International Journal of Applied Engineering Research ISSN 0973-4562 Volume 12, Number 13 (2017) pp. 3850-3856

Provide Safety in School Children's Vehicle in Urban Environments using Navigation system

Paparao Nalajala
Electronics and Communication
Institute of Aeronautical Engg., Hyderabad, India.

ORCID: 0000-0001-9906-5039

K Madhavi
Electronics and Communication
Ellenki Institute of Tech., Hyderabad, India.

Bhavana Godavarthi
Electronics and Communication
Institute of Aeronautical Engg., Hyderabad, India.

ORCID: 0000-0002-0623-9528

M B Naga Aditya
Mechanical Engg., Institute of Aeronautical Engg.
Hyderabad, India.

Abstract

This research paper presents an advance vehicle monitoring and tracking system is designed using embedded and android applications for tracking vehicle from any location. The main aim of this system is to give high security to school vehicles with the help of GPS/GSM/GPRS. The current location of the vehicle is found with the help of GPS and GPRS sends the tracking information to server by giving SMS alert to vehicle owner mobile with the help of GSM module. By using real time monitoring the system constantly watches the moving vehicle position and reports the status on demand. IF any theft is identified, the responsible person sends the message to the system and the system issues the command for control signal to stop the engine motor. To avoid the occurrence of accidents many sensors such as vibration, alcohol, fire detectors LPG gas leakage and temperature sensors are used in vehicle and the information is send to the respective person. IR sensors are used for obstacle detection in mobile and to find the distance measurements. With the help of these vehicle sensors the information is tracked in regular intervals and sends the information to authorized numbers for taking care about traveler's safety.

Keywords: ARM7Controller, MEMS, GPS/GSM/GPRS, Alcohol, gas, theft, Temperature, obstacle sensors

INTRODUCTION

Vehicle tracking system main aim is to give Security to all vehicles. Accident alert system is introduced for rescuing people while accidents. This is improved security systems for vehicles. The GPS used in this system is highly useful for enable the owner to monitor and track the vehicle moment along with its past activities. This new technology popularly known as vehicle Tracking Systems [1] [2] creates many wonders for the security of the vehicle. This hardware is fitted on to the vehicle is invisible to anyone whether the person is inside or outside of the vehicle. The hardware which is fitted inside the vehicle consists sensors, which send the location data to the monitoring unit. When the vehicle is stolen, with the help of tracking system owner can find the location and can be informed to police for further action. Some Vehicle tracking System can even detect unauthorized movements of the vehicle and thenalertthe owner. This gives an edge over other pieces of technology for the same purpose.

This accident alert system present in the vehicle detects the accident and GPS [2] coordinates the location to thespecified mobile, computer etc. The fire detector circuit Present in the vehicle detects fire. When the temperature inside the vehicle goes above a certain limit then a warning is issued automatically to the intended receiver. The infrared sensor which is additionally interfaced to the microcontroller is used to detect the obstacles and accidents. In any case if any mishap occurs then its warning will be directly send to the intended receiver. When a request by user is sent to the number at the modem, the system automatically sends a return reply to that particular mobile indicating the position of the vehicle in terms of latitude and longitude. A Program has been developed which is used to locate the exact position of the vehicle and also to navigated track of the moving vehicle on GoogleMap.

The GPS/ GSM Based System is one of the most important systems, which integrate both GSM and GPS Technologies. It is necessary due to the many of applications of both GSM and GPS systems and the wide usage of them by millions of people throughout the world [3]. This system designed for users in land construction and transport business, provides real-time information such as location, speed and expected

arrival time of the user is moving vehicles in a concise and easy-tread format. This system may also useful for communication process.

The System design [4] [5] of the vehicle tracking system is shown below. The block diagram shows the overall view of the system. The blocks that are connected here are Microcontroller, LCD display; GPS, GSM, Power supply, Infrared sensor, Fire detector the hardware and software of the GPS and GSM network were developed.TheProposed GPS/ GSM based System Has the two parts, first is a mobile unit and another is controlling station.TheSystem processes, interfaces, connections, data transmission and reception of data among the mobile unit and control stations are workingsuccessfully. These results are compatiblewith GPS technologies.

