Instinctive Traffic Switching System for Automatic Ambulance Rescue using WSN

Neeradi Madhusudhan[1], Mr. V. VenkataRamana Rao[2]
[1]M. Tech Student, [2]Assoc Prof.
St.Martin's Engineering College, Dhulapally, Medchal, Telangana, India-500100.

Abstract - Traffic congestion and tidal flow management were recognized as major problems in modern urban areas, which have caused much uncomfortable for the ambulance. Moreover road accidents in the city have been nonstop and to bar the loss of life due to the accidents is even more crucial. To implement this we introduce a scheme called AARS (Automatic ambulance rescue system). In this project we are using a single board computer i.e. Raspberry Pi 3, which act as a CPU in which the programming part is done using Python Programming Language. Here sensors like MEMS and Vibration sensor which will be used to detect the accident has occurred and will send the SMS with the GPS location to the ambulance, next we will have the RF transmitter which will be in the RPI and RF receiver which will be embedded with the signal System. Occurrence of the ambulance will automatically detected by the Signal system using RF transmitter and receiver and according to that it will give the priority to the signal control system to avoid traffic on the way to hospital. Also a camera will be connected to the car, whenever accident will occur it will display the images of that on the Webpage using IOT technology, which can be observed on the web page on any device connected to the network.

In this the Wireless Sensor Network (WSN) will be used to detect the accident, GPS to track the location of the accident and SMS to send it to the ambulance and RF transmitter and receiver to clear the traffic and give the signal priority to clear the traffic on the way for ambulance.

Keywords - Raspberry pi3, Vibration & MEMS sensor, WSN, GPRS etc.

I. INTRODUCTION

In this paper, we have described a design for automatically controlling the traffic signals so that the ambulance would be able to cross all the traffic junctions without time delay [3].The server keeps a database for each node for easy access. Hence, each node will have a unique id for addressing the data. The ambulance is guided to the hospital by the server through the shortest route. The sensor installed in the vehicle senses the accident and Global Positioning System (GPS) tracks the location of the accident [4]. Through GSM (Global System for Mobile Communications), it sends the location of the accident to the ambulance section. The buzzer produces sound when accident occurs. The central unit finds the ambulance, nearest to the accident spot and also the shortest path between the location of the accident, ambulance and the nearest hospital. Here, wireless technologies are used for information transferring. The traffic signals on the path of the ambulance are controlled. When the ambulance reaches the traffic junction, the encoder converts the serial data into parallel data when it passes from the transmitter to the receiver. If the signal is red, it comes to green automatically. The decoder in the receiver section converts the parallel data into serial data when it is sent back. This helps the ambulance to cross the traffic junction as soon as possible. The prioritized traffic switching is done priority wise, i.e. if two ambulances are coming at the same time, the ambulance which will arrive first at the traffic junction will be given the priority to cross the traffic junction before the next ambulance arrives [5]. In this way, using wireless technologies, the information is transferred and the traffic signals are controlled so that the ambulance would be able to reach the hospital on time.

II. DOMAIN APPROACH

Internet of Things (IoT) - As of late, the development of the internet is gigantic and has been additionally stretched out to interfacing things through the internet. All gadgets are associated with each other with different keen advances to make overall universal network called Internet of Things (IoT). The improvement of advancements, for example, IOT produces a colossal measure of information, prompts new time of data. Information produced by the IOT gadgets are utilized for examination and basic leadership process.

III. LITERATURE REVIEW

The joined territory and course systems make use of correspondences networks, have workplaces, and diverse structures with the on-board vehicle rigging to discover and investigate to glance through the loss region [10]. K. Athavan[2] proposed a system, AARS to control the movement signs to pass the ambulances if the mishaps happen. The AARS can similarly be used to screen the passing notification of the educating vehicles. V. O. Matthews, et.al.[7]designed a phase for emergency rescue if there ought to be an event of an auto collision and developed a model named as VAAL. They used the M2M developments and GPS/GSM module, which works generally under the M2M organize. The passing on devices without human interface go under M2M. V. Gaud, et.al. [3] proposed a system, called an ARM. The controller frames the banner, as got and sends the message using the GSM module. The system is joined with the situating .e. GPS systems. A. Kushwaha, et.al.[9] arranged the incident ready

