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# A Survey: An IOT based Smart Emergency Rescue Operation System with Real Time Location Tracking

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**ABSTRACT:** Internet of Things (IoT) is an embedded computing system in which physical devices are embedded with software, sensors, actuators and communication is take place through existing internet infrastructure. Basic vision behind IoT is minimize the human intervention. In IoT physical world directly communicate with computer based system that can help to increase the accuracy and efficiency in communication. Many more IoT project implemented for making our day to day life easier, smarter and faster such smart home system, intelligent transportation system. IoT also helpful for making a lifesaver system. IoT also give contribution in medical services.

We have presented an IoT based lifesaver system. This system proposed for vehicular emergency. In our proposed system we can provide emergency communication and location tracking in vehicle. When a vehicle meets an unfortunate accident or any other emergency situation (police and security, fire and rescue, medical, or civil). After an accident or an emergency, immediately the system either starts automatically or may be triggered manually. According to type of emergency (police and security, fire and rescue, medical, or civil) it initiates communication and shares critical information e.g. location information, a set of relevant images taken from prefixed angles etc. with server/control room. This information also share with appropriate rescue center. This system proposed for two way communication between victim and rescue center. Usability of real-time multimedia communication, real-time location tracking etc. have also been integrated to the proposed system to monitor the exact condition in real-time basis. In proposed system prototype we use Raspberry Pi 3 processor.

**KEYWORDS:** Internet of things (IOT), Location Tracking, Smart City, Rescue System, Raspberry pi.

## I. INTRODUCTION

Internet is the media which is used for easily communicate and share information. Now a days we are moving towards smart planet where every device will be connected to each other. IoT is one of the best emerging technology help to achieve the goal of smart world. Many smart systems design with Internet of Things (IoT) achieve the goal of a smart city. To achieve the goal of smart living possible when IoT and Cyber Physical system integrate with each other. This two system are applied in the different industrial sectors. Over the world, all developing countries have a goal of making its own country into smart country by using such system and several project based on IoT. Recently the government of India has taken one move towards smart country. They introduce concept of Digital India to connect the whole nation to internet.



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## A. Need of developing system for vehicular emergency communication System

Developing vehicular emergency system is important for smart city development. In IoT based system every device communicate with each 24 x 7 in Ubiquitous network. Communication between devices take place using communication protocol and their hardware and software infrastructure. Direct interaction between physical devices and computer based system is rapidly growing to make the system more intelligent and accurate in nature. In this paper, we have used the concept of an IoT and smart city to implement the concept of vehicular emergency system for emergency situation occurred on road. Now a day's most of the car are embedded with sensors and safety devices to detect the accidental condition and avoid them. When we driving any vehicle, safety and security is one of the most important thing. These type of vehicular emergency system is very useful, reliable and essential for vehicle driver as well as passenger on road kinds of modern safety systems are very much useful and reliable for car drivers as well as passengers on road. According to survey in India 141,526 people were killed on road in different type of road accidents. Basic reason behind the death of that people is late arrival of rescue teams to the accident location. When any emergency occur then immediate communication with respective authority take place is helpful for save the some of the lives.

## B. Novelties of the Proposed System

In this paper, we have introduced a system which help to avoid any vehicular emergency situation. Reason behind the developing this system is to minimize damages after any unfortunate situation occur with vehicle.

For minimize the damages, we place the small embedded system in vehicle which directly communicate to control room and rescue center. It send the message to control room when any emergency occur. When a vehicle meets any emergency situation the system starts automatically or manually. According to the type of the situation system sends emergency message to the control room. Control room analyse message content and then forwards the message to the appropriate and nearest rescue center.

When message received by rescue center, it will give acknowledgement back to the control room and control room forwarded back to victim. On task might be required for each patient. Whereas others might have to wait for the completion of dependent tasks. Most patients must wait for unpredictable but long periods in queues, waiting for their turn to accomplish each task. We focus on helping patients complete their tasks in a predictable time. Also helping hospitals schedule each treatment task queue and avoid over peopled and inadequate queues. We use massive realistic data from various hospitals to implement a time prediction system.

The waiting time of each treatment task is predicted by PTPP, which is the sum of all patients' waiting times in the current queue. A Hospital Queuing-Recommendation (HQR) system recommends an efficient and convenient treatment plan with the least waiting time for the patient.

## II. RELATED WORK

In smart city, traffic and road security is important issue hence some researchers studied on that issue. GPS based location tracking system is used to gather location information by using SMS, but in that system some bugs are occurred. User has to start the system manually, it is not fully automated system. Some researchers discussed the impact of Intelligent Transportation System (ITS) for future intelligent vehicle machines.