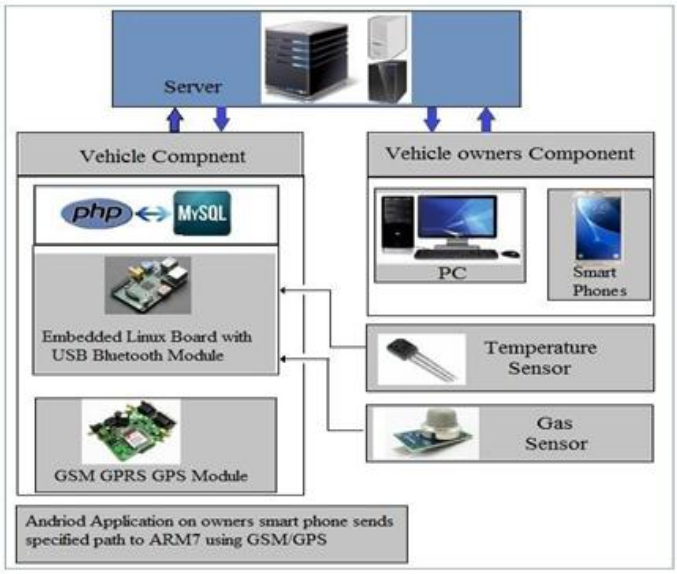

Figure 1: System Design

PROPOSEDSYSTEM

The proposed system is used for positioning and navigating the vehicle with an accuracy of 10 m. With the help of latitude and longitude the exact location is indicated along with the exact Navigated track on Google map. The system tracks the location of particular vehicle and sends the data to users mobile and also to microcontroller. The data is arrived in the form of latitude and longitude is used to locate the Vehicle on the Google maps and also we can observe the output on the LCD.

A. Vehicle Tracking Features:

It is mainly benefit for the companies which are based on transport system. Since it can show the position of all vehicles in real time, so that they can create the expected data accordingly. These tracking system [6] can store the whole data where the vehicle had gone, where did it stop, how much time it take at every stop and can create whole data analysis. It is also used in buses and trains, to estimate how far are they, how much time it takes for them to come to a particular stop. These systems are used to data capture, data storage, data analysis and finally data transfer. By additional sensors such as temperature sensor, gas sensor, alcohol sensor and infrared sensors the system can be enabled to detect fire, theft and obstacles

B. Accident Alert SystemFeatures

This system is based on new technology, its main purpose is to detect an accident and alert to the control room, so the victim can find some help. It can detect accidents the intensity of the accident without any visual contact from control room. It is easy to understand how many vehicles are involved in particular accident and how intense is it when this system is inserted in every vehicle. The present board designed has both vehicle tracking and accident alert systems, which make it more valuable and useful when the vehicle is theft or met with an accident. The fire accidents are detected by placing the fire detector in one of the interruptpins.

C. Usage Of Tracking InIndia

Tracking in India is mainly used by transport systems, taxi companies, traffic operators. Taxi operators use this to estimate how far the vehicle is from a particular area and send this information to call centers and they can inform general public about the distance of the taxi location and time it takes tom come to them. Another use is for traffic police if this system is located in every vehicle they can estimate the traffic by looking on the map and if any accident is detected then they can route the traffic in to another way. This is how tracking is useful because India is one of busy traffic countries and this system can control many of the traffic problems.

D. Applications

Vehicle navigating system can be used for variety of applications such as:

1. Palmtop, Laptop, PDA, andHandheld
2. Carnavigation
3. Fleetmanagement/tracking

Location Based Services enableddevices

IMPLEMENTATION

The system consists of GPS receiver and GSM modem along with a micro controller attached to the vehicle. On the other end (main vehicle station) one GSM mobile phone is attached to the computer with VB application. So the GPS system will send the longitudinal and altitude values corresponding to the position of vehicle to GSM Modem [5] [6] [16].

Imagine that the car has left Mumbai at 5 o clock in the morning by car driver. If the owner of the vehicle wants to know where the vehicle is, he will come to the computer and click on the vehicle number on the VB program .The VB program will send an SMS to the vehicle number. With the help of GSM device and SIM card present in the vehicle the SMS alert will reach the vehicle while travelling.

