge expansion of vehicles. In order to decrease the waiting time and snag of a traffic jam, so to overcome this problem a system has to combine the existing technology and Artificial technology are implemented together where it

takes a decision by themselves. This newly designed technology will demonstrate the traffic light to switch from red to green based on traffic volume by using sensors The Traffic light System with Dynamic Control Which decreases the Average trip waiting time (ATWT). It Consists of IR sensors; Low Power embedded controllers, comparators, and storage device.

[2]This paper Justify a Raspberry Pi controlled Traffic Density monitoring system. Raspberry Pi is a single board computer which can be adequately used for multi-functionalities. Here Is One of The Ways of Using This For multiple ways. By using this system traffic surveillance can be done where the traffic is regularly monitored and stored. In addition to this, it frequently scans and detect the traffic volume and gives the report to the passengers. This traffic report is updated systematically and it displays on the LED screens installed on the traffic pole. These LED screens are also used for advertising purpose which can be one of the advantages. This system can make the transport system more digitalized than before, where this also reduces the usage of paper and plastic for advertising. This method is cost effective.

[3]Intelligent Traffic System (ITS) is one of the most modern research topics on the Internet of Things (IoT). The increase in the number of vehicles in urban cities is creating huge traffic density. To avoid traffic congestion, a number of researches are been done to provide a way for emergency vehicles in cities. To point out this problem directly, an innovative system considers the priority of emergency vehicles based on the incident and method for detecting and responding to the hacking of traffic signals have been proposed in this research. This result of simulation software called a Simulation of Urban Mobility (SUMO) was demonstrated. This system results has exhibited superior performance of our project over ongoing operational and recently proposed Intelligent Traffic System for emergency vehicles in terms of vehicle congestion and waiting time. The response time obtained by our scheme meets the protocol set by BFMG (Budget and Financial Management Guidance) for emergency vehicles in case of both normal and hacked traffic signals.

[4]This research paper is prepared to provide the solution for estimated traffic density which is the major issues in cities and today's modern life. Four different breakthrough methods are proposed for estimating traffic density in different views. All these proposed methods are been tried to calculate the next stage of roads by looking at the previous history of traffic density data. These algorithms or methods are inspired by the practice used to estimate the spectrum holes present in the cognitive radio channels. The same kind of practice is used in the estimation of traffic density. In this study, the Istanbul Metropolitan Municipality Traffic Control Centre data received from the busiest roads of Istanbul in 2013 have been used as traffic data. Different simulations have been performed using these algorithms and results are evaluated based on several performance criteria

III. METHODOLOGY

In Existing Traffic System the signal is controlled and monitored manually by a Policeman in emergency situations to overcome to this problem, we have designed an automated traffic signal which alerts a message to the neighbouring police if in case the traffic is not cleared for 2 consecutive signals. It also has the emergency panic buttons for services in case of an accident the system triggers message to Ambulance, Traffic Police and Fire-service. By the help of this project, human effort can be reduced, waiting time in traffic signals can be reduced, as this system is designed along with manual control buttons the signal can be controlled manually.

Figure 2.1: Block Diagram of traffic Density Control with Emergency

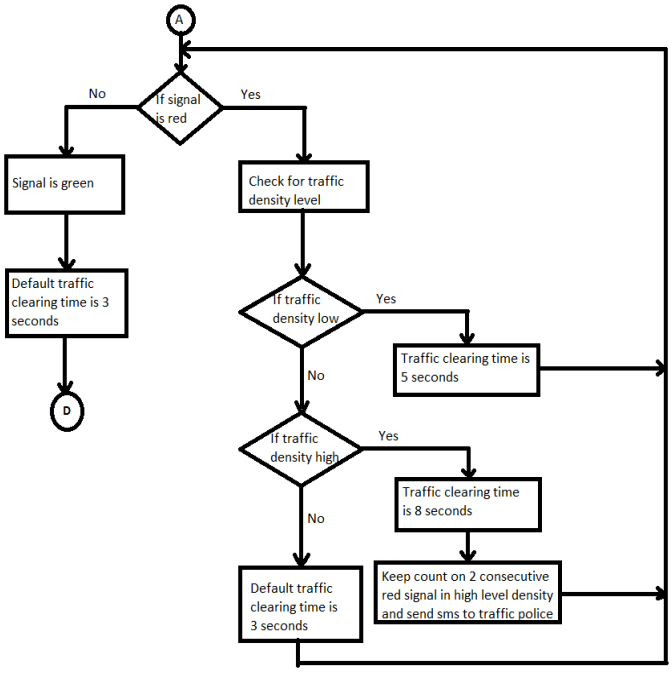

Figure 2.2: Flowchart diagram of Emergency Service (Panic button).

