

# Accident Monitoring System using Wireless Application

Megha Nirbhavane, Shashi Prabha

**Abstract—** 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 accident take place frequently which causes huge loss of life and property because of the poor emergency facilities. Tremendous growth of both road network & road traffic in India brought the problem of road accidents resulting in injury and fatalities to road users. India was number 9 killer in the year 1990 in the world is expected to emerge number 3 killer by year 2020 in road accident. Although road transport safety is a worldwide problem but it is more severe in India. India needs to improve road safety measures to reduce road accidents. Nowadays, the rapid evolution in transportation technologies makes the necessity for avoiding and reducing traffic accidents to increase road safety and save lives. wireless controlling technology system like ARM7, Microcontroller, Sensor, Wi-Fi, Bluetooth, RFID, GSM, GPS and Android are used to monitor the accidents. This paper is the description of android technology for accident detection with the use of heart rate monitoring device.

**Index Terms—** Android, Arduino Bluetooth microcontroller, Heart Rate Monitoring Device

## I. INTRODUCTION

In India, the vehicle population is growing at a faster rate than the economic and population growth. Therefore increasing number of vehicles causes accident to overcome this accident and people who they don't know where it happened, how to save that person's lives. Using one of the based wireless controlling Android technology are give the fast response. Android it is open source operating system.

The android based mobile phone has become major source of information device now it's available in most of the every ones hand. Android mobile access the different categories of application like games ,Google online services, Google maps application including Street View, business finder ,driving direction, satellite view, and traffic condition, access to hardware including camera ,GPS and Accelerometer, Google's GSM cell-based location technology to determine the device's current position.

If more movement More traffic, More load on agencies, More pressure on users This yields Accidents, incidents, delays,

*Manuscript received April, 2014.*

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mental tension, pollution, Loss in productivity, business, economy, Growth of country, mankind According to the World Health Organization (WHO), road traffic injuries are the sixth leading cause of death in India with a greater share of hospitalization, deaths, disabilities and socio-economic losses in the young and middle-aged population. Road traffic injuries also place a huge burden on the health sector in terms of pre-hospital and acute care and rehabilitation. Figure 1 shows Total number of road accidents, persons killed, and Persons injured during 2002-2011.

### A. Problem Statement.

The use of GPS on mobile devices in the recent generations of mobile communication is one of the ever-present applications that are widely developed and used. But using those GPS in case of emergency such as accident, where there is no user interaction will be difficult effort. Android is a new and yet dynamically developing mobile platform and almost all counterpart of application are being adopted to compact the systems requirement. Hence Android can answer for this, by developing an application which can solve the above mentioned problem.

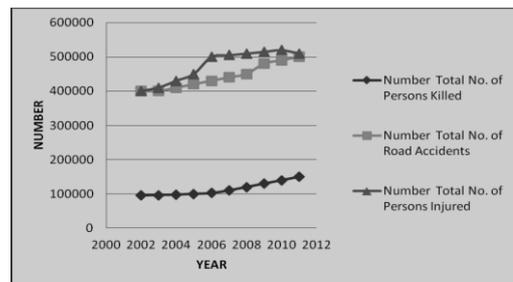


Fig. 1: Total number of road accidents, persons killed, and Persons injured during 2002-2011

Therefore it is proposed to develop a application based on android platform which will help to send the GPS data with remote server and eventually serve the purpose of emergency situation location information sharing to the appropriate authorities such as hospitals, relatives, traffic police etc. in case of traffic accident.

## II. LITERATURE REVIEW

There are many efforts, applications, instruments developed till date to improve travel safety in case of accidents. Hemjit Sawant, Jindong Tan, Qingyan Yang Qizhi Wang presented a novel approach to increase the

