

LITERATURE SURVEY ON AUTOMATIC EMERGENCY SERVICE SYSTEM

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ABSTRACT

Longer response time required for emergency responders to arrive is a primary reason behind increased fatalities in serious accidents. One way to reduce this response time is to reduce the amount of time it takes to report an accident. Smart phones are ubiquitous and with network connectivity, they are perfect devices to immediately inform relevant authorities about the occurrence of an accident.

The paper aims at designing an Android application which will be beneficial for people to help other people who are suffering from incident like accident. It will help us to save the accidental person. The application informs the police control room about the accident by clicking photo of accident. The application suggests nearby hospitals and police stations list. FIR is generated by police station and a copy is sent to the respected hospital system. Respected hospital scans user QR-Code and provide treatment accordingly and also sends an emergency SMS to users preregistered mobile number.

KEYWORDS: GPS(Global Positioning System), QR-Code(Quick Response Code), AES, Haversine Formula, K-nn algorithm.

I. INTRODUCTION

The rapid development of people's living standards and economic development continues to improve. As well as there is a huge loss of life and property due to increased road accidents. Poor emergency incident is a major cause for the high number of traffic fatalities and the death rate in our country.

Now a days we often come across the fact that when an accident occurs the people nearby have to manually call the ambulance which leads to waste of time. Hence there is a

delay for the emergency services to arrive at the location of the accident.

Accident detection systems help reduce fatalities caused due to car accidents by decreasing the response time of emergency responders. The emergency service system makes an effort to provide the emergency facilities to the injured person in the shortest time possible. Through emergency medical services, countless lives have been saved through the years. The main use of EMS is to provide immediate services to the people. Wireless mobile sensors networks coupled with smart phones and their onboard sensors such as GPS receivers and accelerometers are promising platforms for constructing such systems. There are various ways through which an accident can be informed. Different hardware and software based techniques have been used for this purpose. However most of the work done is based on the use of some of the hardware equipments.

Recent advances in Android are one of the most popular smart phone platforms at the moment, and the popularity is even rising. Additionally, it is one of the most open and flexible platforms providing software developers easy access to phone hardware and rich software API. Smartphone technologies are making it possible to minimize the death rate which are happening by vehicle accidents in a more portable and cost effective manner than conventional in-vehicle solutions. These facts are the ones that motivated the researchers to proof the advantages of using the smartphone in development accident notification systems. The benefits of the smartphone that can be exploited to develop systems are - It is known that the user renews the smartphone much more frequently compared with the vehicle and the smartphones are more frequently updated in software and even in hardware. Institution of smartphones gave birth to a lot of innovative technology and exchanging information globally has become more prominent. Smartphones gave a new dimension to the

usage of mobile phones for the users. Regardless, the use of a smart phone gives the possibility of having additional sensors, advance power processor and communication interfaces, which permits to develop traffic accident detection and notification system that predicts when an accident has occurred based on sensor inputs to the smart phone without need to interaction with a car or changing anything in the car. On the other hand, the low cost of the smart phones compared to the existing traffic technologies. The system incorporates the use of inbuilt sensors of smart phones to detect accident and take the actions accordingly. A microcontroller is used to control the GPS and GSM modules [1]. To track vehicle, system uses the GPS to get geographic coordinates at regular time intervals. GPS module uses various algorithm like Harvesine to know the latitude and longitude [2]. The GSM module is used to transmit and update the vehicle location to a database. The Google Maps API is used to display the vehicle on the map in the Smartphone application. It is used to identify the location of the vehicle [1]. It provides a two way communication by using a sim card.

A QR (Quick Response) code is a type of barcode that can store more data than the familiar kind scanned at checkouts around the country [8]. It is a reference to the speed at which the large amounts of information they contain can be decoded by scanners.

II. RELATED WORK

The authors have introduced the use of Arduino Uno, alcohol and piezoelectric sensors to detect accident [1]. It incorporates the use of an embedded system that contains GPS and GSM modules connected with an Arduino UNO. Through GSM, the exact location or position of the vehicle is determined in the form of latitude and longitude. The GPS module used is NEO-6mv2. It gives high performance, flexibility and cost effective receivers. The set-up is installed at the front end of the vehicle and an alcohol sensor is used to detect the Ethanol level in the breathe of the driver. A piezoelectric sensor is used to sense the vibration at the time of the accident. The latitude and longitude positions of the vehicle is sent as a message. If range of that sensor increases beyond specific range then buzzer will get "on" for ten seconds and if driver can't stop the buzzer within ten seconds then it will be detected as an accident and a message will send to previously stored numbers with co-ordinates of that location. With the help of this application, the optimum solution to poor emergency facilities is provided.