This GSM modem will receive the SMS and send to the microcontroller in the vehicle. The microcontroller will receive this SMS and compare the password and the command. If everything matches then it will perform the request required by the office. A place name is assigned for each longitude & latitude. The GSM receiver in the vehicle office receives these data & gives to the PC through serial port. The VB program in the PC checks this data with its database & displays the details of the vehicle on the screen. The device is password controlled i.e. person who knows the device password only able to operate. In case of any mishaps such as fire theft or obstacle, the device will automatically will send an alert to the registered number, i.e., the number that is divided into the memory ofmicrocontroller

Figure 2: Working of System

By using mobile communication, this vehicle tracking system takes input from GPS and sends it through the GSM module to desired mobile/laptop. Vehicle Tracking System is one of the latest technological advancements to track and monitor the activities of the vehicle. The security system uses Global Positioning System GPS [8] [9] [15] [16] to find the location of the monitored or tracked vehicle and then uses satellite or radio systems to send the location and data to the monitoring center. At monitoring center uses various software's to plot the Vehicle on a map. In this way the Vehicle owners are able to track their vehicle on a real-time basis. Due to real-time tracking facility, vehicle tracking systems are becoming increasingly popular among owners of expensivevehicles.

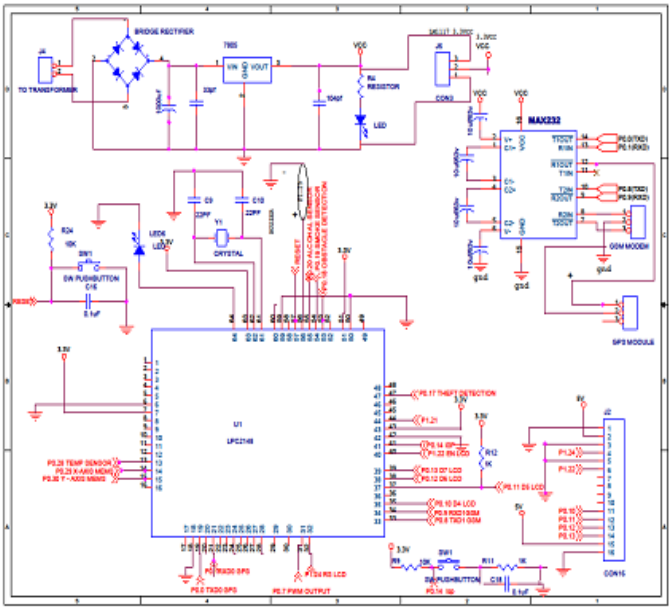

Figure 3: Schematic Design

Commercial fleet operators are by far the largest users of vehicle tracking systems. These systems are used for operational functions such as routing, security; dispatch and collecting on-board information. These are also used for fire detector in large vehicles like train, bus etc. because the vehicle like train contains large number of people and the sending alert of fire accident can save many lives.

The applications for this project are in military, navigation, automobiles, aircrafts, fleet management, remote monitoring, remote control, security systems, tele services, etc.

- Fleetmonitoring
- Vehiclescheduling
- Routemonitoring
- Drivermonitoring
- Accidentanalysis
- Geo-fencinggeo-coding

These are just a few advantages of the project that has been introduced in this report. We can interface more number of sensors in order to serve multiple purposes. The microcontroller that has been used in this project has in built ADCs and hence the controller is capable of accepting analog inputs, which is the biggest advantage. Since all real world signals are analog in nature, by incorporating different sensors required purpose can be served.

Micro electro mechanical sensor (MEMS) is a technique of combining electrical and mechanical components together on a chip. Abrupt vibrations are detected by using Mems sensor when an accident is detected. It also sends a text message to the authorized person through the GSM modem connected to the microcontroller such that remedy measures could be taken by the authorized person and to give proper medical treatment to them ifrequired

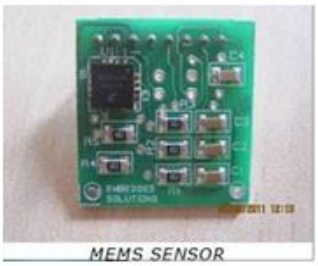

Figure 4: MEMS Sensor

The obstacle sensing module is used to sense the static obstacles in front of the vehicle such that, accidents due to unwanted parking of the vehicles and collision with trees and other objects especially during the night time could be avoided. These obstacles could be detected using various methods such as ultrasonic sensors etc. The working principle of the obstacle sensor is shownin

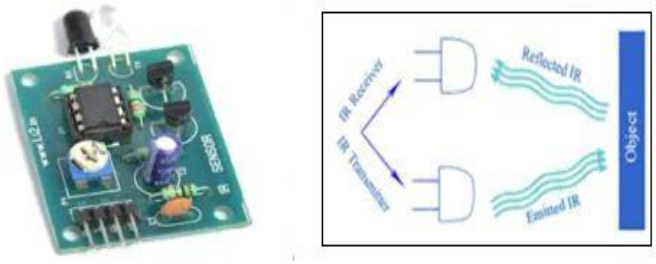

Figure 5: IR Sensing Module

When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network. While these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS and MMSmessages.

