

# Smart Traffic Monitoring

Chilakalapalli Yaswanth Sai<sup>1</sup>, Chaduvula Sushma Rani<sup>2</sup>, Nagam Rangasai<sup>3</sup>, Sathujoda Nikhil<sup>4</sup>, Macharla Umamahesh<sup>5</sup>, Tetla Srilatha<sup>6</sup>

<sup>1,2,3,4,5,6</sup> Department of electronics and communication engineering, Aditya institute of technology and management, tekkali, Srikakulam district

**Abstract-** In emergency condition, each and every second is important in saving a human's life. The major concept of this project is to use the each second efficiently to save person. Now a days many life's are being expired before the person reaches the hospital in ambulance and the delay caused due to this. In this project we are going to be designed a prototype which could reduce all the delays and save the life at the earliest. The main theme of the project is that when the patient is in ambulance in emergency condition the ambulance should reach the hospital utmost fast. When the driver selects the destination then that selected route will be cleared by sending the information to respected traffic signal in the path itself by making use of artificial intelligence and Amazon web services. Thus this project allows us to save the time in more efficient and economical manner and save the life.

## I.INTRODUCTION

Now a days we all face the traffic problems as a major drawback of urban cities. It may lead to lose life of anybody in critical situations. So we have to think to provide a solution to this problem to tackle the critical or emergency situations without the major traffic jams. This in turn has an adverse effect on the economy of our country as well as the loss of lives. As a result, emergency vehicles such as ambulance, fire brigade or police vehicles get stuck in traffic signal and waste their valuable time and golden hour. High priority must be given to human lives in the Ambulance which is travelling through a traffic signal. Here we are introducing a major cloud service AMAZON WEB SERVICES (AWS). It is easy to use, flexible, cost effective and mostly secure. In this project we are using Raspberrypi 3 B+, because when compared to arduino it has more features like raspberrypi is good at software applications. Arduino is micro controller board while raspberrypi, thus arduino is just a part of raspberrypi. This project definitely act as a "Life Saver" project.

## 2. HARDWARE IMPLEMENTATION

### 2.1. Raspberry pi 3 B+

The Raspberry Pi 3 Model B+ is the latest product in the Raspberry Pi 3 range, boasting a 64-bit quad core processor running at 1.4GHz, dual-band 2.4GHz and 5GHz wireless LAN, Bluetooth 4.2/BLE, faster Ethernet, and PoE capability via a separate PoE HAT. The dual-band wireless LAN comes with modular compliance certification, allowing the board to be designed into end products with significantly reduced wireless LAN compliance testing, improving both cost and time to market. The Raspberry Pi 3 Model B+ maintains the same mechanical footprint as both the Raspberry Pi 2 Model B and the Raspberry Pi 3 Model B.

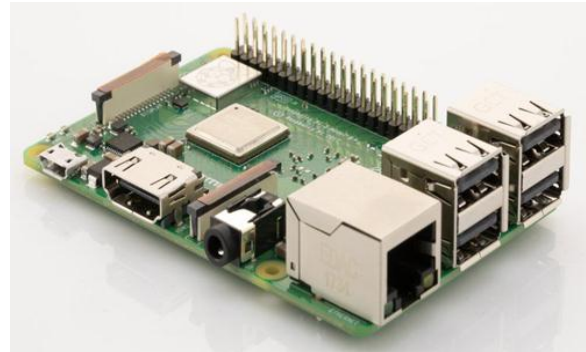


FIG 1.RASPBERRY PI 3B+

### 2.2camera

The Raspberry Pi Camera Board plugs directly into the CSI connector on the Raspberry Pi. It's able to deliver a crystal clear 5MP resolution image, or 1080p HD video recording at 30fps! Latest Version 1.3! Custom designed and manufactured by the Raspberry Pi Foundation in the UK, the Raspberry Pi Camera Board features a 5MP (2592x1944 pixels) Omni vision 5647 sensor in a fixed focus module. The module attaches to Raspberry Pi, by way of a 15 Pin Ribbon Cable, to the dedicated 15-pin MIPI

