**Intelligent Ambulance Using IOT**

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# ABSTRACT

**The main reason for death of patients while going to hospitals is traffic congestions Traffic congestion may be caused due to any of the reasons such as, accidents, road construction works, large numbers of pedestrians crossing roads, etc. Especially in metropolitan cities like Bangalore, Delhi, Hyderabad etc. In such cities people live a busy lifestyle where they have no time for themselves, and they don’t even think of giving way for emergency services like ambulances. To overcome this problem as well as many such problems this paper gives a solution that is “Intelligent Ambulance using IOT”. This paper describes the use of many technologies such as GPS for providing location, IOT for calculating density of vehicles and automatically changing signal light to green if ambulance is on the way and to monitor the health of patient, Arduino microcontroller and Nodemon technology to send vital information such as heartbeat rate and body temperature of patient to nearest hospitals via telegram. The proposed system is used to save the life of patients by taking them to hospital in a faster way than the usual traditional way.** **Additional to this, the patient monitoring system is able to check victim’s health condition using heart rate sensor and temperature sensor i.e. LM35 and send information to hospital**.

**Keywords-** GPS, IOT, microcontroller, health monitoring, Nodemcu

# INTRODUCTION

India being one amongst the foremost inhabited countries within the world, road traffic congestion and delayed provision of medical attention are the critical issues for loss of life. According to many statistics, each minute a life is lost due to late responses by family members, hospital formalities or unavoidable situations such as traffic congestion. Saving a life is precious to both the patient’s family and even the hospital’s name. Due to the increase in population and busy lifestyle of people they are not able to provide a way for the ambulance.

This paper describes a solution for automatic traffic signal light changing and to send patient’s vital information to nearest hospitals so that they can keep the required equipment ready before the patient reaches the hospital. The proposed system is used to save the life of patients by taking them to hospital in a faster way than the usual traditional way. Earlier the ambulance had to wait for a longer time till the signal gives green light which has no technology attached to it, in this system a set of IR sensors and sound sensors are placed on four lanes of the road connected by traffic signal. These sensors are used to calculate the traffic density on the roads and also the presence of ambulances on the lane, if any ambulances are detected the traffic signal in that lane turns green irrespective of which light is should display, and simultaneously the signal on the opposite lane turns red. The presence of heartbeat rate sensor and body temperature sensor will sense the vital details of the patient and this system uses nodemcu.

# LITERATURE SURVEY

In paper [1], we have considered the analysis of finding a shortest path and giving the best route to an ambulance to reach the particular hospital. This paper summarizes the creation of GPS System for which the GPS tracker is built and it is set up with the ambulance to track the path. This technology can be used by everyone even a common man can track all the ambulance in his surroundings. This paper also provided the proper utilization of GPS technology and in case of any emergency this technology will be very useful in finding the nearby ambulances and reach the patient’s address of the accident spot. This GPS technology in ambulance is developed to overcome the current difficulty which is faced by many ambulance drivers. Hence this technology uses a shortest path establishing algorithm to reach the destination hospital in minimum amount of time. The overall architecture of this system consists of two sides. One is the ambulance required one’s side and the other one is ambulance driver’s side. The patient’s side is just to track the address of the available ambulances with of a GPS sensor. Then the ambulance driver can check with the exact location of the person who has booked for the ambulance. If the driver is busy or cannot make to reach at that time then he may cancel the users request for ambulance, user will get notified about the non-availability of ambulance but he still gets many lists of ambulance which are nearby. Meanwhile he will also be getting information about the nearest hospitals.

G. Ramprasad et al. [2] puts a paper which mainly depends on the very low cost and accurate and also real time traffic controlling system. This system mainly focuses on detecting and monitoring the traffic density and overall traffic volume through the help of infrared sensors (IR Sensors), and changes the signal lights and also timing of the slots. From this paper we have considered the usage of IR sensors for monitoring the traffic and controlling the traffic signals. In this paper [2], we observed the usage of mainly three IR sensors that is IR1, IR2, IR3 one is for Low traffic density, and the other two are for medium and High traffic density respectively. Through this knowledge we have taken in consideration of using a total of four IR sensors for the better results and also to avoid any collisions with the signal. According to this paper, when IR1 sensor is sensed, the LCD Display shows Low traffic density and the signal turns to green light and it will be turned ON for 20 seconds of time. When IR2 sensor is sensed, the LCD Display shows medium traffic density and turns ON green light which will be again ON for 40 seconds of time. When IR3 sensor is detected, the LCD Display shows High traffic density and green light will be kept ON for 60 seconds of time. So, when an ambulance reaches the junction, the IR sensors gets detected and the same sensor will turn that junctions signal to green and other to red, the signal will be turned ON to green for next 60 seconds until the ambulance passes to next junction or the next signal.