The GSM mode m is a specialized type of mode m which accepts a SIM card operates on a subscriber's mobile number over a network, just like a cellular phone. It is a cell phone without display. Modem sim300 is a triband GSM/ GPRS engine that works on EGSM 900M Hz, DCS1800MHz and PCS1900MHz frequencies.

Figure 6: GSM Device

A GPS navigation device is a device that accurately calculates geographical location by receiving information [5] [15].The Global Positioning System (GPS) is a satellite-based navigation system consists of a network of 24 satellites located into orbit. The system provides essential in formation to military, civil and commercial users around the world and which is freely accessible to anyone with a GPS receiver.GPS works in any weather circumstances at anywhere in the world. Normally no subscription fees or system charges to utilize GPS. A GPS receiver must be locked on to the signal of at least three satellites to estimate 2D position (latitude and longitude) and track movement from GPS satellites. Initially it was used by the United States military, but now most receivers are in automobiles andsmart phones.

Figure 7: GPS Module

FLOWCHART

The given flowchart gives us the basic idea about how our system works. First of the initialization of the system is carried out in which it checks if the system is working properly or not. If the system is not working properly then it will check the 4 differentConditions and tries to identity which problem is occurring. Then it tracks position of vehicle through GPS and send SMS through GSM module

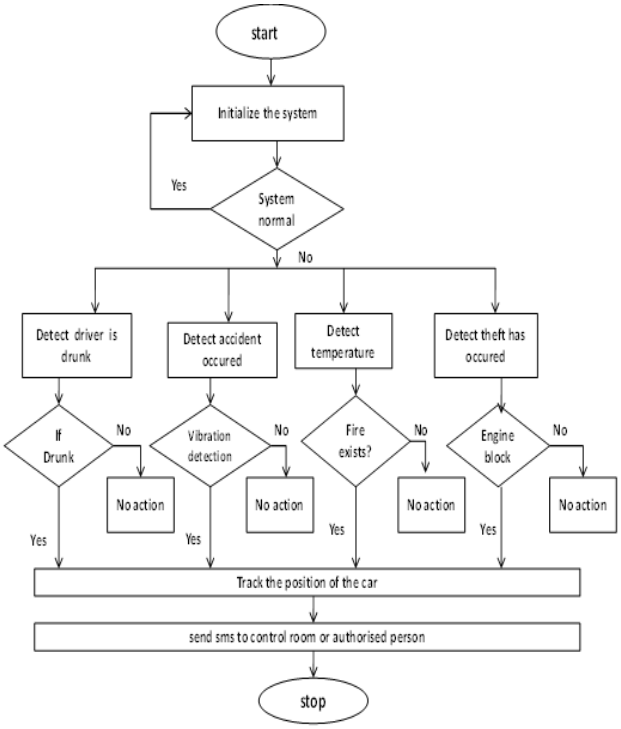

Figure 7.1: Flow chart for the system design

RESULTSANALYSIS

The following figures are track and monitoring the current locations and find the indications how the sensor can activate