There is an automatic alarm device for traffic accidents. It makes use of a of large-range dual-axis accelerometer MMA621010EG and small-scale three-axis accelerometer sensor MMA7260QT for information detection [2]. It can automatically find a traffic accident, search for the spot and then send the basic information to first aid center within two seconds covering geographical coordinates, the time and circumstances in which a traffic accident takes place. It uses KNN algorithm to find the nearest hospital and send the information about the accident. GPS module is fitted in the vehicle which will start communication with the satellite and get the latitude and longitude values and send the information to the centralized server.

The paper focuses on the study of smart phone based wireless mobile sensor networks as accident detection systems [3]. It discusses the issues related to the development of software designed to detect collision is the lack of integration between vehicle and smart phones. It describe solutions to key issues associated with detecting traffic accidents. It discusses how smart phone-based accident detection can reduce overall traffic congestion and increase the preparedness of emergency responders. The paper shows how smart phones in a wireless mobile sensor network can capture the streams of data provided by their compasses, accelerometers, and GPS sensors to provide a portable black box that detects accidents and records data related to accident events.

The main focus of the paper is on to provide security to the vehicle in a very reasonable cost so in this work the basic microcontroller AT89C51 is used for cost effective and also for easy understanding [4]. The purpose of the work is to find where the vehicle is and also can stop the vehicle i.e after sending a block message, the vehicle will get down there itself, until and unless the authorized person comes and gives the security code to that system. The microcontroller AT89C51 is an embedded system which is a combination of hardware and software to achieve a particular task. In this work an assembly programming is used for better accuracy and GPS and GSM modules which helps use to trace the vehicle anywhere on the globe. The experiments of model car's collision and rollover proved that this system can automatically detect corresponding accident and sent related information.

The authors have introduced an approach to eliminate the delay between accident occurrence and first responder dispatch. It is to use in-vehicle automatic accident detection and notification systems, which sense when traffic accidents occur and immediately notify emergency personnel [5]. A formal model for accident detection that combines sensors and context data is presented and also shows how smart phone sensors, network connections, and web services can be used to provide situational awareness to first responders. It describes how smart phones, such as the Google Android platforms and iPhone, can automatically detect traffic accidents using acoustic data and accelerometers, immediately notify a central emergency dispatch server after an accident. It also provide situational awareness through photographs, GPS coordinates, VOIP communication channels and accident data recordings.

The paper introduces the use of AES algorithm for the encryption process [6]. It is a symmetric block cipher chosen to protect classified information and is implemented in software and hardware throughout the world to encrypt sensitive data. It is a block cipher which operates on block size of 128 bits for both encrypting as well as decrypting. The results shows that it is fastest algorithm for encryption and decryption process and provides better security as it uses a single key for the process. It is a symmetric key algorithm rule that uses identical key for each encrypting and decrypting the information. The paper shows that the hardware implementation of AES increases the output. By using an efficient intra-round and inter-round pipeline design, a

throughput much higher than any other implementation is achieved.

A generic scheme for navigating a route through out city is created [7]. The main aim of the paper is to find the route between two placed within a city mentioned by user using the junctions between the source and destination junction. The idea behind this is to provide the better navigation of the user within the city. The paper suggests the use of A* algorithm over the Dijkstra algorithm as it is a combination of Dijkstra and BFS algorithm which gives a faster response. In addition, A* is heuristic in nature. The route is provided by using combination of A* Algorithm and Haversine formula. Haversine Formula is used to find the minimum distance between any two points on spherical body by using latitude and longitude. This minimum distance is then provided to A* algorithm to calculate minimum distance. The process for finding the shortest path is mentioned in this paper.

The paper discusses how QR-code can play a significant role in mobile applications due to their beneficial properties [8]. It can store a large amount of data and acquires the capability of correcting errors. It is highly used for security-sensitive purpose including payments and personal identification as it cannot be decoded easily. Any information on a cell phone can be transmitted to a second cell phone as QR code displayed on the LCD which is then captured using camera of second phone and can be decoded there. Since private data of the QR barcode lacks adequate security protection, AES 128 encryption is used in order to add security to this data transmission.

