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Priority-based Ambulance-to-Traffic Light Communication for Delay Reduction in Emergency

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Abstract:This paper proposes a novel Priority-based Ambulance-to-Traffic Light Communication for Delay Reduction in Emergency. In this framework permits data trading between traffic signals and ambulances ahead of time. This data permits the traffic signals to turn a focused on green light on request to permit the ambulances promptly and securely passing any convergences. Our presentation assessment result show that strikingly accomplishes 68.86%, 100%, and 87.50% decrease as far as complete voyaging time, stop time, and clog time, separately. This extraordinary accomplishment could save a lot more lives later on.

Key words: Traffic clearance, Ambulance, Hospital availability, real time tracking.

I. INTRODUCTION

The numbers of vehicles worldwide is increasing and causes delay due to traffic congestion. While the duration of rescue operations is crucial to save lives, any blockages or congestions can dramatically disrupt its performance. Although an on-mission ambulance normally has a higher priority than other vehicles, the very high rate of accidents during rescue operations shows that light and sound signals from sirens face several limitations. The siren signal helps to raise awareness of other vehicles but road infrastructures, such as traffic lights. According to the statistics [1], NHTSA, US National Highway Traffic Safety Administration, has revealed data from the past 20 years and found that approximately there are 29 annual fatal crashes involving an ambulance. These crashes result in 33 fatalities every year, consisting of 63% as occupant of normal vehicles, 12% as non-occupant, 4% as ambulance driver, and 21% as ambulance passenger. It can be observed that one-fourth of such fatalities happened inside the ambulances, including ambulance drivers and patients.

A novel Priority-based Ambulance to-Traffic Light Communication is proposed to improve rescue operations by manipulating the traffic lights along the ambulance's route. It allows communications from ambulances to traffic lights or Roadside Units (RSUs) in a decentralized manner. For example, rescue information may be conveyed by other vehicles over several communication hops without a requirement of centralized units. Rescue-related information, such as priority, location and speed of ambulances, rescue road and lane, and targeted destinations, can be shared with all traffic lights along the rescue route in far advance. The traffic lights can reschedule the traffic light signal, such as a prioritized green light, to allow the ambulances through intersections immediately and safely without stops or pileup accidents. This cannot be achieved by the traditional implementation of siren signal.

Priority-Based approach allows more critical or more urgent ambulances to go thought the intersections before the other lower priority emergency vehicles, such as police cars or other less urgent ambulances. As a result, the rescue operations are efficiently enhanced, many lives can be saved, and pile-up accidents can be significantly avoided.

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WORKING

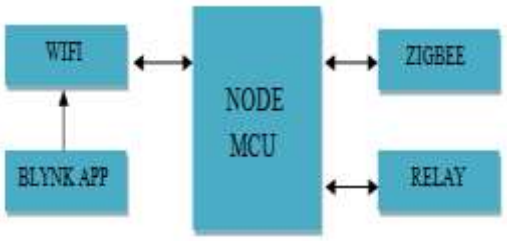

Fig 1: Ambulance Module 1

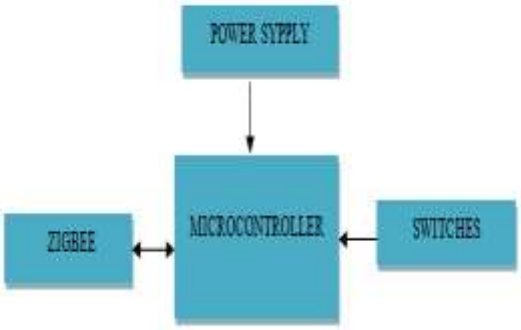

Fig 2: Ambulance Module 2

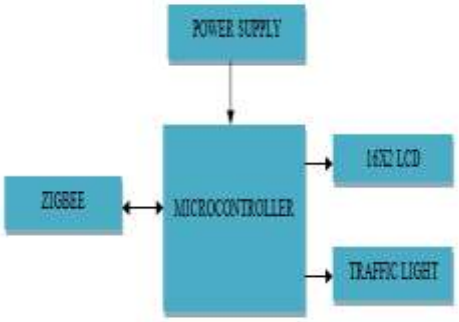

Fig 3: Traffic module

Priority scheme is also proposed in this model to deal with a case that more than one ambulance is approaching the same intersection at the same time. This could be possible in case of a large accident or disaster involving several emergency vehicles, such as ambulances, fire trucks, police cars, and etc. They could come to the common area where the accident happened, which cause a conflict or major delay at any intersections close to the area. Another case could be a main intersection in front of a large hospital. Many ambulances could arrive this intersection at the same time, since they are trying to reach the same hospital as quickly as possible. However, in many cases, these emergency vehicles could have different priorities to pass the intersections according to their urgencies. Therefore, the proposed priority scheme will allow the most urgent vehicles to pass the intersection before the others. For instance, an ambulance with a critical patient on-board should be able to pass the intersection before other vehicles. This priority order can be determined by the traffic lights based the priority information embedded in each broadcasted WSN. The proposed system monitors the ongoing traffic condition and when an ambulance with emergency turned on comes near a traffic signal equipped with an

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integrated hardware, it gets detected and that path gets green signal. Throughout the route to destination, all the roads will get cleared when the ambulance reaches 150 meters near to the traffic signal post. When the switch is pressed, it will transmit the signal. The signal contains a Transmitter range of 3 Hz to 300 GHz. The transmitter contains ARDUINO microcontroller and ZIGBEE. The microcontroller sends the commands and data to the ZIGBEE via serial communication. Second part is the receiver, which is placed at traffic pole. It also contains ARDUINO microcontroller and ZIGBEE. The range corresponds to frequency of alternating current electrical signals used to produce and detect radio waves. If the signal is received, then it will turn the green light on. After the ambulance clears a traffic junction, the traffic gets restored to the previous state. When the signal red turned into green the server will the nearest hospital's location to the ambulance. Then can select the near hospital and can update the availability of the emergency in the hospitals and this availability are displayed on the lcd. For testing purpose, we used short range ZIGBEE transmitter and receiver in our prototype.