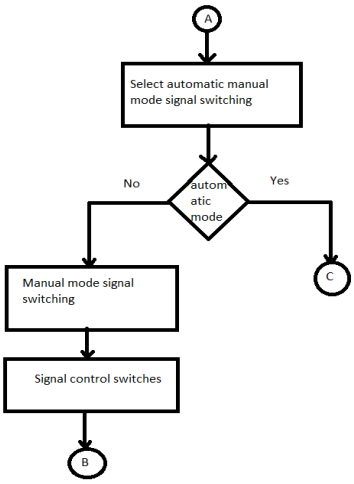

Figure 2.3: Flowchart diagram of switching system for manual and automatic.

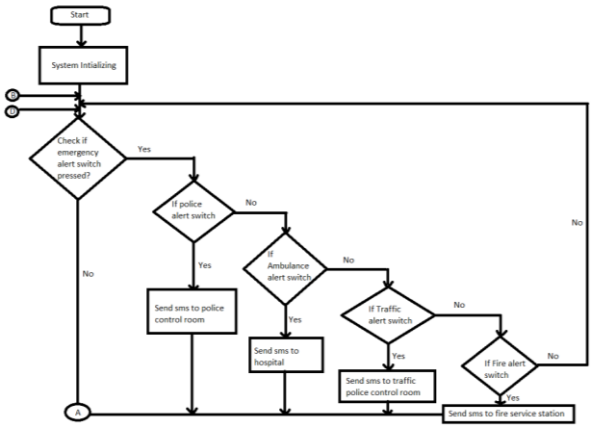

Figure 2.4: Flowchart diagram of validating traffic density.

IV. System Implementation

This system works on 5v DC. An ultrasonic sensor is an electric device which is used to detect the obstacles and measure the distance between the obstacles and provide the output as electric signals then the signals are passed to the microcontroller. The Genuino Mega 2560 is used which as inbuilt microcontroller includes 54 digital I/O pins and 16 analogy I/O pins with a 6v DC supply pin, the system is powered by DC jack and USB port. Genuino Mega 2560 is connected to several Ultrasonic sensors in each lane to survey traffic density. LCDs are connected to the microcontroller triggers the alert message. Panic buttons for emergency services are also connected microcontroller and SIM8000 GSM Module and sim card are used to send the message to police, ambulance, fire-service in case of emergency situation. This system provides manual control in case sensor malfunction and maintenance. Hence this project helps to reduce some amount of traffic jam and provide immediate services to emergency situations

V. Results and Discussion

- In This proposed project Initially System get initialized as shown in figure 4.1, where the control room receives alert message of initializing
- The system when it is initialized by default it will be in Auto mode as shown in the figure 4.2
- When the traffic density is low the green signal is 3 seconds as shown in figure 4.3
- When traffic density is mid-level the timer take by default 5 seconds 7seconds as shown in the figure 4.4
- When traffic density is High-level the timer take by default 7seconds as shown in the figure 4.5
- When the signal is to be controlled by manually the display is shown that it is switched to manual mode
- In case emergency services triggering panic button the message will be displayed and alert message will be sent to the appropriate control room as shown in the figure 4.7,4.8,4.9
- When the traffic is at next junction an alert message is displayed in current junction as shown in figure 4.10.

Figure 4.1: System Initializing

When the system is started the authorized control room will receive the System initialization message.

Figure 4.2: Auto switching Mode

The system is designed in dual mode auto and manual mode, If there is any problem in auto mode manual mode can be changed just by using toggle switch.

Figure 4.3: Low level traffic Density with time 3 seconds at B1 pole

Note: the timer can be changed into minutes, in consideration of demo purpose we have set the timer in seconds so that time can be conserved during demo.
When the sensor sense the density of traffic and also average waiting time is reduced or increased as per the traffic

situation this condition is applicable for all 3 scenarios like low, mid and high.

Figure 4.4: Mid-level traffic Density with time 5 seconds at B1 pole

Figure 4.5: High-level traffic Density with time 7 seconds at B1 pole

Figure 4.6: Switching to manual mode

When the malfunction occurred in sensors or controller then the manual mode can be used here traffic signal in controlled manually where there should be existence of traffic police in that region.

We have provided toggle switch so that the signal can be handled easily.

Only one traffic signal will have green signal and another will be in red we cannot make both the signal in green.

Figure 4.7: Traffic controlled during Emergency (after 2 consecutive signals).

In-case of emergency scenarios there will be a panic buttons Which should triggered manually to appropriate situation The message will be sent to respective control room.

This same condition applicable for all buttons.

Figure 4.8: When Ambulance button is pressed

Figure 4.9: When Fire-service button is pressed

Figure 4.9: When Fire-service button is pressed

VI. CONCLUSION AND FUTURE SCOPE

In this system the traffic density is analyzed on large traffic lanes it helps the traffic clear as soon as possible in case traffic is not cleared for two consecutive signals, the signals can be controlled manually. Where it helps to take decisions as soon as possible the emergency system displays alert messages in LED display, where it reduces risk of traffic density and also in emergency conditions it sends alert messages in future instead of using sensors cameras can be used(using machine learning)and also we can track the violations using the cameras. We can use TENSORFLOW OBJECT COUNTING algorithm to recognize behavior and counting of pedestrians and travelers.

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