

## SMART TRAFFIC MANAGEMENT FOR AMBULANCE

Sunil M<sup>\*1</sup>, V Yashaswini Naidu<sup>\*2</sup>, Vignesh R<sup>\*3</sup>, Vishwas P<sup>\*4</sup>, Amitha S<sup>\*5</sup>

<sup>\*1,2,3,4</sup>Dept. Of Computer Science, KS School Of Engineering And Management, Bangalore, India.

<sup>\*5</sup>Assistant Professor, Dept. Of Computer Science, KS School Of Engineering And Management, Bangalore, India.

DOI : <https://www.doi.org/10.56726/IRJMETS32112>

### ABSTRACT

In today's world, traffic jams during rush hours is one of the major concerns. During rush hours, emergency vehicles like Ambulance get stuck in jams. Due to this, these emergency vehicles are not able to reach their destinations on time, resulting in loss of human lives. We are willing to develop a system which is used to provide clearance to ambulance when it is struck in traffic jam. Here we clear the path of the emergency vehicle hence it can reach the destination in time. We will monitor the CCTV videos and whenever an ambulance gets stuck in a heavy traffic condition our system will detect the ambulance . This information is transmitted to the traffic signal receiver which turns the red light to green light enabling the ambulance to reach the destination faster. This process keeps on repeating until the ambulance reaches the destination. If the ambulance fails to cross a signal within 10 minutes then the signal automatically turns to red. This project helps the ambulances reach the destination in minimum time. The entire system is based on Artificial Intelligence and Machine Learning which is a booming technology. It has many advantages compared to the existing system of clearing the traffic manually.

**Keywords:** Tracking, Ambulance, Traffic Jam.

### I. INTRODUCTION

Now a days traffic jam is very high in metropolitan cities like Bengaluru, Chennai and Kolkata etc and also major popular cities. Traffic congestion is one of the major problems in urban areas, which have caused hitches for the ambulance to reach the hospital in right time. Moreover, road accidents in the city have increased and the loss of life due to the accidents is even more crucial. Nearly 1.2 billion people lose their life because of delay in emergency system. Siren in emergency vehicle is not sufficient to indicate its existence when it is stuck in heavy traffic as sound might not travel to the vehicle which is stationed first in the jam and it leads to ambulance reaching the hospital late than the normal time which may cause loss of a patient in the ambulance vehicle. To address the issue, we are introducing smart traffic system for ambulance. Here we use a video footage from traffic CCTV cams and input it to the system. The system then converts the video into video frames and uses the ambulance detection algorithm to search for ambulance in the video. If we detect any ambulance in that frame then immediately the signal light turns to green from red allowing the vehicles along with the ambulance to move forward. This system will be implemented in all signals so the ambulance will not get stuck in any signal until it reaches the destination i.e., hospital. If the ambulance does not pass the signal before 10 minutes then automatically the signal will resume to its original state it was before getting forcefully changed by the system. By this there will be no delay of any patient reaching the hospital and loss of lives due to delay in medical services.

