Intelligent Traffic Management in Emergency Situations

J. Rajesh, I. Naveen, A. Pravin, T. Prem Jacob, and G. Nagarajan

1 Introduction

Survey taken during past decade has unveiled a tragic up rise of increasing moral rate due to poor traffic management that acts as hindrance for rescue vehicle and delaying them from reaching their respective destinations on time. Rescue vans have a strict and important responsibility for maintaining a punctuality for arriving on time for rescue. There are various factors that affect current discussed issue. One of those factors is due to poor traffic management and insufficient personal that control or assist during emergency situation. Figure 1 shows the traffic situation. India is a developing country and contains many developing communities and administrative personal. This increase in economic value of an individuals' drives them to purchase valuable cars. This increasing number of automobiles makes it difficult manage. Recent reports suggest that there is decent reduce in administrative personal that could provide better advice thus increase the efficiency. And also by making the public come to know the present scenario, how the general problems the government facing to control.

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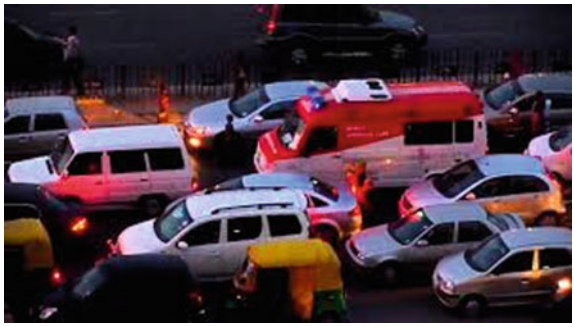

Fig. 1 Traffic issues as hindrance to rescue vehicles

To reduce this issue, many have introduced various devices that could provide better advices and thereby increasing efficiency. In our proposed system, we are going to add additional functionality that could help to clear traffic in other public areas. For providing better passage through traffic, we are going to implement a cloud-based application integrated to Arduino device that is connected to traffic management cloud database. For this, we can make use of Google-based maps. Due to improving technological parameters and demands, there are various inventions emerging in the society. We can take advantage of artificial intelligence provided by various map management applications to provide path that is chronologically better. By using Arduino electronic component as main computing device that process the information gathered. First, the input of dedicated path is fed into the driver's device providing most efficient path possible. The traffic management device present in the path will be alerted about the emergency and respective security measures are added to evade the risk situation. The main component will begin to execute the emergency protocol whenever the vehicle comes into the effective range. To provide a short-range communication between sender and receiver, we are going to use Bluetooth-oriented component like ZigBee. Using high aspect ratio camera, we can track the vehicle in high traffic zones. Additional functionality is also added into this device that would also alert other public areas like toll gates and hospitals to provide immediate aid to the patient. Further modifications can be done to the current system like integrating the system to a mobile device that would reduce device maintenance.

2 Related Works

The system for facing the traffic issues is proposed in a brilliant way [1]. Where the way he invented is making all the signals to be turned red, whenever the emergency vans went through the traffic area, then automatically the signals will be getting turned to green. When the van enters the corresponding zone by all the way, when the van is assigned a way in which makes all the traffic signals turns to green. So by this way, we can even make the way to emergency vehicles like ambulance, fire engines, and police vehicles, all belongs to emergency purpose vehicles [2–4]. There

are many ways for the emergency vehicles to make the changes. We invited this system to make the people know the problem, how hard to face the situation in the hard times. So to make the things happen and make the situation to be favor to the priority vehicles. Here, we invented the system not to change the system but can make at least a small change to the environment by helping them. This is one of the finest way to clear the problem and the system invented to help them to even reduce the small problem by this way. Even though we that there are ways to define many ways to, but making the way finest in single one is not such easy we should consider every single to be in and make the things to righteous way. The consideration is important here, making the lights change to green is the change we invented for vehicles.

A system called auto-controlling mechanism is proposed [5]. The main purpose in this mechanism is to make the things happen automatically without waiting for the commands or condition from some one. Here, main objective is to make things to be in a command-wise execution where it does not sit and wait for the command from some one. It automatically take the decisions based on the situation. Where it has some set conditions; when the condition's met by that system, it automatically takes the decision. It does not need any approvals and it checks for situations. Command of situations are listed to make it crystal clear [6, 7]. The main objective is only to make it user friendly and to help the environment. So this even helps in many ways by which using this technique, we can achieve many problems possible, where the mankind is not able to solve the problem or cannot enter the situations. There are many situations where humans cannot solve the issues or humans are enough to maintain the situations, so to make the things all happen even in the situations the humans cannot solve them can also be cleared and solved by taking the automatic decisions by it self is the best way to by setting the some sort of conditions to it [8, 9]. So that it can solve all of them.