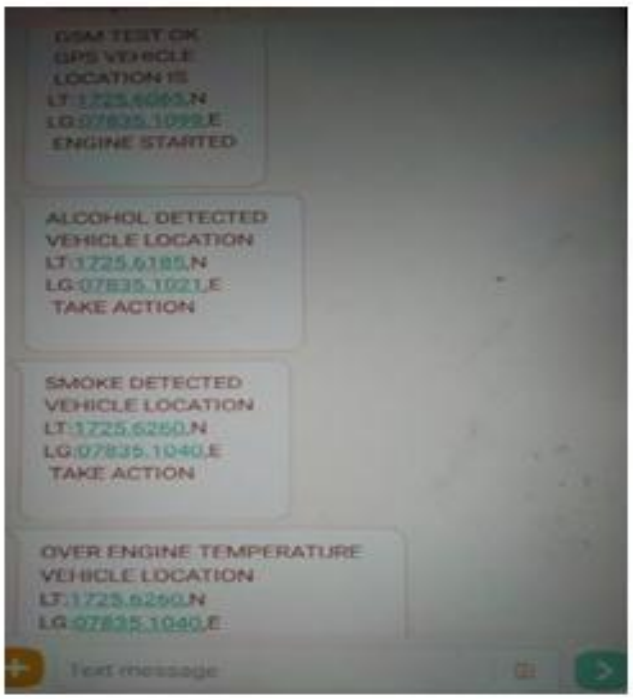

Figure 8: Values for longitude and latitude Alcohol, Smoke sensors, over heat

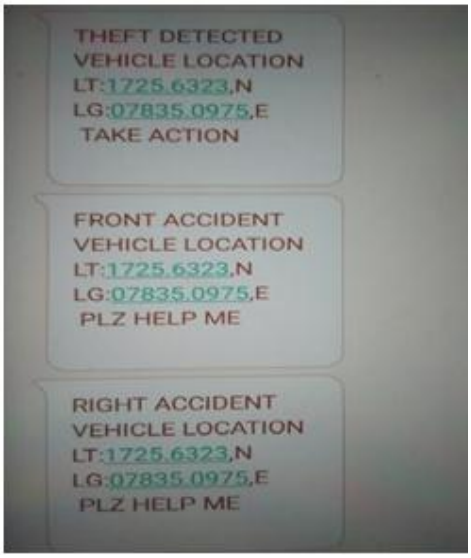

Figure 9: Theft detection Front accident and rightaccident detections

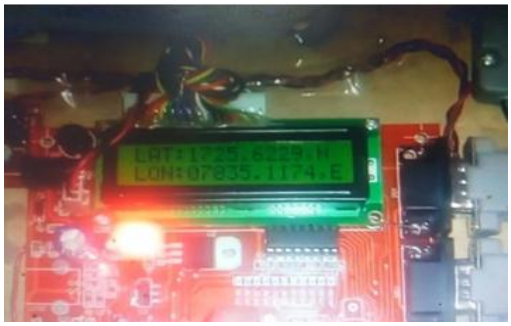

Figure 10: Hard ware design

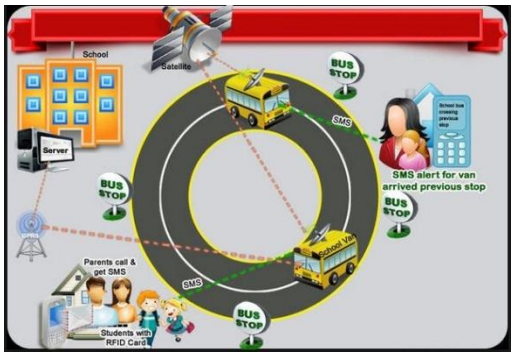

Figure 10.1: Tracking Information

Google Maps is a desktop and mobile web mapping service application and technology provided by Google, offering satellite imagery, street maps, and Street View perspectives, as well as functions such as a route planner for traveling by foot, car, bicycle (beta test), or with public transportation. Also supported are maps embedded on third-party websites via the Google Maps API,[1]and a locator for urban

businesses and other organizations in numerous countries around the world.

Figure 11: Using Google map location tracking

Google Maps satellite images are not updated in real time; however, Google adds data to their Primary Database on a regular basis. Google Earth support states that most of the images are no more than 3 yearsold.

CONCLUSION

Vehicle tracking system makes better fleet management and which in turn brings large profits. Provide scheduling or route planning can enable you handle larger jobs loadswith in a particular time. Vehicle tracking both in case of personal as well as business purpose improves safety and security, communication medium, performance monitoring and increases productivity. So in the coming years, it is going to play a major role in our day to day living. This research paper is to incorporate different types of sensors so that they help in decrease the chances of losing life in such accident which we cannot stop from occurring When ever accident is alerted the paramedics are reached to the particular location to increase the chances of life. This devices invention is much more useful for accident occurred in deserted places and midnights. This vehicle tracking and accident alert feature plays much more important role in day to day life in future

FUTURE SCOPE

Can use the EEPROM to store the previous navigation position up to 256 locations and navigate up to N number of locations by increasing its memory and increases the accuracy up to 3m by increasing the cost of GPS. The systems can be used to detect the explosives also with the help of high sensitivity vibration sensors to detect the accident. Use this system to assist the traffic, by keeping the system in vehicles and by knowing the locations of all the vehicles

ACKNOWLEDGMENT

I have taken offers in this project. The authors would like to thanks however, it would not have been possible without the kind support and help of many individuals and organizations. I would like to extend my sincere thanks to all of them.

