

Advanced Traffic Signal

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Abstract— Road traffic is main problem for the metropolitan cities. Vehicular traffic is endlessly increasing everywhere in the world can cause terrible traffic congestion. Therefore, vehicles such as ambulances stuck in a traffic jam and delayed in reaching their destination, it can lead to loss of valuable lives. For this problem, and we are giving a solution in our project. In this system we are providing automatic detection of ambulance with the help of RFID sensors, also the system will manage real-time traffic. Driver of ambulance can also interact with the system through android application in case of any failure. Whenever RFID reader detects the ambulance, traffic signal of that particular lane changes to the green. After passing the ambulance system will resume from its previous condition. According to length of traffic of each lane traffic signals are managed.

Key words: RFID Tag & Reader, IR Sensors, Android App

I. INTRODUCTION

Traffic congestion is the major issue in many cities of India as well as in other countries. The traffic congestion occurs when the number of vehicles on the road exceeds the road capacity. In a smooth flow of heavy traffic, incidents like accident or sudden braking of a car leads to traffic jams. While travelling on highways if sudden accident causes traffic jams and huge queues of vehicles has no option to escape from the jam but to wait for clearing of jam. The economic growth has an effect on the urban traffic. It also affects the emergency vehicles like ambulance. Due to the heavy traffic, it takes more time to reach the hospital.

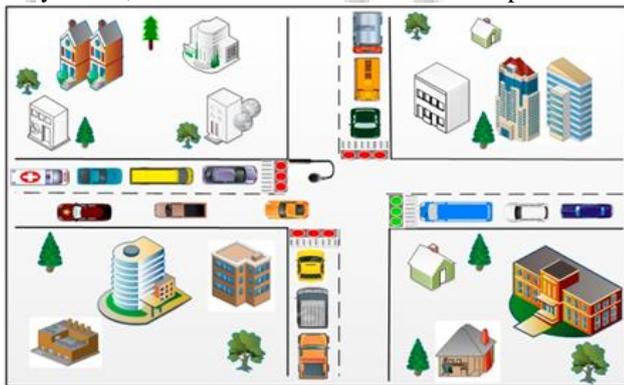


Fig. 1: Ambulance Stuck in Traffic

Main purpose of this system is to provide smooth flow for the emergency vehicles like ambulance. In this system, we are providing a blue light or buzzer at traffic signal to inform that ambulance is coming from specific lane. With the help of RFID tags, and readers the ambulance will be detected & signal of that particular lane will be changed to the green from the red to provide the way to ambulance. System will also inform nearby hospitals about the emergency.

The proposed system will examine the possibility of deploying an intelligent real-time traffic signal controller, which will receives information transmitted from sensors,

and then utilizes this information to optimize the traffic signal scheduling at the inter-section. To monitor the density of the traffic, we will keep the IR sensors besides the road and depends upon the data from the sensors; the delay of the traffic signals will be increase or decrease. RFID tag and RFID reader used to detect the emergency vehicles. For that, we have designed a framework for a dynamic and automatic traffic light control system and developed a model with codes in to build the system. Generally, each traffic light on an intersection is assigned fixed signal time. It is possible to propose dynamic time-based coordination schemes where the green signal time of the traffic lights assigned based on the present conditions of traffic. This System used in heavy traffic roads, the junction, which is based on the time as well as the density and the time delay, will be controlled, and density will control by program coded. If the traffic density is high in particular lane, more time given for that lane.

II. PROBLEM STATEMENT

Implementation of smart traffic lights for Ambulance Detection to reduce the congestion of vehicles and provide an expeditious path to the ambulance.

A. System Architecture

The Block diagram of the proposed system is shown in figure. It consist of RFID, IR Sensors, PIC controller and Android App.