Thompson, Chris, et al. in that with help of smart phone's sensors can detect an accident in that system, e.g. accelerometer, sensor etc. 3G connection can be used to transmit accident reaction. But the system is not integrated into vehicle and also not fully automated and sometime need third party reporter to send complete emergency information along with photos.

From General Motors provides smart assistance to their vehicles by providing driving assistance, navigation service and route direction to its customers. It also provides emergency communication services through its always connected 4G connection. But with OnStar, the user can only contact the vehicle's manufacturer or emergency numbers (e.g. 911) and not to the local emergency rescue center's that can cause a delay in rescue.

Authors introduced ARRS that can automatically detect an accident and report it. They have used image processing approach to detect a vehicular crash from CC Camera videos. But the main problem of this kind of system is the accidents can't be detected in absence of a camera.



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Most of these kinds of systems are dependent on the users' smart phones and are not always automated. Some of them are entirely proprietary product for their own cars and on emergency, they can connect to their call centers only. There is no provision for those solutions to contact nearest rescue centers directly for emergencies that causes delay in rescue mission.

## III. LITERATURE SURVEY

### 1. Subha Koley, Prasun Ghosal, "An IoT Enabled Real-Time Communication and Location Tracking System for Vehicular Emergency", 2017

The rapid growth of technology and infrastructure has made our lives easier. The advent of technology has also increased the traffic hazards and the road accidents take place frequently which causes huge loss of life and property because of the poor emergency facilities. The accident detection project will provide an optimum solution to this drawback. An accelerometer can be used in a car alarm application so that dangerous driving can be detected. It can be used as a crash or rollover detector of the vehicle during and after a crash. Internet of Things is an emerging technology having the ability to change the way we live.

### 2. A. Zanella, N. Bui, A. Castellani, L. Vangelista, and M. Zorzi, "Internet of things for Smart Cities," *Internet of Things Journal, IEEE, 2014*

The Internet of Things (IoT) shall be able to incorporate transparently and seamlessly a large number of different and heterogeneous end systems, while providing open access to selected subsets of data for the development of a plethora of digital services. Building a general architecture for the IoT is hence a very complex task, mainly because of the extremely large variety of devices, link layer technologies, and services that may be involved in such a system. It focus specifically to an urban IoT systems that, while still being quite a broad category, are characterized by their specific application domain. Furthermore, present and discuss the technical solutions and best-practice guidelines adopted in the Padova Smart City project, a proof of concept deployment of an IoT island in the city of Padova, Italy, performed in collaboration with the city municipality

### 3. Shamshul Bahar and Junzo Watada, "Reliability enhancement of a traffic signal light system using a mean variance approach," *IEEE Transactions on Intelligent Transportation Systems, 2012.*

Traffic accidents cause tragic loss of life, property damage and substantial congestion to transportation systems. A large percentage of crashes occur at or near intersections. Therefore, traffic signals are often used to improve traffic safety and operations. The objective of this study is to present a significant and effective method of determining the optimal investment involved in retrofitting signals with light emitting diode (LED) units. In this study, the reliability and risks of each unit are evaluated using a variance-covariance matrix, and the effects and expenses of replacement are analysed. The mean-variance analysis is formulated as a mathematical program with the objectives of minimizing the risk and maximizing the expected return. Finally, a structural learning model of a mutual connection neural network is proposed to solve problems defined by mixed-integer quadratic programming, and this model is employed in the mean variance analysis. This method is applied to an LED signal retrofitting problem. This method enables us to select results more effectively and enhance decision-making.



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## 4. L. Atzori, A. Iera, and G. Morabito, "The Internet of Things: A Survey, Computer Networks, 2010

This addresses the Internet of Things. Main enabling factor of this promising paradigm is the integration of several technologies and communications solutions. Identification and tracking technologies, wired and wireless sensor and actuator networks, enhanced communication protocols (shared with the Next Generation Internet), and distributed intelligence for smart objects are just the most relevant. As one can easily imagine, any serious contribution to the advance of the Internet of Things must necessarily be the result of synergetic activities conducted in different fields of knowledge, such as telecommunications, informatics, electronics and social science. In such a complex scenario, this survey is directed to those who want to approach this complex discipline and contribute to its development. Different visions of this Internet of Things paradigm are reported and enabling technologies reviewed. What emerges is that still major issues shall be faced by the research community. The most relevant among them are addressed in details.