Camera Serial Interface (CSI), which was designed especially for interfacing to cameras. The CSI bus is capable of extremely high data rates, and it exclusively carries pixel data to the BCM2835 processor. The board itself is tiny, at around 25mm x 20mm x 9mm, and weighs just over 3g, making it perfect for mobile or other applications where size and weight are important. The sensor itself has a native resolution of 5 megapixel, and has a fixed focus lens onboard. In terms of still images, the camera is capable of 2592 x 1944 pixel static images, and also supports 1080p @ 30fps, 720p @ 60fps and 640x480p 60/90 video recording. The camera is supported in the latest version of Raspbian, the Raspberry Pi's preferred operating system

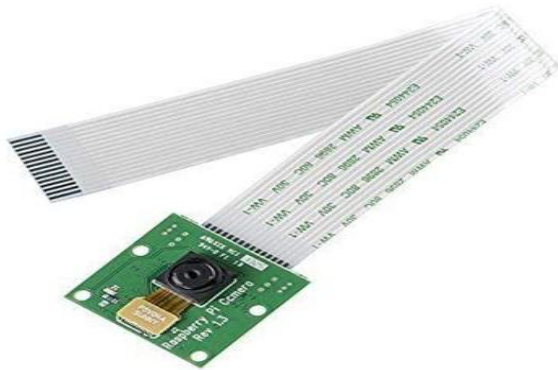


FIG 2.RASPBERRYPI CAMERA

### 3. AMAZON WEB SERVICES



FIG 3. Amazon web services

Amazon Web Services (AWS) is a secure cloud services platform, offering compute power, database storage, content delivery and other functionality to help businesses scale and grow. Running web and application servers in the cloud to host dynamic websites .Amazon Web services is a subsidiary of amazon.com that provides on- demand cloud

computing platforms to individuals ,companies and governments, on a paid subscription basis. Cloud computing is the on-demand delivery of IT resources over the Internet with pay-as-you-go pricing. Instead of buying, owning, and maintaining physical data centers and servers, you can access technology services, such as computing power, storage, and databases, on an as-needed basis from a cloud provider like Amazon Web Services (AWS).

#### Types of cloud computing:

The three main types of cloud computing include Infrastructure as a Service, Platform as a Service, and Software as a Service. Each type of cloud computing provides different levels of control, flexibility, and management so that you can select the right set of services for your needs.

#### Infrastructure as a Service (IaaS)

IaaS contains the basic building blocks for cloud IT. It typically provides access to networking features, computers (virtual or on dedicated hardware), and data storage space. IaaS gives you the highest level of flexibility and management control over your IT resources. It is most similar to the existing IT resources with which many IT departments and developers are familiar.

#### Platform as a Service (PaaS)

PaaS removes the need for you to manage underlying infrastructure (usually hardware and operating systems), and allows you to focus on the deployment and management of your applications. This helps you be more efficient as you don't need to worry about resource procurement, capacity planning, software maintenance, patching, or any of the other undifferentiated heavy lifting involved in running your application.

#### Software as a Service (SaaS)

SaaS provides you with a complete product that is run and managed by the service provider. In most cases, people referring to SaaS are referring to end-user applications (such as web-based email). With a SaaS offering, you don't have to think about how the service is maintained or how the underlying infrastructure is managed. You only need to think about how you will use that particular software. All over the world AWS has 55 availability zones, Only

Mumbai is the availability zone in India for AWS .In our project AWS plays a key role. Lets us discuss about the working of our project by the methodology.

#### 4. WORK ANALYSIS

##### 4.1 CONNECTING GOOGLE MAPS TO AWS:

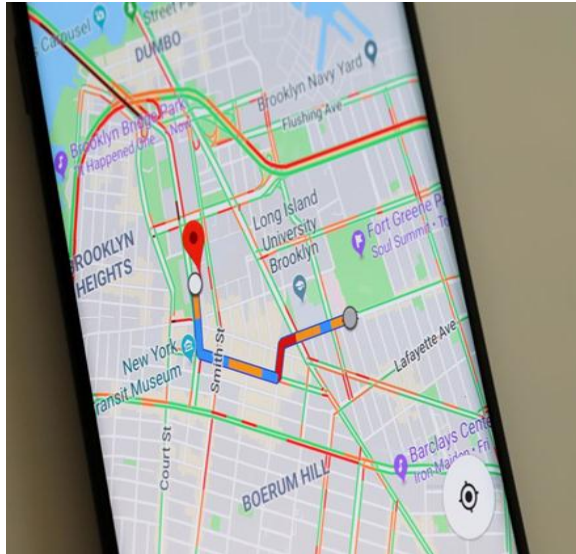


Fig 4. Google maps

By making use of Google developers, we are going to install Google maps in the Ambulance. By using programming we can connect google maps to AWS. When the driver selects the shortest path to reach the destination. The data is sent to the AWS that is in which path Ambulance is approaching.