An Android based application that monitors the vehicle through an On Board Diagnostics (OBD-II) interface, being able to detect accidents is proposed [9]. The application estimates the G force experienced by the passengers in case of a frontal collision, which is used together with airbag triggers to detect accidents. The application reacts to positive detection by sending details about the accident through either e-mail or SMS to pre-defined destinations, immediately followed by an automatic phone call to the emergency services.

Most of the smart phone based accident detection systems rely on the high speed of the vehicle and the G-Force value to detect an accident [10]. Here, in addition to the high speed accident detection, this paper concentrated on low speed car accident detection. The proposed system consists of different phases as the detection phase which is used to detect car accident in low and high speeds. The notification phase, and immediately after an accident is indicated, is used to send detailed information such as images, video, accident location, etc. to the emergency responder for fast recovery.

III. ALGORITHM

There are various algorithms proposed which are used to find the nearest neighbour as well as used for the encryption and decryption process. Some of them for finding neighbour are K- nearest neighbour, Approximate nearest neighbour, Nearest neighbour distance ratio, etc. and for the encryption are AES, MD5, RSA, etc. From the above mentioned algorithms the survey done shows that the use of K-nn and AES algorithms are efficient

and reliable. k-nn algorithm is a type of instance-based learning or lazy learning where the function is only approximated locally and all computation is deferred until classification [2]. K-nn algorithm is used to find the top k nearest neighbour among all the identified neighbours. It is the simplest machine learning algorithms, an object is classified by a majority vote of its neighbours, with the object being classified by a majority vote of its neighbours. This algorithm is pretty useful as in the real world, most of the practical data does not obey the typical theoretical assumptions made.

A. Advantages of k-nn

- 1) The cost of the learning process is zero
- 2) No assumptions about the characteristics of the concepts to learn have to be done
- 3) Complex concepts can be learned by local approximation using simple procedures

Similarly, AES algorithm is better than other algorithms as it is a symmetric block cipher chosen by the U.S. government to protect classified information and is implemented in software and hardware throughout the world to encrypt sensitive data [6],[8]. It is used in order to protect data against unauthorised access and to encrypt this. Symmetric (also known as secret-key) ciphers use the same key for encrypting and decrypting, so the sender and the receiver must both know and use the same secret key.

B. Features of AES

- 1) Block encryption implementation
- 2) 128-bit group encryption with 128, 192 and 256-bit key lengths
- 3) Symmetric algorithm requiring only one encryption and decryption key
- 4) Data security for 20-30 years
- 5) Worldwide access
- 6) Easy overall implementation

IV. EXISTING SYSTEM

As the existing system is totally manual and user needs to call police station and hospital individually. There is no such corporation between police station and hospital in order to provide services to the injured person. Firstly the police station needs to register the FIR and unless and until it finishes its process, hospital can't proceed further. There isn't any automation system for accident. Apart from the manual system, there exists a lot of hardware based systems which doesn't incorporate the collaborative working of hospital and police station. Also the work done is based on the emergency calling to the preregistered number and to the hospital but not to the police station.

A. Disadvantages of existing system

- 1) Existing system is lengthy and time consuming.
- 2) Lengthy paper work process.
- 3) Need collaborative working of police station and hospital.

V. CONCLUSION

The survey done shows that there are various methods to detect accidents using both hardware and software which give good results. Most of the designs also enable the drivers with the option of turning off the alarm in the cases where the accident is not serious or false detections. These

methods are either mostly dependent on some hardware like sensors that have to be present in the vehicle or require a smart phone to be present within the vehicle. While the use of such hardware can prove to be a cost-efficient.

The design being developed will be more able to correctly solve the problem within a short time period. It is possible by using the algorithms such as K-nn and AES algorithm. The k-nearest neighbor algorithm is efficient for finding the nearest neighbors. Also it has been shown in the discussed papers that it is efficient to store the user's personal information in the QR-code which will provide security to the information using AES algorithm as the information can only be decrypted when it is required.

VI. FUTURE SCOPE

With further modifications to the existing systems the design can be used as a navigation system which can navigate through out city. A further analysis can be tried to improve the accuracy of detection phase and reduces the probability of false positive signs that are generated from being the user is outside or inside the car when the vehicle is travelling at a low speed.

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