In paper [3] Saah H. N et a, proposes the method of implementing a health monitoring system in an ambulance, which helps to have an update about the patient’s health conditions before reaching the particular hospital. The health monitoring system includes the body temperature, patient’s heart beat, pulse sensors etc... In this paper [3], it helped about the usage of various health monitoring sensors for detecting these health-related conditions of the patient in the ambulance while reaching the hospital. We also see the usage of temperature sensor which is used to identify the temperature in blood vessels and also to find out the output of cardiac. In this paper we see that IC lm35 sensor is used to know the body’s temperature. In this paper, we have observed the usage of the new model of raspberry Pi which is Raspberry Pi 4 microcontroller for developing health monitoring system inside the ambulance. To get the health conditions of the patient, these sensors are connected to the Raspberry Pi. When compared to old raspberry models, the speed and performance of this was better. And also compared to other microcontrollers this consumes less power and runs without producing any noise. Raspberry Pi 4 has upgraded USB capacity, it also has two USB 2 ports and two USB 3 ports, which help in transferring data ten times faster. There are different varieties in raspberry models are available depending on how much RAM is needed for the particular application. The raspberry model is more powerful which can do multitasking at a single time. Through this paper we got an idea about usage of microcontroller for implementing the health monitoring system inside the ambulance.

In Paper [4] The system focusses on providing the ambulance a free way to an emergency unit on the way to a hospital ambulance or to the accident spot when struck in traffic jams or not. So, to overcome this problem researchers of this paper [4], proposed an adaptive way where the ambulance informs the closest traffic signals about their arrival through IR led and the ambulance buzzer. This system tries to develop an algorithm, considering the current and the destination location, in deciding the path that the ambulance must take. Helps also in routing the traffic based on traffic density, by establishing a network between the ambulance and the signal posts. Further in this paper, the health condition of the patient is continuously monitored is discovered by the emergency unit is performed by various sensors on the ambulance. Based on the described parameters the availability of the medical requirement to treat the patient is judged. The various parameters like Heart Rate and Body Temperature are monitored. This data is sent to hospital for further analysis. Proper treatment may not be available if the doctors do not the sufficient medical history of the patient. This system ties in obviating just that. The entire system is enhanced to develop the facility for proving the patient first aid at the earliest in an emergency situation.

In Paper [5], At present, there is no automation system for controlling the traffic signals at emergencies. This paper [5] proposed a basic architectural model of intelligent ambulance by enhancing its features by adding GPS module to the traffic control system which was successfully proposed previously. This model is a complete automation system where the driver has to switch on to the emergency mode through the created mobile application. This activation will help the app track the live location of the ambulance and also help in tracking the nearest traffic control signals with the help of GPS. The destination location is pinned which helps in understanding the best route available to reach at the earliest. Whenever the ambulance approaches in the 500m of the traffic signal, it immediately sends request to control the traffic lights of which the ambulance will have to cross and again send a signal to set it back. When the signal is already green, based on the timing the app automatically requests control to the nearest control signal. If the signal is red, similarly depending on the remaining time, the app requests a control to open that particular the ambulance is travelling by calculating the distance. This helps the ambulance to move freely without getting struck in the traffic. Considering the direction of the vehicle the server toggles the signal. In real time, the system is improved so, the death rate can be reduced during emergency situations. Hence in this paper we come across an idea to control signal from the driver’s smartphone itself.

In Paper [6], A lot of advantages that IoT application offers within the aid sector is most categorized into tracking of patients, staffs, authenticating people and also gathering information and sensing. Paper [6] presents an architectural model consisting of three different modules. The ambulance module is placed inside the ambulance. It consists of Raspberry Pi with various sensor units interfacing to it. The different health parameters of the patient’s health are monitored including heartbeat, temperature, blood glucose levels and various others. After processing these statistics, it can be uploaded into the cloud. The second module is the cloud or WIFI module, which consists of two cloud services. The Think Speak cloud platform supports numerical data to be uploaded. The image uploading is done on Dropboxcloud. The third module is the hospital module which helps the doctor monitor the patients’ health condition based on the data which is uploaded into the cloud. This module also consists a simple application to download the data from the cloud. If these real-time data can be made available for the access to the doctor, it can help him to give adequate feedback to the emergency vehicle as well as arrange hospital facilities for the patient.