A system on traffic management on which it works for managing the traffic [10]. Here, the objective of this system is to make some vehicles, van, cars, and some other which belong to the family of emergency auto mobiles. Here, we used a sensor called IR(Infra red) for this defining of vehicles. Which does senses the automobiles based on their priority defined in the system [11]. Whenever it detects, it automatically changes the light accordingly based on the situation present all over the surrounding; if the traffic is very high, then it automatically changes them to green based on the situation. For example, if we have a ambulance(or)fire engine in the way passing by, then whenever it enters to zone or surrounding of that sensor, then it automatically detects and changes the light to green. By making the light changing to green, there is no way for problem to that type of situations met. So by this, we can except some what change to those important automobiles. Another advantage is to the important vehicles such as government vehicles [5, 12]. For example, if any important government vehicles are passing by, we can manage the situation in an ample time and we can even reduce the man power with out wasting the time of humans. We can control the situation from a single standing position based on the situation and the admin can react immediately by accessing the device from a single place.

Proposed system M2M-based service coverage management [13, 14]. The importance of this system to make the signals and information and data from the devices or

notifications is received and replied automatically. The meaning of M2M is machine to machine, in which it works for sending the data from one end to another end based on the importance. Here, the device is to decide and give the signal to end user, who are sending the notifications then this device automatically gets connected to it and starts sending the information based on the query they requested for sends the related query which and where they are related for. It also have the quality of high frequency communication with one another in a single communication channel. Here, it establishes a separate channel secure the connect and makes the connection to stronger and send the reply frequently until the situation get resolved and it has also the option of checking the issue or incident is resolved or not. Proposed a system a RFID technology [6, 15]. The technology works on the part of traffic in which it was designed by keeping the standard methods, which are being normally faced by the environment outside every where. The ongoing activity gives the verdict of traffic police officer to be obliged. This device works for even multiple type of problems which are generally faced by the public outside. The process of this to main the key objective to be achieved. This system is invented for automatically things to happen. RFID is to fix in the vehicles when they met the situation. The technology was invented and developed by considering the general problems faced by, so to overcome that issues we invented this to overcome situations [16–18]. Here, the activity is to define and evaluate the particular thing has undergone in a excepted method or not, if any automobile consisting this device or technology automatically identified easily and getting the details of the particular vehicles does have all the information about. Nowadays, this system is automatically predefined or affixed during the manufacturing of product. This device also being already used by many motives presently in order to reduce the compatibility for present scenario outside.

3 Proposed System

Emergency reaction vehicles, for example, ambulances and fire engines, cannot wait idly while looking out for signals. These types of vehicles need a separate secure way to cross the signals immediately. That is why we are inventing this technology to be in lime light to overcome the situations commonly faced at signals by important vehicles. The device follows a technique to overcome the situations by checking the following condition; they are: vehicles passing on the way the after route splitting on three different ways the choosing the best way to be consider by calculation all the considerations to be taken under it, for example time taken, distance, route specifications, etc. And owner registers their primary secondary details on application which is connected to server which is a cloud-based technology and this is connected to pc server and the toll gate contains of ZigBee with LED and the automatic amount deduction from account.

The flowchart Fig. 2 consists of over all overview of this invented technology. The proposed idea utilizes IR as sensor interface. Versatile application is utilized for distinguishing proof of best course. Our proposed work is to actualize a similar idea

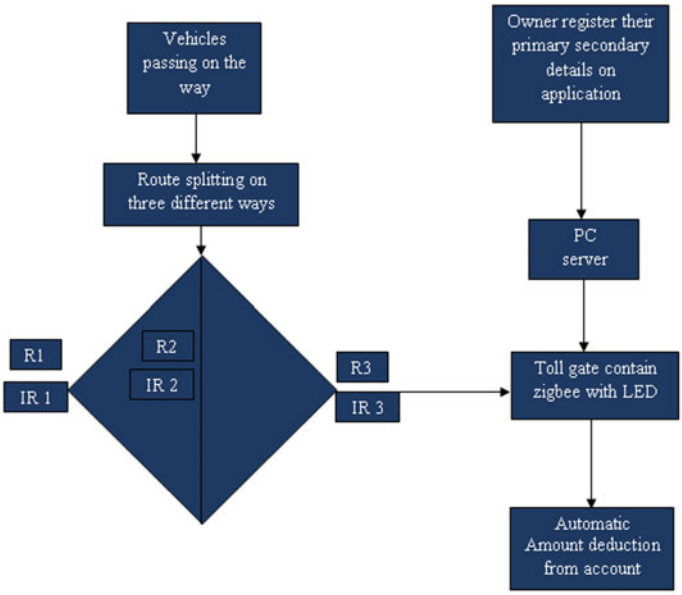

Fig. 2 Overview of the proposed system

to maintain a strategic distance from time squandering in the signs for emergency vehicle, however, utilizing ZigBee as the idea. The fundamental preferred position of utilizing ZigBee in the long scope of correspondence. Sings can be moved to green mode even the vehicle comes in the long range. IR is utilized for controlling the signals. Aside from this work, we likewise send ZigBee-based cost door installment robotization framework right now. Installment is taken naturally from the vehicle proprietors record even the vehicle originates from the long range from the cost door. Vehicle proprietor needs to give 2 records, sum would be consider, on the off chance that there is no adequate equalization, and at that point, the sum would be taken from the second record consequently. We likewise send android application for best course just as for cost installment framework.

