

Density Based Traffic Control For Smart Ambulance System

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Abstract - This paper explains the low-cost and real time smart traffic light control system that aims to overcome many defects and improve the traffic management. The system uses SST (Silicon Storage Technology) microcontroller that controls the various operations, monitors the traffic volume and density flow through infrared sensors (IR Sensors), and changes the lighting transition slots. The Ambulance section is also included in the system. The RF Tx (Transmitter) is fixed in the ambulance, the ambulance will give the signal to the transmitter and will send information wirelessly to the receiver in the traffic junction for the lights to go GREEN from RED Through the RF Technology so that the ambulance way gets cleared.

Key Words: GSM Module, IR Sensors and Microcontroller.

1. INTRODUCTION

Traffic lights are signaling devices that are considered to control the traffic at road intersections, Traffic lights has colored lights: the green light, which allows traffic to proceed in the specified direction, the yellow light, which warns the vehicles to stop, and the red light prohibits any traffic from proceeding.

Currently, many countries suffer from the traffic congestion problems that affect the transportation in cities and cause serious quandary. In spite of replacing traffic officers and flagmen by automatic traffic systems, heavy traffic jam is still a major issue. The system uses microcontroller that controls the various operations, monitors the traffic volume and density flow through infrared sensors (IR Sensors), and changes the lighting transition slots. The Ambulance section is also included in the system. The RF Tx (Transmitter) is fixed in the ambulance, the ambulance will give the signal to the transmitter and will send information wirelessly to the receiver in the traffic junction for the lights to go GREEN from RED Through the RF Technology so that the ambulance way gets cleared.

1. RELATED WORK

1.1 Based Intelligent Traffic Control System [1]

In the paper, a new approach for controlling Traffic System is designed. The proposed system uses a concept of Internet of Things. An intelligent traffic controller is designed with components like Raspberry Pi, Pi-Camera, RFID, IR

sensors. Raspberry Pi is the main component which is used to control all, it acts like a controller. Traffic density will be decided with the help of IR sensors

1.2 Smart Traffic Control System for Emergency Vehicle Clearance [2]

In this system each separate vehicle is armed with special radio frequency identification (RFID) tag. They have used RFID reader, NSK EDK-125-TTL, LPC2148 a system-on-chip to read the RFID tags attached to the vehicle. The number of vehicles is counted that passes on a specific path during a specified duration. Depending upon the density of vehicles on the particular junction, the traffic signals will vary.

1.2 Smart Traffic Light Control System [3]

The synchronization of multiple traffic light systems at adjacent intersections is a complex problem. The mutual interference between adjacent traffic light systems, the disproportion of cars flow with time, the accidents, the pass of emergency vehicles, and the pedestrian crossing are not implemented in the existing traffic system.

2. HARDWARE REQUIREMENTS

- Microcontroller SST89E516RD.
- GSM SIM800c.
- Buzzer.
- Relays HRS4 (H).
- Liquid crystal display (LCD).
- IR Sensors.
- RF Transmitter and Receiver.

3. SOFTWARE REQUIREMENTS

- Arduino IDE.

4. PROPOSED DESIGN

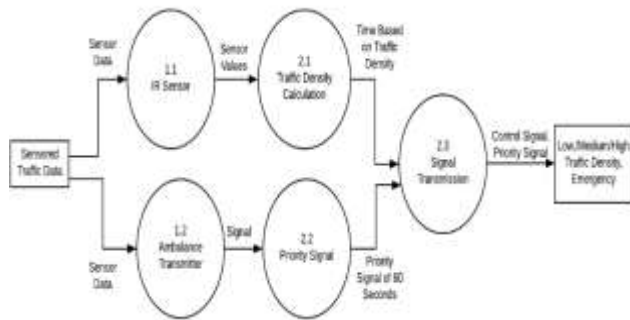


Fig -1: Level 2 DFD of Density Based Traffic Control and Smart Ambulance.

The Microcontroller is the main part of the system to which LCD Display, IR Sensors, Signal Circuit, GSM Modem are connected. Two Smart phones are integrated with the system. One for the user to request for the traffic status through message and another one is placed at the signal junction to capture the traffic density and send it to the user when requested by the user.

There are three IR sensors (IR-1, IR-2, IR-3) for Low traffic density, Medium traffic density and High traffic density. When IR-1 sensor is detected, the LCD Display displays Low traffic density and Green light will be on for 20 seconds. When IR-2 sensor is detected, the LCD Display displays Medium traffic density and Green light will be on for 40 seconds. When IR-3 sensor is detected, the LCD Display displays High traffic density and Green light will be on for 60 seconds.

When an Ambulance approaches the signal junction, the transmitter in the Ambulance sends signal to the receiver which is placed at the traffic signal junction. Whether is Low traffic density, or Medium traffic density, or High traffic density, the Green light will be on for 60 seconds for the Ambulance to pass through the signal junction.

