

# AN IOT BASED VEHICLE TRACKING AND ACCIDENT DETECTION SYSTEM

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**Abstract**— *Internet of Things (IOT) is an emerging technology which has the ability to change the way of living. In IoT vision, each and every ‘thing’ has the ability of communicating with each other that brings the idea of Internet of Everything in Reality. Many number of IOT services can make our daily life easier, smarter and even safer. Using IoT in designing some special services can make a lifesaver system. In this paper, we have presented an IoT enabled approach that can provide emergency communication (GSM) and location tracking services (GPS) in a remote car that meets an unexpected accident or any other emergency situation. Immediately after an accident or an emergency occurs, the system either starts spontaneously or may be triggered manually. Depending upon type of emergency (police insecurity, fire and rescue, medical, or civil) it starts to communicate and shares critical information. Provision of interactive real-time multimedia communication, real-time location tracking have also been integrated to the proposed system in order to monitor the exact condition in real-time basis. The system prototype has been designed with ARDUINO UNO IOT communication protocol.*

**Keywords**— *Accident, Medical Services, GSM, GPS.*

## I INTRODUCTION

Right now we are living in the era of Internet and rapidly moving towards a smart planet where every device will be connected to each other. Internet of Things (IoT) is the technology helping us to achieve the goal of a smart world. IoT and Cyber Physical system have the ability to change the vision of our way of living. All developing countries are aiming to transform their cities into Smart City by taking several projects. For example, the government of India has taken an initiative called Digital India to connect the nation to Internet.

### 1.1 Necessity of Vehicular Emergency Communication System in Smart City Perspective

In a smart city every device or better to say every ‘thing’ is connected 24 × 7 to the Ubiquitous network. They can communicate to each other regardless of their communication protocols and hardware / software infrastructure. Machine to machine (M2M) communication [6] is rapidly growing to make the machines more intelligent and shared in nature. In this paper, we have used the concept

of a smart city to provide a life savior system for a smart vehicle in any kind of emergency situation occurred on road. Most of the modern cars are well equipped with several sensors, mechanical devices, software, embedded hardware etc. to pre-detect collisions or crashes and avoid them. ‘Safety and security’ is one of the most important criteria of a vehicle. These kinds of modern safety systems are very much useful and reliable for car drivers as well as passengers on road. But those safety systems have one major limitation. These systems can only be used to avoid crashes. But unfortunately, if the system fails to avoid an accident or there is any other emergency situation other than accident, those systems have no provision to deal with them. If the driver gets sick while driving or some road blockage occurs or some mechanical problem occurs, those systems cant help. A study says that in India 141,526 people were killed on road in 2014 by different types of road accidents. Most of them were killed due to late arrival of rescue teams to the accident location. So it is obvious that if the accident information can be sent to the respective authorities immediately after a situation has occurred some of the lives could be saved.

### 1.2 Novelties of The Proposed System

In this paper, we have introduced an emergency communication and location tracking system for any type of vehicular emergency. This system aims to minimize the damages after a vehicle meets any unfortunate situation like an accident by sending automatic message to the nearest hospital and police station. It is also helpful for other emergency situations such as medical emergency, criminal problem, civil emergency and also for mechanical problem in the car. When a car meets any emergency situation the system starts automatically or manually according to the type of the situation and sends emergency message to the control room. The control room then forwards the message to the nearest rescue center (hospital, police station, govt. office, car workshop) according to the emergency type and situation.

- It has a wide verity of emergency situations that could occur on road.

- There are some cameras in the car in different angles that can send pictures automatically to the control room to describe the condition more specifically.
- The control room can forward the message to right and nearest authority for that emergency automatically or Manually.
- Real-time multimedia (voice and video) communication feature also integrated to the system that helps the rescue authority to understand the real scenario of the victims any time.

### 1.3 Problem Statement

A vehicular emergency system is highly necessary and is an integral part of any smart city for proper safety, security, and reliability of smart living. Most important feature of this system is when vehicles meets an accident the system starts automatically and tracks its location and takes some of its initial photos with the preinstalled cameras and send them immediately to the emergency control room. The control room system automatically finds the nearest hospital and police station and forwards the message to them. Now the hospital and police station authority analyze the situation with the help of initial photos and send rescue teams to the accident location.