### II. IMPLEMENTATION OF THE SYSTEM

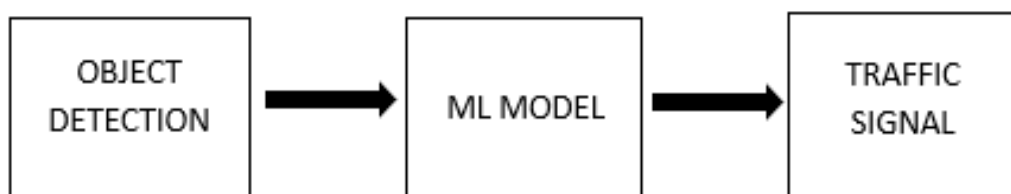


Fig. 1. Basic System Design

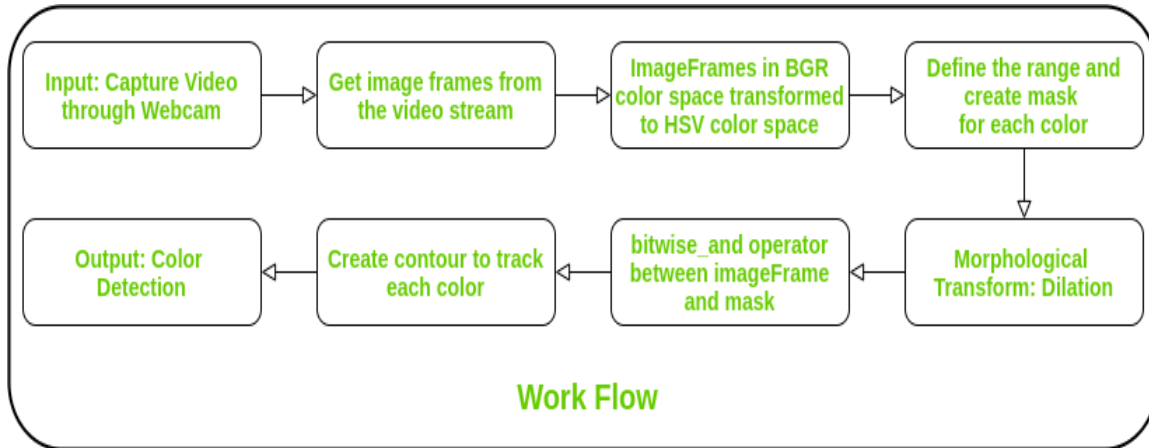


Fig. 2. Workflow

The CCTV's which is already functional set up by the traffic department for monitoring offences in traffic signals will be used for this project. The live video stream which is coming from this CCTV's is fed as input to the algorithm. The algorithm converts these videos into image frames and starts scanning for the ambulances. If the algorithm detects any image of ambulance which matches with the datasets given to the algorithm prior then it alerts the traffic signal receiver. The receiver at the traffic signal pole after receiving the alert turns the signal from red to green allowing the ambulance which is stuck in the traffic. This system is installed in all the traffic signals so that the ambulance reaches the destination without further stoppages.

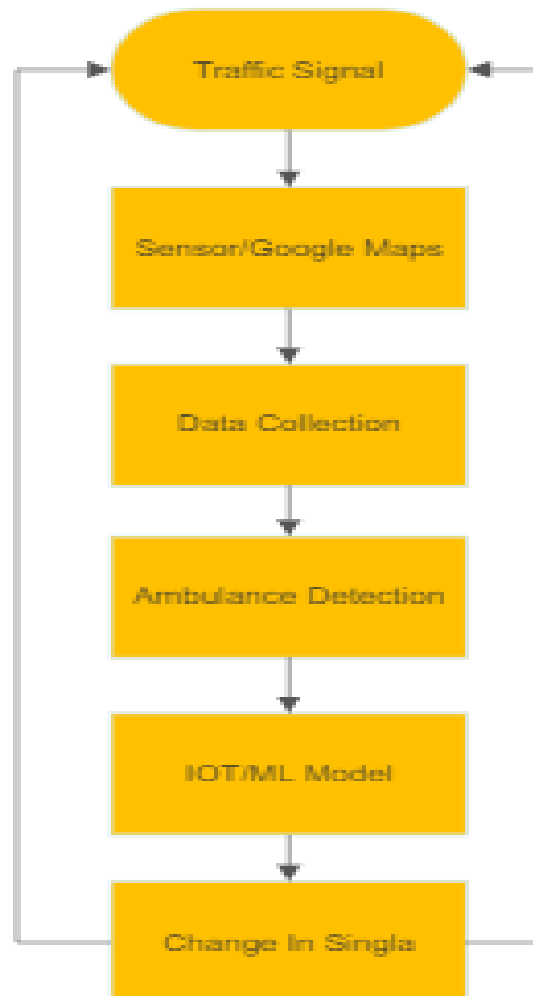


Fig. 3. Implementation of Flow chart

### III. COMPONENTS

The main components required for the functioning of the above proposed solution are elucidated below.

#### A. Microcontroller

The Arduino Mega 2560 has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

#### B. Raspberry Pi

- Broadcom BCM2711, Quad core Cortex-A72 (ARM v8) 64-bit SoC @ 1.5GHz
- Raspberry Pi standard 40 pin GPIO header
- Operating temperature: 0 – 50 degrees C ambient
- 4-pole stereo audio and composite video port

#### C. Image Sensor

It is an electronic device that converts an optical image into an electronic signal. It is used in digital cameras and imaging devices to convert the light received on the camera or imaging device lens into a digital image.

#### D. Raspberry Pi Camera Module

The Raspberry Pi Camera Board is a custom designed add-on module for Raspberry Pi hardware. It attaches to Raspberry Pi hardware through a custom CSI interface. The sensor has 5 megapixel native resolution in still capture mode. In video mode it supports capture resolutions up to 1080p at 30 frames per second.

#### E. Arduino Uno

Arduino UNO is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started

### IV. RESULTS AND DISCUSSIONS

Emergency vehicle stuck in a traffic condition is detected with detection algorithm and then the traffic signal gets an alert by which it changes the signal to green from red. For the video part we use the already setup CCTV which is used by the traffic department for traffic violations. This live stream is broken into image frames and then the algorithm is run which searches with the dataset images and then alerts if a match is found from the image frames.