safety of road travel using the concepts of wireless sensor networks and the Bluetooth protocol, discussed how vehicles can form mobile ad-hoc networks and exchange data sensed by the on-board sensors [1]. Daniel B. Work and Alexandre M. Bayen described how the mobile internet is changing the face of the transportation cyber physical system at a rapid pace. [2]. J. Whipple, W. Arensman and M.S Boler explored the android operating system (OS) and software development environment and evaluated several of its capabilities by constructing a working application. The platform proved capable of supporting a melding of different services, and we believe such smart phones have broad applicability to public safety problems [3]. Helia Mamdouhi, Sabira Khatun and Javad Zarrin developed integrated system to manage, control and monitor all the accessories inside the vehicle by using a personal mobile phone and system based on Microcontroller, Bluetooth and Java technology and in order to achieve the idea of an intelligence car with ability to uses personal mobile hand phone as a remote interface. [4]. Jules White, Brian Dougherty, Adam Albright, and Douglas discussed how smart phone-based accident detection can reduce overall traffic congestion and increase the preparedness of emergency responders [5]. Amit Kushwaha, Vineet Kushwaha created a number of different applications where we provide the user with information regarding a place he or she wants to visit. [6]. Rajesh Borade, Aniket Kapse, Prasad Bidwai and Priya Kaul developed secured vehicle tracking and control system to control his vehicle through an android based Smartphone.[7]. Corcoba Magaña and M. Muñoz Organero presented a novel efficient driving assistant that uses the features of the Smartphone to accurately model the driver's driving style from the point of view of energy consumption and generate eco-driving tips to correct the bad driver's driving habits [8]. Ashokkumar Ramalingam, Prabhu Dorairaj and Saranya Ramamoorthy described 'Emergency Based Remote Collateral Tracking System' application using [9]. Matko Kuna, Hrvoje Kolaric, Iva Bojic, Mario Kusek and Gordan Jezic presented a context-aware system that uses Machine-to-Machine communication to retrieve sensor data collected by an Android operating system smart phone [10]. Lawal Olufowobi provided a solution with the use of a mobile phone for monitoring an SMS-based GPS tracker provided by WRD Systems Ltd especially in locations where GPRS may not be available [11]. Ashokkumar Ramalingam, Prabhu Dorairaj and Saranya Ramamoorthy, developed safety triggering system on android Mobile platform [12]. Nagadeepa N proposed a novel infrastructure for vehicular communication on highways with Bluetooth technology aimed to assist drivers are presented [13]. Kamal Jain and Rahul Goel described the implementation of Global positioning systems (GPS) in low cost intelligent vehicle tracking system systems [14]. Wen-Chen Hu, Naima Kaabouch, Hung-Jen Yang, Ather Sharif studied the location-based servicee (LBS) structure by dividing an LBS system into five components: [15]. Zhiquan Ren, Chun Wang and Jibo presented a mobile technology using smart phones to detect the leading vehicle, allowing the possibility to make collision warning systems

more affordable and portable. [16]. Jinsong Song, Zhenghua Xin, Wei Ding allowed the bluetooth-enabled android phones to communicate with sensors wirelessly through designed software. [17]. Peter Handel, Jens Ohlsson, Martin Ohlsson, Isaac Skog, Elin Nygren presented a framework to deploy a smart phone based measurement system for road vehicle traffic monitoring and usage based insurance. [18].

### III. STUDY METHODOLOGY

ANDROID, and its features such as GPS, Internet capability to serve person under emergency with the help of , a heart rate monitoring device is integrated with intelligent application based on android operating system to ensure safety with regards to the person heartbeats. Moreover, a new yet dynamically developing open source microcontroller platform called as ARDUINO is also presented here, which plays a major role in this project. Arudino microcontroller is integrated with the mobile via Bluetooth. Arduino board based micro controller programming is also performed to send an emergency signal when person is under critical situation. This project is developed with JAVA programming language which is executed on Eclipse IDE and implemented on Android mobile platform. A typical Graphical User Interface is used to manage the scenario and make it eventually available to the public at large.

#### A. *Arduino Bluetooth Microcontroller*

Main advantage of the controller is that it consumes lesser space and makes the design very compact. The significance of microcontroller is that it can be useful for embedded applications where automation of the devices is of at most importance. This feature of controller has encouraged us to use it in our project. There are different types of microcontroller such as AVR, ARM, PIC and so on. Of all these, AVR is the first controller to use flash memory for its storage. To suit the requirements such as better sensitivity to the environment, automatic halt of the vehicle, compact design and maximum storage, AVR microcontroller is chosen for our project. Android is an open source platform, hence a controller with similar feature should also be chosen and there comes the choice of using Arduino Microcontroller.