In 2019 Dr. Deepak B et al. [7] put forward a paper which mainly emphasizes on. There is conjointly projected phone health observation system for the elderly that works with smart phones and wireless sensors to check their health. The elderly person's smart phone can send an alert to the people who have been pre-assigned in case of an emergency so they can prepare for a machine. This technology provides a platform for distant family members and the elderly person's health state to communicate. The advertisement promises a tool that may display a wide range of physical characteristics of different patient bodies. The base station receives information from the organizer cluster point through the wireless sensors, which emit signals that are concentrated on the patient's skin. In addition to mere measurement the physical attributes the device may also detect irregular activity from them and notify the doctor accordingly. With the help of HMS, the patient will be admitted via an automatic procedure more often. The HMS is designed with a display, bio-medical sensors, and a 1x4 keypad; all of them are not intended to form a group of the patient's critical data. The projected system uses a variety of sensors, including pulse and vital sign sensors as well as fingerprint and vital sign sensors. For displaying the selected mode, an OLED is used. Patient may not be conscious when placed inside the car teaming forces with a relative. Due to the patient's inability to access their vital information, there may be an urgent circumstance when the patient is also not awake. When transporting the patient, the care in the automobile makes a judgement call regarding the patient's current status and selects one of the earlier modes. In order to provide the care confidence in the mode that was selected, the mode is presented on the screen.

In 2019 Venkata Krishna Kota et al. [8] put forward a paper which mainly emphasizes on. There is conjointly a projected phone safety observation system for elder that are experiencing with wireless body sensors, sensible mobiles and observation of the health of elderly. If there is any emergency the sensible mobile with elder human being can provide associate awake to the folks that are preassigned in order that they'll organize for associate machine. this technique creates a platform for family members to communicate on the health of the elderly person regardless of distance. The advertisement suggests a device that is capable of monitoring multiple physical characteristics of various patient bodies. Through an organizer node that communicates with a base station, the signals from the wireless sensors are gathered on the patient's body. In addition to just measuring the physical parameters, the device may also detect problems and alert the physician accordingly. The process continues with the help of the HMS as of right now because the patient has been admitted into the car. This HMS is equipped with bio-medical sensors, a display, and a 1x4 membrane keypad; all of them are intended to gather the patient's vital information. A few of the sensors used in the proposed system include pulse and vital sign sensors as well as fingerprint and vital sign readers. The selected mode is displayed using a degree OLED. Once the patient is in the car, a family member or guardian may or may not be present to assist. There may be emergency situations in which the patient is also unconscious, rendering vital information about the patient unavailable are going to be accessed. The HMS employs a fingerprint sensor component to overcome this problem. After assessing the patient, the helper inside the car determines that the patient is in an emergency situation and selects one of the several options. The selected mode is displayed on the OLED display to give the helper confidence in the selected option.

In 2020 Tugay Akca et al. [9] suggests a paper that chiefly emphasizes on “IoT primarily based auto deployment” technique to manage auto and emergency services. This analysis is economical to hide all the items required to develop a sensible auto management framework however lacks to elucidate however the system will add real time with a mixture of mobile computing, cloud computing and standalone application along. On call-based machine management technique to manage machine and emergency services. This analysis is economical to hide all the items required to develop a sensible machine management framework however lacks to elucidate however the system will add real time with a mix of mobile computing, cloud computing and standalone application along. Remote medical services mistreatment cloud” technique to manage machine and emergency services. This analysis is economical to hide all the items required to develop a sensible machine management framework however lacks to elucidate however the system will add real time with a mix of mobile computing, cloud computing and standalone application along. advance a paper that principally emphasizes on ambulance service supplier mistreatment automaton application technique to manage machine and emergency services. This analysis is economical to hide all the items required to develop a sensible machine management framework however lacks to elucidate however the system will add real time with a mix of mobile computing, cloud computing and standalone application along.

In 2019 Rajeshwari S et al. [10] A discovery mechanism for V2V communication facilitated by traffic jams on the road is suggested. In order to evaluate the severity of the initial traffic jam, a fuzzy regulator is initially constructed with vehicle speed and business viscosity as the input and the original traffic position as the affair. Additionally, the position of indigenous business jam is accomplished supported by the massive sub-sample thesis test as the amount of original business jam of bordering cars is collected supported by V2V communication. To maximize the efficacy of business jam discovery findings, the business jam information is promptly communicated to the affected cars when it has been obtained. Internet of Vehicles (IoVs) communication technology can significantly improve the transmission of traffic information, whereas traditional technologies like electronic information boards, FM radios, and SMS cannot guarantee the effective dispersion of traffic information. have suggested using IOT to automate gestures and discover business viscosity. This design includes IR detectors that monitor the viscosity of the business position on a certain side. Both IR detectors are placed at specific distances so that it is possible to simultaneously measure the viscosity of each side.

# CONCLUSION

In India, the traffic signals are fixed with specified time for every signal regardless of the density of traffic in that lane, Ambulance service is one of the most important systems, if it gets delayed the result is death of patient. To overcome this problem, we have designed this system which has three sub systems i.e., to automatically change the traffic lights in the path of ambulance, to help the driver with nearest way to the hospital and at last monitor the health of patient and send real time vital information to the nearest hospital. This project can be a real-life saver project which saves life at the “golden hour”.

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