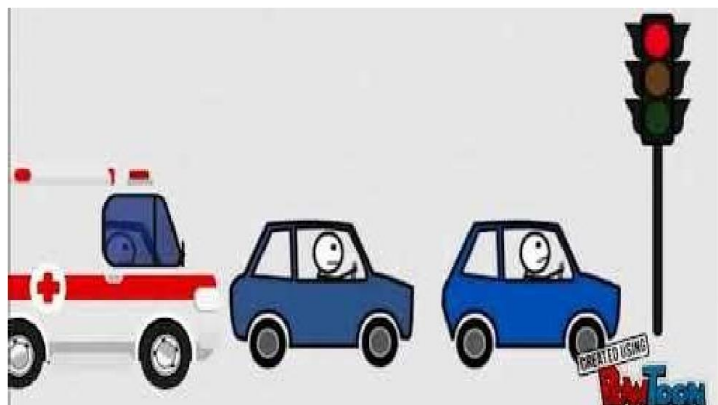


Fig. 4. Sketch of the System model

### V. APPLICATIONS

- It can be implemented in the city which has heavy traffic density.
- We can share the alert to nearby hospitals from the signal that an ambulance is coming and for the hospital staff to be ready.
- This technology can be implemented in any emergency cases like fire engine truck, VIP vehicles.

## VI. CONCLUSION

In this paper, an idea is proposed for saving a patient's life in a faster way possible. It is beneficial for users in case of emergencies as it saves time. With this Application, the ambulance can reach the patients as fast as possible using the video and detection algorithm. This system makes sure that more lives are saved. It is easier for detecting ambulance and low cost. The difficulty is if the ambulance is stuck after a distance of more than 300 metres then it would be very difficult to detect the ambulance.

## VII. FUTURE ENHANCEMENT

This system can be implemented to all other emergency vehicles in future like fire engine, police, cars etc., in future. We can share the patient information to the hospital in an easy way. The patient information can be shared to the hospital do that they get ready with the required medicines or infrastructure to treat that patient. Traffic signal timer can be controlled dependent on number of vehicles present in front of the ambulance.

## VIII. REFERENCES

- [1] Pandiaraj, K., et al. "RFID Based Automatic Lane Clearance for Ambulance." 2021 International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE). IEEE, 2021.
- [2] Deepajothi, S., et al. "Intelligent Traffic Management for Emergency Vehicles using Convolutional Neural Network." 2021 7th International Conference on Advanced Computing and Communication Systems (ICACCS). Vol. 1. IEEE, 2021
- [3] Kamdar, Arihant, and Jigarkumar Shah. "Smart traffic system using traffic ow models." 2021 International Conference on Artificial Intelligence and Smart Systems (ICAIS). IEEE, 2021.
- [4] Rachana K P, Aravind R, Ranjitha M, Spoorthi Jwanita, Soumya K, 2021, IOT Based Smart Traffic Management System, INTERNATIONAL JOURNAL OF ENGINEERING RESEARCH & TECHNOLOGY (IJERT) NCCDS – 2021 (Volume 09 – Issue 12),
- [5] V. Bali, S. Mathur, V. Sharma and D. Gaur, "Smart Traffic Management System using IoT Enabled Technology," 2020 2nd International Conference on Advances in Computing, Communication Control and Networking (ICACCCN), 2020, pp. 565-568, doi: 10.1109/ICACCCN51052.2020.9362753.
- [6] Lingani, Guy M., Danda B. Rawat, and Moses Garuba. "Smart traffic management system using deep learning for smart city applications." 2019 IEEE 9th annual computing and communication workshop and conference (CCWC). IEEE, 2019.
- [7] Javaid, Sabeen, et al. "Smart traffic management system using Internet of Things." 2018 20th international conference on advanced communication technology (ICACT). IEEE, 2018
- [8] Ghazal, Bilal, et al. "Smart traffic light control system." 2016 third international conference on electrical, electronics, computer engineering and their applications (EECEA). IEEE, 2016.
- [9] Lanke, Ninad, and Sheetal Koul. "Smart traffic management system." International Journal of Computer Applications 75.7 (2013)
- [10] Smart Traffic Control System for Emergency Vehicle Clearance, D.Aswani, Student, Department of ECE, C. Padma, (Ph.D), Assistant Professor, Department of ECE, Priyadarshini Institute of Technology, Ramachandrapuram, Tirupati, A.P., India.