4 Device Components

Arduino

It is a single-board microcontroller device used for building digital devices. Here, Fig. 3 explains the device. It takes its input from various sensors. Arduino will settle on choices dependent on information given in the sensor. Arduino is a small-scale controller to which sensors are associated. It tends to be bought either on the Web or in any store. Arduino appears as though a Mastercard estimated board. There are numerous forms of Arduino. They are available in various forms. For now, we

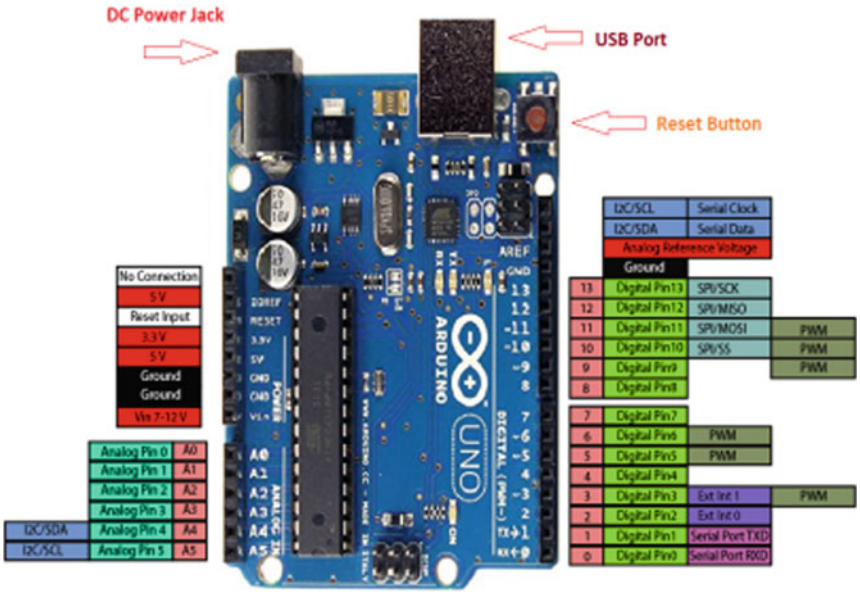

Fig. 3 Arduino UNO

are going to use Uno master board. This circuit component acts as main computing component in the proposed architecture.

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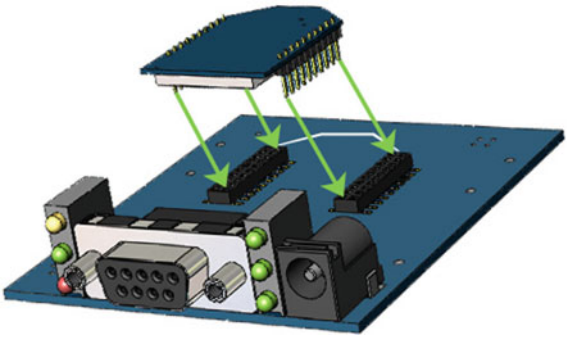
ZigBee

ZigBee is a Bluetooth-style-oriented device that provides short-range communication. Figure 4 component or device provides low data rate transfer suitable for small-scale projects. They are used to create a personalized area network and device maintenance. It is also called IEEE 802.15.4. In current project, we are going to use ZigBee interface to provide a short-range communication between vehicle and traffic checkpoint. This allows betterment in traffic flow in emergency situations. These ZigBee components are less expensive than other communication modules. Applications of ZigBee are basic home automations, data collection device for medical devices, and many others.

Fig. 4 ZigBee component



5 Results and Discussion

- Better traffic management during emergency situations.
- Replaces the issue of insufficient administrative personal.
- Reduction of mortality rate.
- Increase in efficiency of various emergency service provider by removing the traffic hindrance.
- Existing arrangements consideration of individuals by which they can facilitate and move according to the situations and help the important vehicles like ambulance or fire engines.
- Emergency vehicles to be pass by easily during the traffic blockages is by making the traffic clear by the way in which the important or emergency vehicles are going on before it arrives to the exact traffics point.
- We can clear the way and automatically changing the traffic light to green and remaining to red making the way to emergency automotive.
- Device components can be access and is open for cyber-attack; thus, decreases the liability of the proposed architecture.
- Initially, the device maintenance is difficult. To resolve this issue, we can implement this system protocol through mobile devices thereby increasing accessibility.

6 Conclusion

Thus, we have implemented the proposed system using various individual electronic components like Arduino, Zigbee, and sensors. Future work can be done to improve the functionality of the current device by integrating it into various available platforms. This version of system can be minimized to be implemented on any various other situation. We can add urgency value to report the priority value of the situation in other events and report it to respective department.

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