ADVANTAGES

These days traffic tie-up isn't uncommon, because of which it is difficult to come by a way for crisis vehicles. Thus this assists with getting a 24x7 traffic free help for individuals. A crisis is a circumstance that represents an impending danger to wellbeing life. Thus, It gives high exactness in following the crisis conditions. In the event of unanticipated crisis circumstance when individuals can't ready the concerned specialists about the area, the Wi-Fi module will act the hero, it track continuous area and assists with clearing the path. While in crisis conditions individuals get alarm and can't find the specific medical clinics, for this significant disadvantage, the rescue vehicle itself follow the close by emergency clinic area.

RESULT

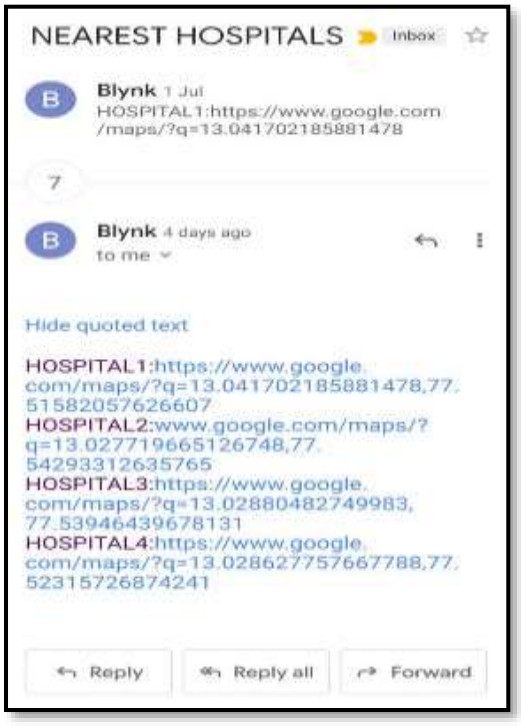

Fig 4: E-mail by Blynk Application

As a result the ambulance driver with a first priority gets the email by the Blynk application utilizing wifi module embedded in the ambulance displaying the near-by hospitals location referring HOSPITAL 1, HOSPITAL 2, HOSPITAL 3 and HOSPITAL 4 as shown in figure 4.

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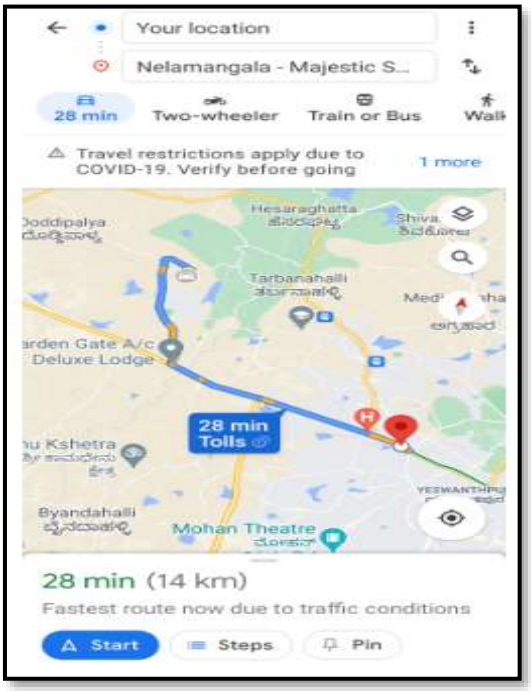

Fig 5: Nearest hospital route map

After getting an email the driver locates to the nearest hospital, if the driver of ambulance 1 locates to HOSPITAL 1 by clicking on the link provided in the email it shows the direction on the map to the HOSPITAL 1 as shown in figure 5.

Fig 6: LCD Display

Once the HOSPITAL 1 is selected by the ambulance 1 driver then it shows HOSPITAL 1 is unavailable on the LCD display. For ambulance 2 driver the left out options will be HOSPITAL 2, HOSPITAL 3 and HOSPITAL 4, and if the HOSPITAL 2 is selected then it is displayed as unavailable as shown in figure 6.

II. CONCLUSION

In this paper to further develop salvage tasks by controlling the traffic signal timetable on the salvage course. Our paper results show that altogether further develop the salvage activity execution. The complete voyaging time, the stop time, and the blockage season of the ambulances are amazingly decreased, individually. This significant defer decrease could save more individual's live and advance better quality for salvage activities. Later on works, more development execution are needed for a more thorough examination and investigation by utilizing numerous street networks dependent on genuine street geography and genuine street traffic data.

III.ACKNOWLEDGEMENT

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