##### 4.2 AWS –RASPERRY PI -RASPERRY PI CAMERA MODULE:

Here the data is received by the AWS. The alert (In which way the ambulance is arriving) is given to the Raspberry pi which is placed in Traffic signal. The Entire process will begins when the ambulance is in Certain distance From the Traffic signal. Raspberry pi gives an alert to camera module to observe the Vehicle density.

##### 4.3 OPENCV-EDGE DETECTION ALGORITHM:

In edge detection algorithm, the edges of the vehicle is detected and it is considered as a vehicle. The Edge detection process will be done by the openCV. The expecting edge detection algorithm using OpenCV is shown below. Here the data is again sent back to AWS. Vehicle database will be stored in Amazon

web services because Raspberry pi storage is insufficient to store the entire Vehicle database.

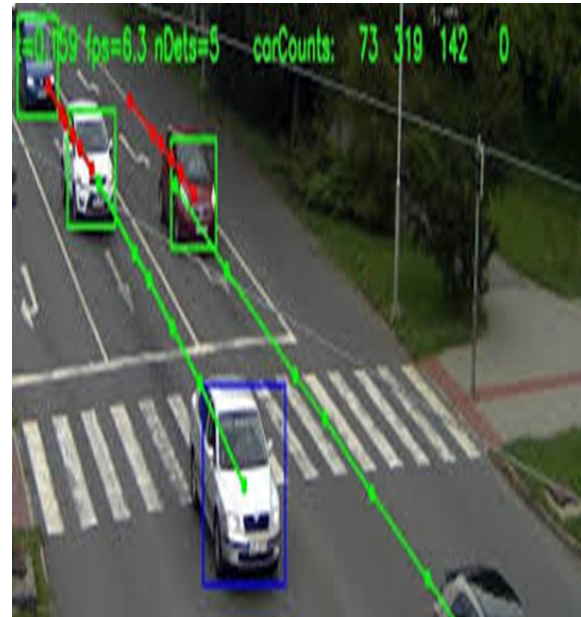


Fig 5. Vehicle detection technic

##### 4.4 GENERATION OF TIMER:

The vehicle count data is sent back to AWS, For adjustment of timer and vehicle count, Certain Coding will be given. Now the total data is again sent back to Raspberry pi and it automatically generates timer by making use of Python .Now the timer is generated based on Vehicle density.

##### 4.5 ALERT IN FORM OF DISPLAY:



Fig 6. Display alerts

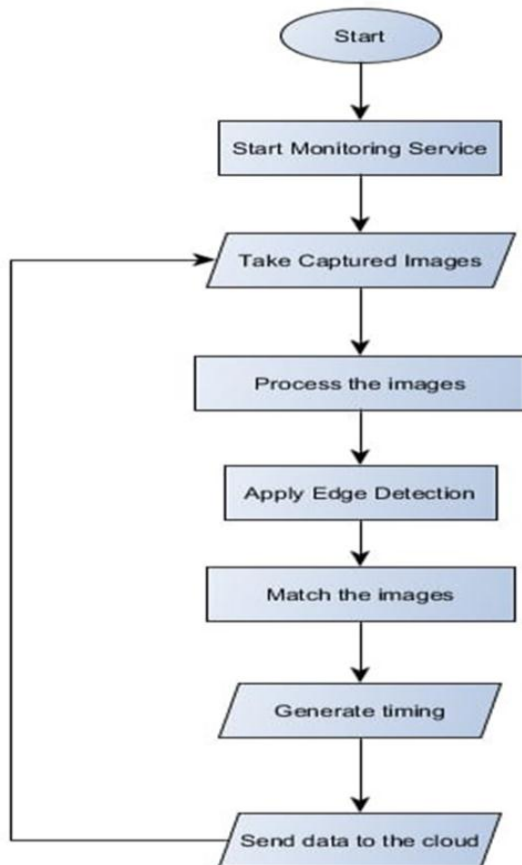
As we stated before , we have another strategy . When the ambulance is at certain distance from the traffic signal, an alert will be given in form of display, then people can clear a lane for Ambulance. vehicles, then also we must wait for 90 sec timer, In