system, AAS. It is totally planned with the hardware and programming modules including course systems. At whatever point the sensor gets the banner, the attestation will be gotten from the GSM modem to decided versatile numbers set away in EEPROM, quickly [9][5]. The accident zone can be unequivocally proficient if the system is presented in the vehicles. Y. Zhao [10] analyzed diverse headways, for instance, TOA (Time of Arrival), TDOA (Time Difference ao Arrival), and helped GPS game plans, which are the most astounding battling correspondence systems nowadays. He also proposed the use of these systems in the mobile phone can improve the security in the transportation, similarly to follow the zones. He is like manner proposed a Mayday system. It makes use of a cell phone for voice and data trades, a worldwide situating system (GPS) receiver for the territory following [11]. S. Sonika, et.al. [4] proposed system to impede a vehicle by passing a message, and just an affirmed singular open using security code and helps the setback. The system can diminish the time required to reach from the accident place to the specialist s office. J. M. S. Pons, et.al. [6] discussed distinctive strategies for land information systems and Intelligent transport system, which can outline the strong correspondence network on the planet. S. K. C. Varma, et.al.[5]. Sara Nazari,et.al.[12] proposed an adjustment of the Dijkstra's most constrained way coordinating count, in which it is demonstrated that the requested space can be restricted by using a square shape or a static and dynamic hexagon. This can improve the execution of the system, to the extent time and memory use, as the centers and edges went to will be compelled. Zhaosheng Yang[13] acquainted another hailing technique with pass the vehicles at the banner mergings require canny. In this proposed work, the banner parameters can be changed, if there is any vehicle experiencing any heading if the vehicle is having GPS to discover its position.

IV. PROJECT OVERVIEW

These days, traffic jams for a considerable length of time are one of the huge concerns. In the midst of hours, crisis vehicles like Ambulances, Police automobiles, and Fire Brigade trucks back off out in jams. Thusly, these crisis vehicles are not set up to achieve their targets in time, working out as expected into lost human lives. We have built up a system which is utilized to offer the chance to any crisis vehicle by turning all the red lights to green in travel of the crisis vehicle, thus giving a total green channel to the pined for the vehicle. A green strait is the synchronization of the green time of traffic signals. With a green inlet setup, a vehicle encountering a green standard will keep tolerating green pennants as it goes not far-expelled. Around the globe, green delta is utilized to unimaginable effect. Despite the green gulf way, the system is used to execute the possibility of the green inlet. Beside this system will in like manner give tolerant seeing from the hospital.

Human life is impacted due to deferral in the landing of the ambulance. The ambulance can't accomplish the specialist s office in the splendid hour. It slows down out in the traffic signals. It would be of great use to the patient if the traffic movements in the method for the ambulance are ON. There must be a system by which the ambulance would accomplish the setback spot and a short time later the center as fast as time grants to do prosperity organizations[1]. The present systems are posted disaster acknowledgment systems. It has the nonattendance of learning. It fails to track the rear crash and pre-hurt status. It depends upon the technique for watching people be manual. It requires manual work to save human life which realizes time deferral and because of that crisis treatment can t be given to the patient on time. This prompts loss of human life.

The employments of earth shattering flexible devices for human activities are depicted [6][7]. A mechanized compact system for road prosperity organizations is depicted. It offers assistance to emergency benefit vehicles (EV) for accomplishing the mission speedier and stronger. The system must be established on checks, totally robotized, versatile, quick and insignificant exertion. The openness of more unavoidable and more present correspondence networks, for instance, Zig Bee, WiMAX and work networks are stronger. The objective of the system is to fulfill the necessities of a botch free and capable emergency system. In the event that there ought to emerge an event of an accident, it can decisively and rapidly find the ambulance and send it to the setback spot without the essential of manual work. It is made to lessen human goofs, wrong data or treatment.

The response for traffic stop up issue and a moved computation have been depicted to find the most concise path in auto-route system[8][9]. It is troublesome for a few, drivers to find a capable course. These systems can play out the errand of choosing the most ideal path to the objective. The path toward finding the briefest course beginning with one point then onto the following is called directing. Another estimation is proposed in this paper. It is a balanced interpretation of dijkstra. These systems can upgrade used memory and run times in light of the way that went to edges and center points are limited. Traffic stop up is a social issue that occurs in perspective of the extending number of vehicles. Here, a pheromone show is associated with a traffic hail control to help traffic stop up. It is spread by vehicles over the road. The measure of pheromone identifies with traffic stop up.