Arduino Microcontroller is an open source prototyping platform which can sense the environment by the sensors which is given as the input to it. The programming of the controller is done using Arduino Programming language. The language used for programming is C/C++. It consists of an IDE. This IDE is a cross platform application written in Java and then it is derived from IDE for programming and wiring. The best thing about this programming is that the language is so easy to understand that even a beginner can write it easily. IDE also provides sample programs which can be used for further development of the project. Various Arduino microcontrollers are available in market such as Arduino Extreme, Arduino Mini, Arduino Nano, Arduino Bluetooth, Arduino Diecimila, Arduino Duemilanove, Arduino Mega and so on. Each of these microcontrollers

have their own significance. Arduino Bluetooth is found as best choice for our project. As the name suggests, this microcontroller has in built Bluetooth module which lacks in other controllers.

Arduino Bluetooth (Arduino BT) microcontroller works on principle of Atmega168 and the Bluegiga WT11 Bluetooth module. It has 14 input/output pins and it supports serial communication over Bluetooth. The operating voltage is 5V which makes the controller very fragile and hence the voltage should not be exceeded else it would result in the damage of the microcontroller. It has 16kb flash memory for the storage of the code. The reset option is at pin number 7 which is connected to the reset of bluegiga WT11 module. The Bluetooth communication is provided by Bluegiga WT11 module on Arduino BT which can connect to any devices which has Bluetooth connectivity. It should be configured and should be detected by the device to which it is connected. It works on the baud rate of 112500. The controller is connected to another device by pairing and the name of the device suggested by Arduino is ARDUINOBT and the pass code is 12345. This is the default setting of the device. Arduino Bluetooth microcontroller is connected to the Android mobile device via Bluetooth. The challenge is the compatibility of the microcontroller to the mobile phone enabled with android. The programming of the android mobile device should work well with Arduino BT microcontroller which is proper integration of them. This amalgamation of the components is done using Amarino.

#### *B. Arduino Microcontroller Integration with Android-Amarino*

Every request sent has its own response. The same is the case with a mobile phone. For instance, a phone call is alerted to the user by a ringtone, a text message received is displayed on the screen, a photo clicked with the help of the camera is saved in memory of the phone and so on. These events are generated on the phone itself. The same event can also be viewed somewhere else like in our room, through a sensor like accelerometer or on a microcontroller. To such a situation to occur, Amarino is used. Amarino is a tool kit which helps in integration of android with Arduino. It consists of the Android application and libraries required for arduino. Amarino helps to connect a mobile device enabled with android and an arduino microcontroller via Bluetooth.

#### *C. Heart Rate Monitoring Device*

Heart is the main organ in a human's body. One can't live without it. It's because of this anything in the world is compared to heart, that's the importance of such a vital organ. Heart rate is an important factor to be considered in a human body. Heart rate tells us how many times heart beats in a minute. It is usually measured by feeling the pulse on any area near the artery. This measure signifies the blood pressure of a person. The blood pressure either low or high is dangerous to health. Hence it has to be kept under control and also by constant monitoring. Heart rate monitoring is an important aspect of a human being. This monitoring is usually done by a regular health checkup at any hospital. This is a normal scenario, but there are situations where the

heart rate is not monitored while driving any vehicle or while exercising and so on. Hence a heart rate monitoring device is very essential. Heart rate monitoring is done at any hospitals using devices like ECG. Even though it is accurate, this device is costly and also regular visit to hospital should also be carried out. Also a person with heart disease complaint should be able to monitor his condition continuously. To solve all these criticalities, a heart rate monitoring device has to be purchased and maintained for personal care. These days heart rate monitor is been used commonly by normal person rather than in a hospital.