5. EXPERIMENTAL SETUP

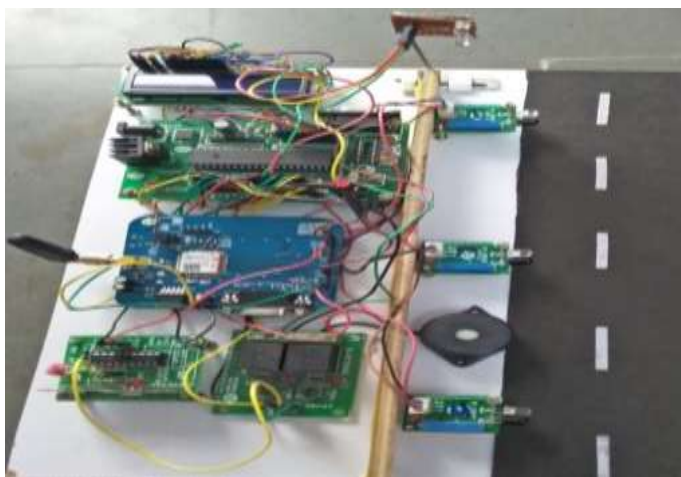


Fig - 2: Experimental Setup

6. RESULTS

This chapter gives details about the project after testing. The results after testing shows if the requirements are met in the project and if the requirements are not satisfied. A thought for future developments is done after study of results.

The following results were obtained when experiment was conducted.

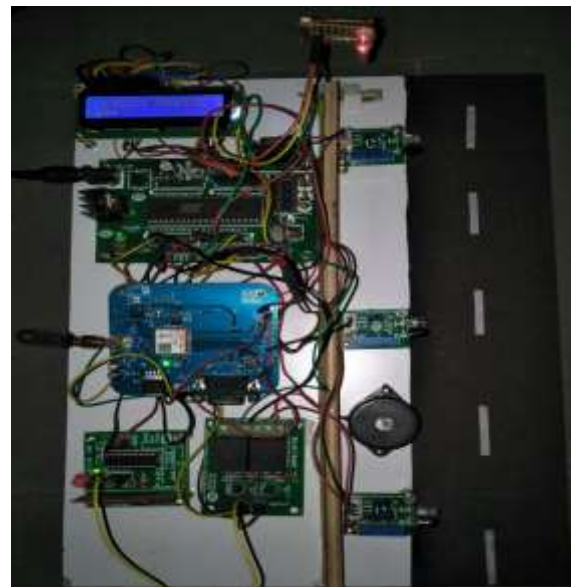


Fig -4: Initially when the system is setup.

The figure 4 shows picture, when the system is setup initially.



Fig -5: Traffic up to IR Sensor-1 which is Low traffic Density

The figure 5 shows the traffic density up to IS Sensor-1 and IR-1 is detected.



Fig -6: IR-2 Sensor detected when the traffic is Medium Traffic Density

The figure 6 shows IR-2 Sensor detected, which is medium traffic density.



Fig -8: Traffic Green light on for 60 seconds.

The figure 6 shows IR-3 Sensor detected due to which Green light is on for 60 seconds, which is High traffic density.



Fig -7: Traffic Green light on for 40 seconds

The figure 7 shows IR-2 Sensor detected due to which Green light is on for 40 seconds, which is medium traffic density.

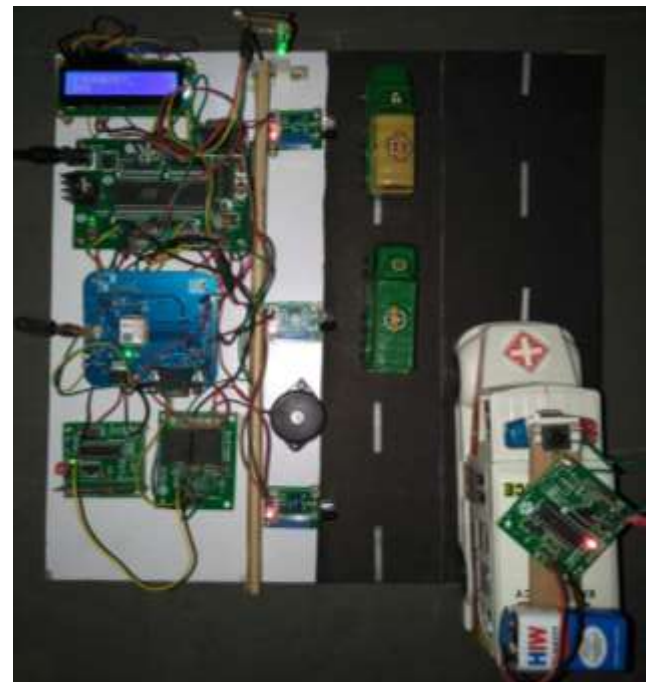


Fig -9: Emergency Clearance

The figure 9 shows the emergency clearance for ambulance for which Green light is on for 60 seconds.

7. ADVANTAGES

1. Defence vehicles in emergency cases.
2. Fire extinguishing vehicles.

3. Police vans in emergency cases.
4. Emergency clearance of Ambulance Vehicles.

8. CONCLUSION

To reduce the congestion and unwanted time delay in traffic, an advanced system is required. One such advanced technology is Density Based traffic Control and Smart Ambulance using IR sensors. The sensors help in knowing the Traffic Density i.e., Low Traffic Density, Medium Traffic Density and High Traffic Density.

When an Ambulance approaches the signal junction, the transmitter in the Ambulance sends signal to the receiver which is placed at the traffic signal junction. Whether is Low traffic density, or Medium traffic density, or High traffic density, the Green light will be on for 60 seconds for the Ambulance to pass through the signal junction. With this technique, a new era of traffic signal control is entered.

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