The components of traffic signals are controlled by the pheromone to lessen the sit out of gear time before it. In the references [10][11], the emergency rescue system unfaltering quality on interstate and keen ambulance have been depicted. To guarantee, that the ambulance would connect at the territory of the incident on time and would reach to specialist s office at the most punctual chance to give prosperity organizations to the patient, the emergency rescue system started. It dismembered its structure on interstate in three diverse ways: rescue outline, event revelation and equipment organization. The immovable nature of the system is discussed in light of the development

time. By then, a logical model of the steady nature of development time is set up. At last, a model case for the reliability of development time is showed up. The adroit ambulance is proposed for the harmed to keep up the level of self-altering state. To recognize the gravitational vertical stretcher, it wears down the manager of whirligig.
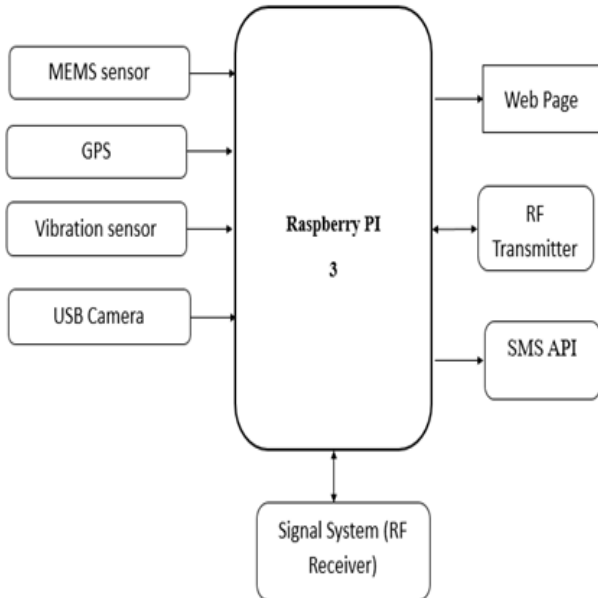
V. BLOCK DIAGRAM

Figure 1: Block Diagram for proposed technique

Block Diagram Description - The above analysis demonstrates the equipment part of this undertaking, Raspberry pi 3 a solitary board PC is utilized which will go about as CPU with 1.2 GHz MEMS accelerometer is utilized to know the pivot of the vehicle, if any adjustment in the vehicle it will give the Alert to the closest ambulance with the GPS area, GPS is utilized to track the longitude and scope of the region and will tell the area. Vibration sensor if any weight or load is on the vehicle it will give the alarm. USB camera to take the pictures of the mischance zone and will keep on the page of the hospital. SMS API utilizing Twilio is made keeping in mind the end goal to make automatic SMS to the closest ambulance. Presently the fundamental part is the flag control part RF transmitter which will be embedded in the Ambulance. In the Traffic flagging part RF collector will be there which will automatically identify the bearing of the ambulance and clear the traffic likewise.
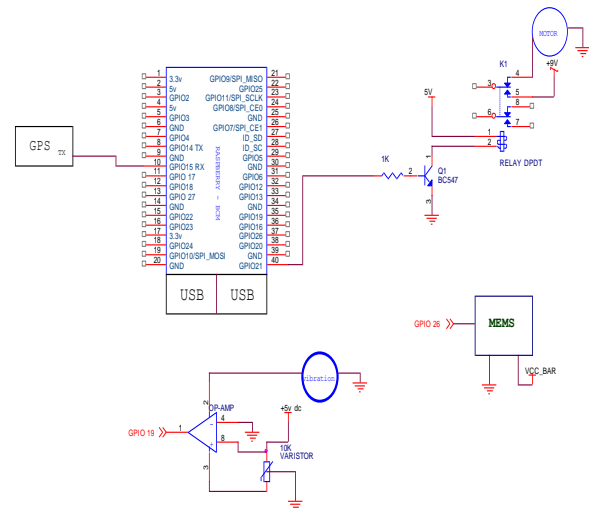
VI. SCHEMATIC DIAGRAM

Figure 2: Schematic Diagram

Explanation of Schematic Diagram - GPS module associated with the raspberry pi GPIO stick no 15. same like that MEMS sensor, vibration sensor, associated with the raspberry pi GPIO stick no 19 and 26 separately; sensors like MEMS and Vibration sensor which will be utilized to identify the mishap and will send the SMS with the GPS area to the ambulance. RF transmitter and recipient to clear the traffic and give the flag need to clear the traffic in transit for the ambulance.