REFERENCES

[1] Seokju Lee, Tewolde, G Jaerock Kwon," Design and implementation of vehicle tracking system using GPS/GSM/GPRS technology ad smart phone application", *Internet of things (IoT), 2014 IEEE* world forum on, Vol. No., pp.353 358, 6-8 March2014.

[2] R Ramani, S Valarmathy, N SuthanthiraVanitha, S Selvaraju and M Thiruppathi," Vehicle tarcking and locking system based on GSM andGPS",*I.JIntelligentsystemsandApplications,2013*,09, 86-93.

[3] A l Rashed, M A Omar, O A Singh," A real time GSM/GPS based tracking system based on GSM mobile phone," Future generation communication Technology(FGCT), *2013 second International Conference on*, Vol. No., PP. 65,68,12-14 Nov2013

[4] Bhavana Godavarthi, Paparao Nalajala, Vasavi Ganapuram, "Design and implementation of vehicle navigation system in urban environments using internet of things (IoT)",*International Conference on Advanced Material Technologies (ICAMT)-2016,* India.

[5] Paparao N, G Bhavana," RTOS Based Image Recognition & Location Finder Using GPS, GSM and OpenCV", *International Advanced Research Journal in Science, Engineering and Technology*, Vol.2, No. 12, pp. 85-88,Dec 2015

[6] Tarapiah, S Atalla, S Alsayid,"Smart on board transportation management system Geo- Casting featured", *Computer Application and information system (WCCAIS), 2014 World Congress on*, Vol. No.,pp. 1,6, 17-19 Jan 2014

[7] R Kumar, H Kumar, "Availability and handling of data received through GPS device in tracking vehicle", *Advance Computing Conference(IACC),2014 IEEE International*, Vol., No.,pp.245, 249, 21-22 Feb.2014

[8] Pengfei Zhou, YuanqingZheng, Mo Li,"Predictiing bus arrival time width mobile phone based participatory sensing," *Mobile computing IEEE Transaction on,* Vol.13, No.6,pp.1228.1241 june 2014.

[9] Liu, AnqiZhng, ShaojunLi,"Vehicle anti theft tracking system on internet of things," Vehicular Electronics and safety (ICVES), *2013 IEEE International conference on*, Vol., No., pp.48,52,28-30 July 2013

[10] Hoang Dat Pham, M Chi CuongNguyen,"Development of vehicle tracking system using GPS and GSM modem," *open systems (ICOS), 2013 IEEE,* Vol., no., pp.89, 94, 2-4 Dec.2013

[11] Zhigang Shang, Wenli; He, Chao; Zhou, Xiaofeng; Han, Zhonghua; Peng, Hui; Shi, Haibo, "Advanced vehicle monitoring system based on arcgissilverlight," *Modelling, Identification & Control (ICMIC), 2012Proceedings of International Conference on* , vol., no., pp.832,836, 24-26 June 2014.

[12] Upton, Eben, and Gareth Halfacree. Meet the Raspberry Pi. *Wiley. Com, 2012*

[13] Membrey, Peter, and David Hows. Learn Raspberry Pi with Linux. Apress, First Edition, 2012

[14] Iman M. Almomani, Nour Y. Alkhalil, Enas M. Ahmad, Rani a M. Jodeh "Ubiquitous GPS Vehicle Tracking and Management System", *IEEE Jordan Conference on Applied Electrical Engineering and Computing Technologies (AEECT)* 2011

[15] BhavanaGodavarthi, PaparaoNalajala," Wireless Sensors Based Data Acquisition System using Smart Mobile Application," Internet of things, "*International Journal of Advanced Trends in Computer Science and Engineering*" Vol. 5 No.1, pp. 25-29 Jan 2016

[16] PaparaoNalajala, D Hemanth kumar," Intelligent Detection of Explosives using Wireless Sensor Network and Internet of Things (IOT)", *International Journal of Control Theory and Applications*, Dec 2016, Vol. no.9, IssueNo. 45, pp 391-397