## IV. PROPOSED SYSTEM

### 1. Software Pre-requisites:

The basic and initial software requirements are as follows,

- (a) Rasbian Pi OS
- (b) Android Studio
- (c) NetBeans
- (d) JDK 1.8.0
- (e) Windows 8 operating system

### 2. Input process:

- a) When vehicle get trap in any emergency problem such as accident, medical, criminal, civil and mechanical then emergency message is send to the control room.
- b) The message contains vehicle information such as location, Emergency type, and Initial pics.

### 3. Processing:

- a) The control room has the task of managing the any type of emergency occur on road.
- b) Control room receives message come from vehicle side then it locate the nearest rescue center according to type of emergency.
- c) It has its separate database containing information of different rescue centers like hospitals, policestation, car workshop, govt.office and it also contains location of several rescue centers.

### 4. Output process:

- a) The rescue system receives the message come from control room and then they send their rescue team to emergency location.
- b) They analyse the situation and handle according to type of emergency issues.
- c) Message extraction is done in these sytem and after analysing the photos of situation, it can better understand the real scenario of the situation.

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## 5. Testing:

- (a) The hardware module and the system is thoroughly tested using various hardware and software testing techniques.
- (b) At each module testing is done in order to create a reliable system and useful interactive characteristics builder.

## V. THE OPERATION OF THE SYSTEM

### 1. Project task set:

- I. Task 1: Send Emergency Message To Control Room
- II. Task 2: Send Emergency Message To Rescue Center
- III. Task 3: Send Acknowledgement To Control Room
- IV. Task 4: Send Acknowledgement To User

**1. Send Emergency Message To Control Room:** When vehicle meets accident or any emergency then System can be activate and send message (type, location, image, information) to the control room.

**2. Send Emergency Message To Rescue Center:** After sending message to the control room, Control Rooms send message to the near rescue center according to type.

**3. Send Acknowledgement to Control Room:** Rescue center send the acknowledgement to the Control room. E.g. they will reach within seconds.

**4. Send Acknowledgement to User:** Sending the Acknowledgement to the control room, after that Control room also send the acknowledgement to the user.

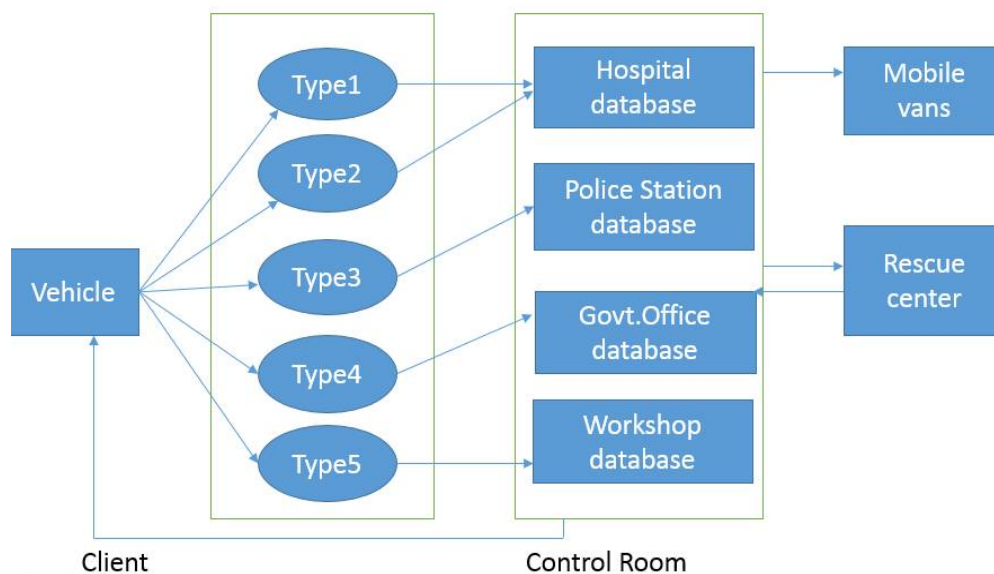


Fig. System Architecture



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## VI. SUMMARY AND CONCLUSION

The emergency communication system sends message of information of vehicle to the control room. This system is applicable for vehicular emergency occur on road. It help us to reduce the accidental damage. This is designed for IOT enabled vehicles and for smart cities. The various modules are interacting with each other and also rescue system is sending acknowledgement to the control room and user side. However, this system may also be used with existing infrastructure in any cities. This proposed system has the ability to send emergency information of a vehicle to nearest rescue centers and avoid the various emergency issues.

## VII. CONCLUSION

The Real time location tracking and Emergency communication system can be used for analysing different things and sends the emergency message to the rescue center through the control room which would make personal lives much safer and easier. Due to automatic nature of the system, the emergency damages get reduced.

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