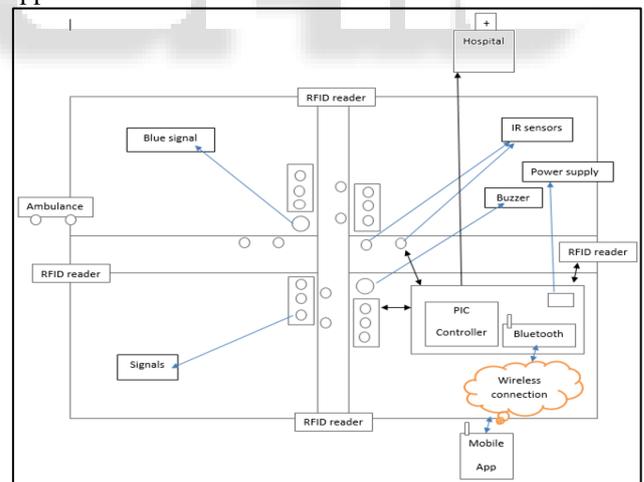


Fig. 2: System Architecture Diagram

B. Module Descriptions

1) RFID Module

The RFID module is used to identify an ambulance through the RFID tags. The RFID module then sends the information to the ATS System for further operation.

2) IR Sensors

IR sensor used to calculate the traffic length or traffic density and send results to controller.

3) Traffic Signal Module

Traffic signal module is used to sense the traffic through the IR Sensors and respectively divide the signal timings for the

vehicles. It's also used to change the signal when there is an Ambulance identified.

4) Android App

Android app is developed to provide additional information consists of EMERGENCY button present in mobile app and sends this command to the controller. If RFID reader fails, then after certain period of time driver sends an "Emergency" command to the controller.

C. Circuit Diagram

PIC (Peripheral Interface Controller) microcontroller is the core part of our project. PIC microcontroller programmed using the MPLAB Software (IDE). The circuit diagram of ATS system is shown in figure.

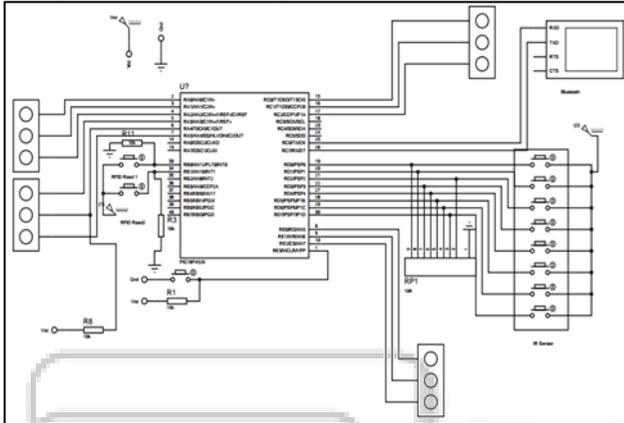


Fig. 3: Circuit Diagram

All sensors like RFID tag, reader, IR sensors etc. and LED's (4 Red, 4 Green, and 4 Yellow) are connected to the microcontroller. It is programmed to read the data from the sensors (RFID, IR sensor etc.) and perform set of operation. For example, when ambulance passes through the RFID reader, then reader get the data from tag which is installed on ambulance and send these data to the microcontroller and microcontroller perform the operation to change the signal.

III. WORKING OF ATS SYSTEM

Ambulance will consist of a RFID tag. RFID readers will be placed on all four lane. As ambulance passes through reader, the RFID tag will be detected by reader. As soon as reader detects the tag it will send signal to the microcontroller. When microcontroller receives the signal from reader it will check lane number of that reader and signal of that lane will be changed to green and buzzer will be activate. Simultaneously microcontroller will inform about the emergency to the nearest hospital. If reader fails to detect the tag then through a mobile application driver of the ambulance can send command to change the signal. The mobile application is connected to microcontroller through Bluetooth. When device comes within range of Bluetooth it will automatically connect to the system.