Emergency Conditions if we can reduce the timer then we can save the time as well as the human life. As per the Block diagram shown above, we are going to be install Google maps in the emergency vehicle and it will be sending data to AMAZON WEB SERVICES CLOUD which is going to play a major role in our project. Now the drivers chooses best path to reach the destination, now the data is transferred to AWS Cloud i.e. about the path chosen by the driver of emergency vehicle, In the way there will be the traffic signals, The Traffic signals are already deployed with raspberry pi connected with camera ,Here the AWS cloud sends data to camera about vehicle, by using OpenCV algorithms and edge detection algorithms Camera is going to detect vehicle density in the Junction (either more vehicles or few vehicles) and camera again sends data to the AWS cloud. Now the result that means the vehicle count is again sent to the raspberry pi from Amazon web services cloud, Now the raspberry pi controls traffic lights timer



The proposed work considers not only the priority of the vehicles but also the density of the vehicles on the road and Controls the traffic light order well and more properly and the precision of the RFID is more than Camera's so it also enhances the performance of traffic light Violation Detection System. Also as a future scope the condition of patient can be monitored and this information is sent to the respective doctor so that doctor can prepare for the next process before the patient reach to the hospital. Traffic lights can be extended to N number and traffic light control can be done for whole city by session on a single place. In ambulance system, the data of the patient in the ambulance can be sent to the Hospitals via GSM technology. Thus, it can provide early and fast treatment of the patient. In the future, this system can be extended to more. In this way we can make the traffic management as per the computer based technics from this technology we can reduce the time around minutes ,in this way there is a great hope for future development of this technology, now a days artificial intelligence plays a key role in humans life there is a great scope for artificial intelligence in this project artificial intelligence will play a key role, As per the definition, AI is a branch of computer science that involves creation of intelligent machines that work exactly like humans and possess all the capabilities as that of a human brain. They can perform numerous human functions such as speech recognition, learning, planning and problem solving. AI machines are also being programmed to simulate human brain such as gaining knowledge, reasoning, solving problems, perceiving things, and learning, planning and developing ability to manipulate and move objects. ideally, a traffic

Algorithm



4.6 FUTURE ENHANCEMENT:

official on the road would leave the carriageway opened for equal minutes for smoother flow of traffic. However, not all carriageways have similar volume of traffic which means that the carriageways should be opened for particular time duration depending on the volume of traffic it has. AI would use camera live feeds, sensors and even Google Maps to make a predictive algorithm and instruct automated traffic signals to work accordingly. A lot of advancements have been made in the field of Artificial Intelligence which are utilised in various industries mostly in manufacturing industries. It can lead to minimal intervention of human being. Having said that, it can perform those functions which was impossible for human being to perform. However, on the other hand it can appear to be dangerous if left uncontrolled. One of the applications of Artificial Intelligence is in traffic management system which can ease the life of people and fulfill the requirements of infrastructural reforms which is the need of the hour, especially in metropolitan cities where traffic is high.



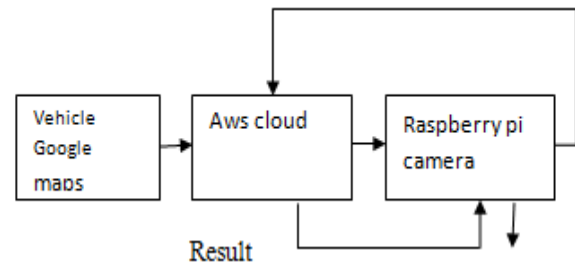
### 5. METHODOLOGY

In simply we can say that now one of the burning issue is, In the traffic signal, If there is a long lane of vehicles we have to wait for 90 sec timer or more than that, If there is a small lane or few vehicles, then also we must wait for 90 sec timer, In Emergency Conditions if we can reduce the timer then we can save the time as well as the human life. As per the Block diagram shown above, we are going to be install Google maps in the emergency vehicle and it will be sending data to AMAZON WEB SERVICES CLOUD which is going to play a major role in our project. Now the drivers chooses best path to reach the destination, now the data is transferred to AWS Cloud i.e about the path chosen by the driver of emergency vehicle, In the way there will be the