VII. IMPLEMENTATION, TESTING AND RESULTS

Design and implementation - Starting at now, there is no advancement for setback discovery. As it is done physically, there is a loss of life in splendid hours. The incident loss is liable to the generosity of others to flood him to mending office. Ordinarily incident goes unnoticed for a significant period of time before help comes in. Because of each one of these components, there is a high rate of mortality of accident losses. Also, there is a deferral in the ambulance accomplishing the mending office on account of the traffic congestion between setback area and facility which assembles the chances of death of loss. To overcome the present issue we execute another system in which there is an automatic location of setback. A GSM, GPS, Accelerometer unit fitted in the vehicle recognizes the disaster and sends the accident area to the essential server unit and an ambulance is rushed into incident spot which passes on the patient to specialist s office and alongside this controlling the traffic lights movements in the method for the ambulance to give the sensible way. This will constrain the time required to by the ambulance to accomplish the mending focus.

Automatic Ambulance Rescue System Our system comprises of four essential units, which orchestrates with each other and guarantees that ambulance accomplishes the recuperating office with no time slack. In this way, our system is apportioned into the accompanying four units. The

Vehicle Unit, Main Server, Ambulance Unit, Node Circuit. (Traffic Junction Unit). The vehicle unit presented in the vehicle identifies the accident and sends the area of the incident to the central server. The key server finds the nearest ambulance to the incident spot and besides the briefest path between the ambulance and accident spot. The server by then sends thusly to the ambulance. Also using this data the server controls each one of the center points in the method for the ambulance and make it ON, which ensures that the ambulance accomplishes the mending focus promptly. The engineering of this system has showed up in figure3.

Figure 3: Vehicle unit

According to our system, every vehicle should have a vehicle unit. The vehicle unit comprises of an accelerometer, controller, alert, a UI, a GPS system and a GSM module. On influence on the vehicle, data about the setback is sent to the principal server .this data comprise of the area of mishap perceived by GPS module presented in the vehicle .the GPS system finds current position of vehicle (extension and longitude) which is the area of the accident spot and gives the data to the GSM module. This data to the essential server is passed on by a GSM module. There is in like manner an arrangement of avoiding of the disaster by using accelerometer. Accelerometer alerts the driver and open by turning on the ringer at whatever point the position go not right from the typical The GPS SYSTEM finds the flow position of the vehicle (scope and the longitude) which is the area of the setback spot and gives that data to the WI-FI. The SMS sends this data to the MAIN SERVER whose Mobile number is starting at now there in the module as an emergency number.

At whatever point traffic signal area gets the data about the accident, the controller in this segment is swung ON to search for ambulance nearing the traffic hail. At whatever point the ambulance comes to near the traffic signal (approximately 100m), the traffic banner will be made to green. Along these lines, the ambulance is recommended to accomplish the mending focus in time.
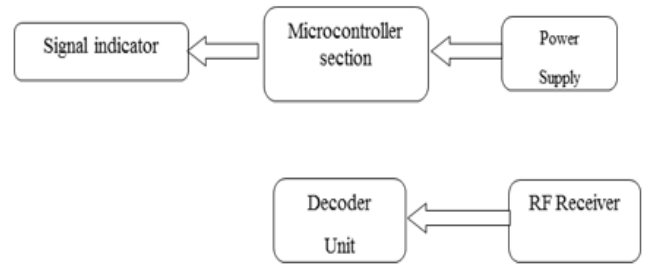

Figure 4: Traffic unit

Ambulance unit has a GPS SYSTEM and a GSM MODEM for transmitting GPS information to the Main Server. The server gets the GPS information sent by the ambulance at interims of time. The server sends the coordinates of the considerable number of hubs in the way to the ambulance. The server will demonstrate the mishap spot and ambulance location separately. The ambulance unit on getting the co-ordinates plots them on to a guide with the last two coordinates as the mishap spot and the healing facility location to get the most limited way to the doctor s facility.
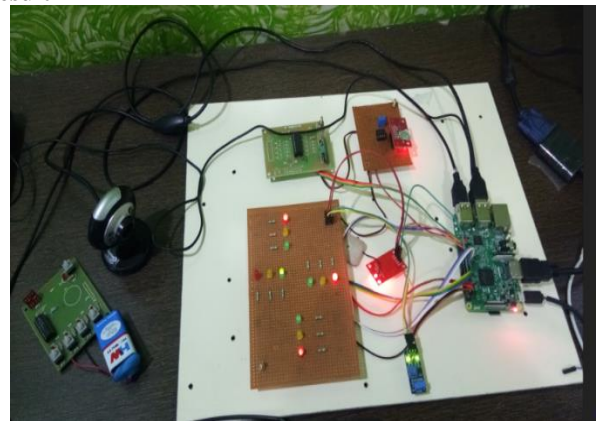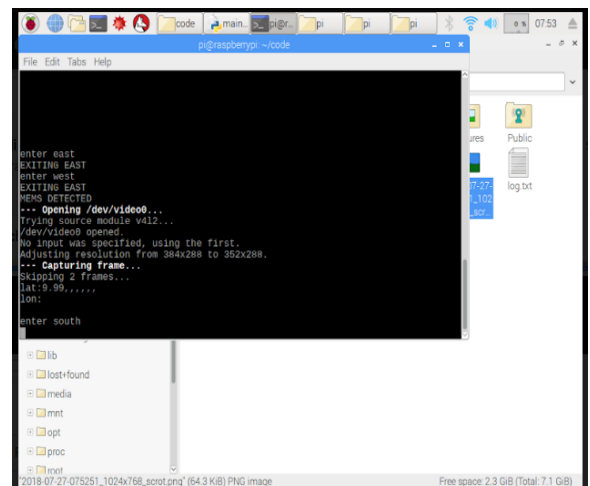
Result -