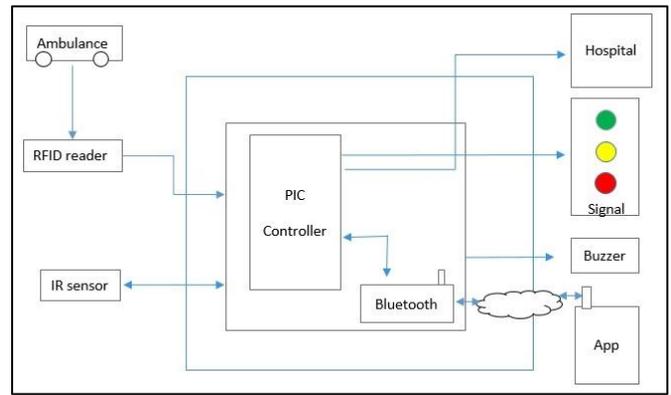


Fig. 4: Working Of ATS System

IR sensors are used to check the traffic density. Sensors will be placed beside roads. Each sensor will be placed after specific distance of another sensor to calculate the length of traffic. We are using two sensors in each lane, if 1st sensor is not activate then traffic status will be low, else status will be medium and if 1st and 2nd both activates at same time then status of traffic will be High. Microcontroller will manage the system based on this status. In Low status there will not be change in the system. If it is medium then time span of green signal will be increased by 5 seconds and if it is high then time span of green signal will be increased by 15 seconds. Traffic will be managed according to the density of each lane.

IV. RESULT

Following Figures shows the results of our system from Hardware perspective.

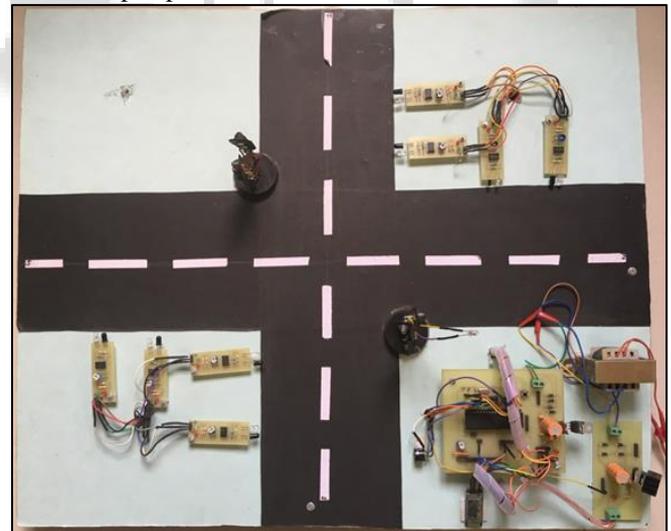


Fig. 5: ATS System

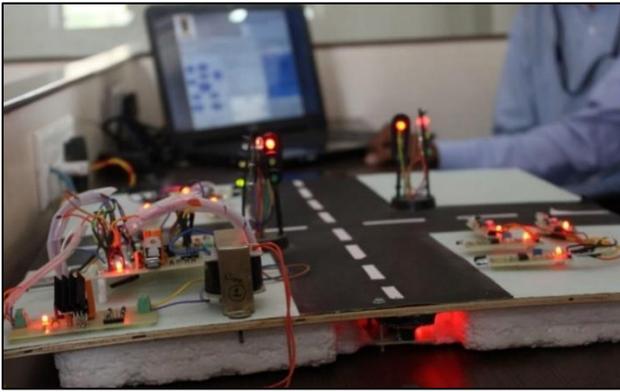


Fig. 6: ATS System

V. CONCLUSION

This system will help to reduce congestion on roads and by using this traffic control system we can achieve the uninterrupted service for ambulance. The system will help to reduce the time of ambulance to reach the hospital. It can save the life of any critical patient. System will also manage the traffic on basis of real-time situation.

VI. FUTURE SCOPE

This system can also be helpful for emergency vehicles such as Defence vehicle in emergency case, Fire engines, and police vans in emergency case. Even we can establish a network for traffic signals to provide start to destination uninterrupted service to the emergency vehicles.

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