Heart rate monitor helps to detect the abnormalities in the heart and would display it to the person who is using it. This feature has inspired us to use such a device for our emergency conditions especially when a person is driving a car and is suddenly met with heart attack. To get situation under control, this monitor device would send an alert to the android enabled mobile phone which will in turn halt the car to avoid further casualties. There are various heart rate monitoring device are available in the market such as Zephyr HR Bluetooth heart rate monitor, polar Bluetooth heart rate monitor, Wahoo Fitness ANT plus Dongle and so on. Zephyr HR Bluetooth enabled heart rate monitor is best suited for our project for various reasons such as the Zephyr programming is easier and it is open source. It is a device with Bluetooth connectivity which avoids wired connection and reduces the hardware cost for it. It also has a fabric sensor which detects the data irrespective of any fabric. Speed, distance is also displayed using this device which helps to see a pictorial representation of a person's heart rate. The best thing about this device is that it can tolerate any extreme motion of the body like running, jumping, jogging and so on. Also the transfer of data is via Bluetooth.

#### *D. Study Methodology*

Heart rate of a person will be monitored and will be notified under critical situation to android mobile device and using that information the location of a person will be tracked and will be sent to an emergency contact number/email/Facebook wall. Under critical situation of heart rates, the android mobile send a signal to a microcontroller and LED in that microcontroller blinks to make an alert of risk signal. Design an application and user interface using Java program to integrate SMS functionality to send geographical information to another remote emergency email address and also message which has to be posted on Facebook wall. Integrating Arduino microcontroller with android mobile phone, to make an alert of risk signal under critical situation.

The design of this project deals with a person/user driving in a vehicle. A typical scenario is, when a person driving in isolated roads, wearing the Zephyr heart rate device around the chest. This heart rate device will send the heart rate every second to the android mobile via Bluetooth by which it is monitoring the heart beat of the driving person. The heart rate is normal between 60-100, if it is less than 60 its called has Bradycardia and if its more than 100 it is called as tachycardia. In most condition the heart beat becomes less

when there is dehydration, decreased protein intake and it becomes more in uncontrolled hypertension.

Our application is designed to sense this heart rate, and if there are any abnormalities in the heart rate like, if the heart rate goes below 60 or above 100, automatically the android mobile will send a signal to an Arudino microcontroller which is connected to android mobile via Bluetooth. This Arduino microcontroller will make an alert signal, in our case the alert signal is indicated by blink of a led. Simultaneously our application will track the location information of the user who is under emergency and send that location information to a remote pre-stored emergency contact number. This scenario is shown in fig.2

#### IV. CONCLUSION

Accident based emergency scenario can be sensed by our intelligent application in Android mobile using a accelerometer and alert message which contains the GPS location information was sent via SMS, email and message can be successfully posted on respective user's Facebook wall. Hence, Android once again proved to be a versatile operating system which allowed us to manipulate various inbuilt features of an Android mobile which made us to develop an intelligent application called as ETS.

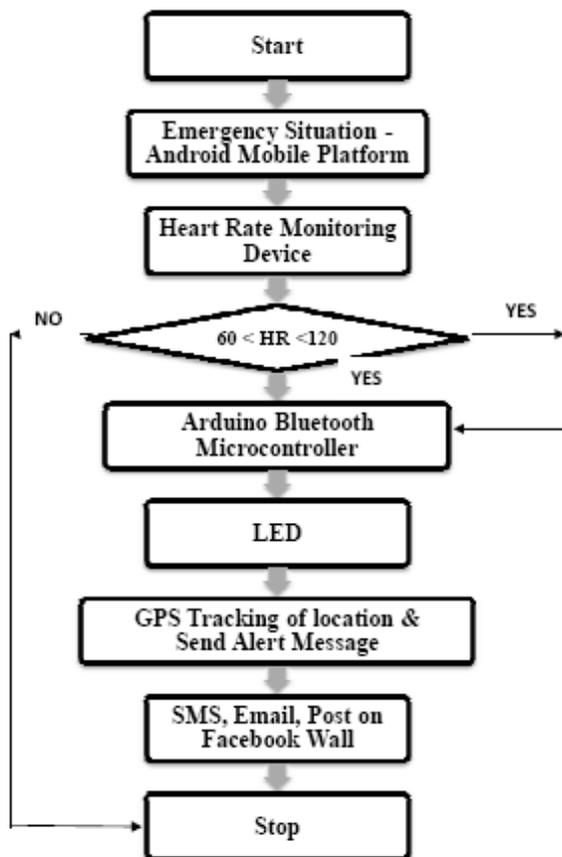


Figure 2: Study Methodology

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