Figure 5: KIT PIC
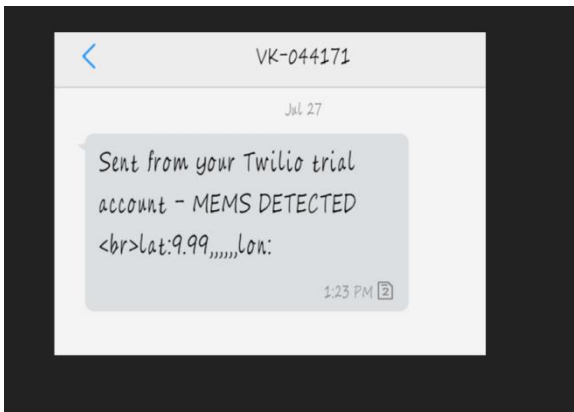

Figure 6: Execution result

Figure 7: Execution result

Figure 8: SMS output

VIII. CONCLUSION AND FUTURE SCOPE

Conclusion - This system will traffic police to give the course to the ambulance when there is overpowering traffic out on the town. Moreover, the setback zone is perceived and the area is sent to the controller, and the nearest ambulance is advised and the message is sent to the police headquarters. The arrangement and execution of this strategy are particularly centered around the traffic organization so emergency vehicle on road gets a reasonable way to deal with accomplish their goal in less time and with no human interference. The essential segment of this activity is the ability to talk with reason using GSM and GPS. It is extraordinarily splendid to find the area of the emergency of VIP vehicle and the ambulance to clear approach to pass on.

Advantages -
• With the assistance of GPS we get the scope and longitude of the distinguished position.
• When we get the correct location of the vehicle the ambulance will reach there in almost no time
• The ambulance would have the capacity to cross all the traffic junctions without pausing.

Future Scope - An original thought is proposed for controlling the traffic motions for ambulances amid the mishaps. With this system the ambulance can be moved precisely utilizing the concept of ARSITM can be turned

out to be strong, to control ambulance as well as legitimate vehicles. In this manner ARSITM if executed in nations with a substantial population like INDIA can deliver better outcomes. The ARSITM is more exact with no loss of time. Be that as it may, there might be a deferral caused in light of GSM messages since it is a line based procedure, which can be diminished by giving greater need to the messages imparted through the controller. At the point when a ton of messages is sent to the principal server from the GSM, there will be a deferral caused because of which there will be a postponement in achieving the mishap spot. In addition to this healing facility databases can likewise be incorporated that consists of the records of the specialists right now accessible in the doctor s facility and furthermore an alarm message can be sent to the doctor s facility**.**

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AUTHOR PROFILE

Mr. Neeradi Madhusudhan was born on April 04 1994, completed his graduation in Electronics and Communications Engineering from Vijay Rural Engineering College. Currently he is pursuing his M.Tech in Embedded systems from St. Martins Engineering College. His areas of interest include data analyzing and communication systems.

Mr. V.Venkata Ramana Rao working as an associate professor in the Dept. of Electronics and Communication Engineering at St. Martin's Engineering College. He received his bachelor's degree from Jawaharlal Nehru Technological University and master's degree from Jawaharlal Nehru Technological University Kakinada, India. He has about 8 years of teaching experience. He is a co-author of many International Conferences and Journal Publications.