### 1.4 Objective

Transportation is a basic need of society. It's make human life more easy and comfortable. As far as increasing transportation, accident is also increasing. It cause death of human and damages any part of body. To prevent the particular action, we try to implement a system is Accident detection and messaging system using GPS and GSM.

### 1.5 Related Works

Internet of Things and Smart City are emerging research topics recent days in Internet oriented technologies grabbing the attention of researchers. The exponential growth of this field is taking us rapidly towards a smart planet, well-equipped with smart objects everywhere. Not only in theory but Padova smart city [9] has actually proved that a fully IoT enabled (smart) city can be achieved in reality. Some of the researchers have also studied on traffic and road security in a smart city. In [10] authors have proposed a GPS based location tracking system able to collect location information and send it through SMS. But the main problem of this system is, it is not a fully automated system. The user has to start the system manually. In [11] the authors have discussed the impact of Intelligent Transportation System (ITS) for future intelligent vehicles.

## II. EXISTING SYSTEM

The existing system a smart accident detection system using that detects the occurrence of an accident and sends a message to the traffic control authorities or emergency help centers in case of an accident so that immediate help can be provided. It also enables real-time tracking of vehicle's location via SMS. The system has a switch to enable driver to stop alert system in case of false alarms. This system acts as a black box to vehicles. The vehicle's location can be viewed using Google maps which are much more easier than location in terms of latitude and longitude.

## III. PROPOSED SYSTEM

The proposed system is divided in three major parts, an onboard embedded device (situation node), emergency control terminal room and rescue center terminal. We have divided vehicular emergencies into five different types according to their characteristics. The details of each part are discussed in the following sections.

### 3.1 Details of the System

A vehicular emergency system is highly necessary and is an integral part of any smart city for proper safety, security, and reliability of smart living. Most important feature of this system is when vehicles meets an accident the system starts automatically and tracks its location and takes some of its initial photos with the preinstalled cameras and send them immediately to the emergency control room. The control room system automatically finds the nearest hospital and police station and forwards the message to them. Now the hospital and police station authority analyze the situation with the help of initial photos and send rescue teams to the accident location. We have divided emergency situations in five different categories as follows.

#### **Type-1(Accident):**

This is the most important emergency type for a vehicle on road. When a vehicle crashes or meets any accident the system sends the emergency message to the nearest hospital and police station. Also, the preinstalled cameras activate only for this type of emergency to help the rescue teams to understand the real scenario of the situation from the base station and act accordingly.

#### **Type-2 (Medical):**

Sometime it happens that a passenger or the driver of a car suddenly becomes sick and is unable to go to the hospital or find any hospital nearby. In that case, they can start the system manually and define the emergency type to medical issue. For this type of emergency the control room sends the

message to the nearest hospital as emergency medical situation and the hospital acts accordingly.

### 3.2 Control Room

The emergency control room is the central control center to manage and rescue any kind of vehicular emergencies on road. The main task of the control room is to receive emergency messages from a vehicle, locate the nearest rescue centers for that kind of emergency from the actual emergency location, and forward the message to them. Control room server has all information of different types of rescue centers (i.e. hospitals, police stations, car workshops, govt. offices etc.) and their locations stored in its database. So whenever an emergency message comes to the control room, it immediately starts finding the nearest rescue center for its kind from its own database. To measure the distances from situation node to the rescue centers, we have used Have sine formula. The control room system is fully automatic in nature. So there is no human delay. Actions are taken immediately after receiving emergency message. Also, there is a feature of manual control by the control room operator. If he thinks that any other action should take for a particular emergency, he could manually take the actions by forwarding the message to some other rescue center and check the status of the rescue mission. This can supersede the functioning of the automated mode.

## IV CONCLUSION

In this paper, we have proposed an emergency contact and location tracking system for vehicular emergencies on road. The system is fully automatic in nature that can help us to minimize accidental and other emergency damages. This prototype is mainly designed for smart cities and IoT enabled vehicles. However, this system may also be used with existing infrastructure in any cities. This proposed system is only able to send emergency information from a vehicle to nearby rescue centers, but it can't help to avoid any emergency issues. Also, the system is dependent on several mechanical and electrical devices in a car to detect accident or other emergencies. In future, we would like to include these concerns. Also, we are aiming to design a hardware secured [22] on chip (System-on-Chip / Network-on-Chip) system featuring these services in future.

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