traffic signals, The Traffic signals are already deployed with raspberry pi connected with camera ,Here the AWS cloud sends data to camera about vehicle, by using Open CV algorithms and edge detection algorithms Camera is going to detect vehicle density in the Junction (either more vehicles or few vehicles) and camera again sends data to the AWS cloud. Now the result that means the vehicle count is again sent to the raspberry pi from Amazon web services cloud, Now the raspberry pi controls traffic lights timer. FUTURE ENHANCEMENT: The proposed work considers not only the priority

### 6. BLOCK DIAGRAM

Detects density Calculation using AI algorithm



Raspberry pi controls traffic light timer

As per the Block diagram shown above, we are going to be install Google maps in the emergency vehicle and it will be sending data to amazon web services cloud which is going to play a major role in our project. Now the drivers chooses best path to reach the destination, now the data is transferred to AWS Cloud i.e about the path chosen by the driver of emergency vehicle, In the way there will be the traffic signals ,The Traffic signals are already deployed with raspberry pi connected with camera ,Here the AWS cloud sends data to camera about vehicle, by using OpenCV algorithms and edge detection algorithms Camera is going to detect vehicle density in the Junction (either more vehicles or few vehicles) and camera again sends data to the AWS cloud. Now the result that means the vehicle count is again sent to the raspberry pi from Amazon web services cloud, Now the raspberrypi controls traffic lights timer.

Lets us write the algorithm that we are going to use in vehicle detection.

### 7. CONCLUSION

In Emergency condition, Waiting in a queue in a Traffic Signal is a Recurring Problem, We have to Solve this Problem Shortly. Our Proposed statement about Controlling Traffic signal timer by Vehicle density Can be Done easy by our Suggested Process(Methodology).This system makes the traffic signaling Timer automatic, by providing the vehicle density measurement intelligence to the system. So that there should not be any difficulties in traffic handling. We are going do the prototype by using components which are listed above and by using Most significant technology Artificial Intelligence and Major cloud Services AWS and vehicle density is estimated using OpenCV algorithm by using edge detection. Another strategy, A indication will be given in form of display, then people can be alert and then people can clear a lane for emergency vehicle. In this proposed system, idea is proposed for controlling the traffic signals in favor of ambulance during the emergency time. With this statement the ambulance can be reached to the hospital without time lag using the mechanism of shortest path and congestion details of all possible routes. By using this system ambulance can reach nearest hospital with short period of time. If we compare our proposed system with existing system, Our proposed system helps to find shortest path from source location to destination location and we call set the traffic light timer based on Vehicle density. This project definitely acts as a “LIFE SAVER “Project.

- [5] Rajeshwari Sundar, Santhoshs Hebbar, and Varaprasad Golla (2015), „Implementing Intelligent Traffic Control System for Congestion Control, Ambulance Clearance, and Stolen Vehicle Detection,“ IEEE Sensor .
- [6] Veeravenkatesh, Nazneensyed ,” smart traffic control system for emergency vehicle clearance” International Journal of Innovative Research in Computer and Communication Engineering – Vol.3, Issue 8, August 2015.

#### REFERENCES

- [1] M. Prasanth, G Sai Abhinay & Dr. J V N Ramesh, Automated traffic control system for emergency services,2015 Global Journal of Computer Science and Technology: ENetwork, Web & Security
- [2] J R Latha, U Suman, “Intelligent traffic light controller”, 2015 International Journal of Emerging Engineering Research and Technology
- [3] Suresh Sharma, Alok Pithora, Gaurav Gupta, Mohit Goel ,Mohit Sinha , “Traffic light priority control for emergency vehicle using rfid”, 2013 IJJET
- [4] K.Sangeetha, P.Archana , M.Ramya, P.Ramya , “Automatic ambulance rescue with intelligent traffic light system”, 2014IOSR Journal of Engineering (IOSRJEN)