

# Accident Detection and Emergency Rescue Alert System

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## ABSTRACT

Smart Black Box Unit is a device to record driving history which can be used for vehicles (car, truck, and lorry) crash analysis. This device is installed in vehicles to record information related to vehicle crashes or accidents. Smart black box stores engine temperature, obstacle detection, speed of vehicle, brake status, alcohol content, time and date, Global Positioning System(GPS)/Global System for Mobile (GSM) will be used to pinpoint the exact location of the crash and send that data to an emergency rescue authority(such as hospitals, fire department, police). This reduces manpower, time and complexity over traditional system.

**Keywords:** Smart Black Box, Renesas Microcontroller, Rescue Alert System GSM, Smart Phone

## I. INTRODUCTION

Currently traditional method of crash analysis is being used in which cops need to visit accident site and check for signs of accident. Then they need to check for evidences like skid marks, degree of damage, collision part, eye witness etc. Often, there is situation of insufficient evidences and quicker emergency rescue operation will not be there. Sometimes it may also possible that some clues got missed by police. This is very time consuming and complex process.

## II. PROBLEM STATEMENT

### A. Existing System

Various Architectures are proposed for evidence collection of the car like log your car where this device can also help the car owner to claim vehicle insurance from the respective insurance company. In Existing system only the Black Box will be attached to the car to record all the information and this information will be stored in server.

### B. Proposed System

In Proposed system Smart Black Box will be used to collect statistically applicable crash or accident information which could construct clear picture of an accident. This collected information are send to Android mobile phone of police server via **SMTP**, which will reduce time and complexity in police verification and accident analysis process. Emergency alert system will be used to send notifications, so that it will reduce the time it takes for emergency services to arrive at the crash location in the event of an accidents thereby saving life.



Figure 1. Smart Black Box

### III. LITERATURE SURVEY

“Implementation of Car Black Box for Evidence Collection and Accident Locater using Embedded System”

The background of the paper is to develop a prototype of car black box for vehicle diagnosis that can be installed into any vehicle. [1].

“Evidence Collection Car Using Android Phone, application”

The aim of the paper is to collect critical video clips from car black boxes using smart phone.[2].

“Critical Areas Detection and Estimation towards Intersection related Driving Behavior Analysis”

The vision of this paper is Smart phone based interaction related system for driving behavior. [5].

“Research Paper on Airbag Deployment and Accident Detection System”

The aim of the paper is to collect details on accident of automobile emergency alert situation for the economically low cost or old vehicle. [6]

“Tracking and Emergency Detection of Inland Vessel using GPS-GSM System”.

The Background of this paper is Using GPS module, the base station will get the latitude and longitude position notification of the vessel and base station will get the exact location of vessel in the sea. [7].

“Intelligent Accident Detection and Alert System for Emergency Medical Assistance”

The aim of the paper is about the proposed system will check whether an accident has occurred and identify the seriousness of the injury to the accident victim/driver. [11].

“Car Surveillance and Driver Assistance Using Black box with the help of GSM and GPS”.

The Background of this paper is about guiding unit included in the car and the base station is server. The guiding unit consists of a GPS unit and sensor. [12].

“An Embedded System for Traffic Rule Violation and Vehicle Crash Analysis Using Black Box”

The main vision of this paper is When a misadventure is detected via the trigger concerning the breeze portmanteau signal, the wi-fi fuscous box stops the statistics acquisition. [15]

### IV. METHDOLOGY

Many embedded systems have substantially different designs according to their functions and utilities. In this project design, structured modular design concept is adopted and the system is mainly composed of microcontroller, GSM, DCM, accelerometer, GPS, D.C motor, ultrasonic sensor, temperature sensor, dump switch and LCD. The microcontroller located at the centre of the block diagram forms the control unit of the entire project.

Embedded within the microcontroller is a program that helps the microcontroller to take action based on the inputs provided by the output of the sensors. Here accelerometer represents accelerator of a car. An accelerometer generates output voltages against changes in gravitational pull. These output voltages are analogous in nature. Hence the output of accelerometer is given to the ADC unit of the microcontroller. Based on the code embedded within the microcontroller, the D.C motor speed is varied. The D.C motor in the project demo represents a vehicle. As accelerometer is varied the speed of the D.C motor is varied.

To simulate operation of seat belt, slot sensor is utilized in this demo. When anything is placed in slot sensor, it generates a logic 1 signal which is given to

the input pin of the microcontroller. As seen in the block diagram, a temperature sensor is attached to monitor temperature of the engine. This sensor generates an output voltage which is analogous in nature. This is given to the ADC unit of the microcontroller.

Ultrasonic sensor is placed in front of the vehicle. It constantly monitors the distance of the vehicle ahead of it. A toggle switch is used to simulate left and right indication switching of vehicle. LED is used to indicate left and right bulb. So when switch slides to left, LED is ON and when slides to right, LED is ON. All the details from these sensors are sent to Android mobile phone via Bluetooth. In android mobile phone, an application is created for this specific purpose. When vehicle is met with an accident, the camera in the phone captures image of the accident. GPS directly communicates with satellite thereby giving coordinates of the position of accident. These details are sent to Amazon cloud server via e-mail. Android application is created to make the application user interactive. Here LCD is used in the demonstration to display the actions taking place.

### V. SYSTEM ARCHITECTURE

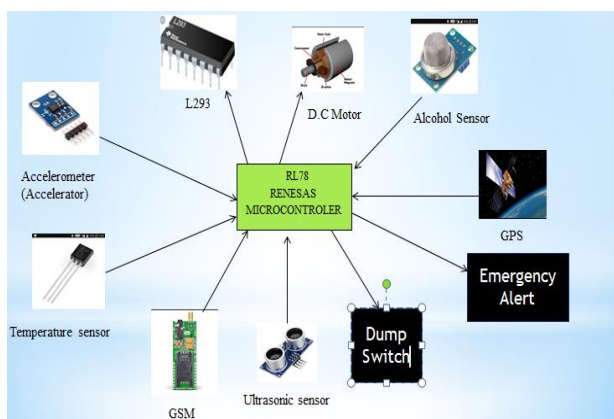


Figure 2. Sensors used in Smart Black Box

### VI. RESULTS AND DISCUSSION

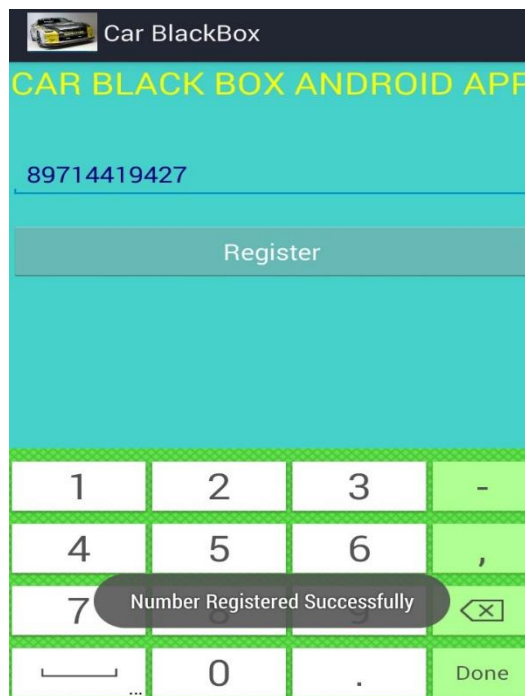


Figure 3. Snapshot for Car Black Box Android App Registration

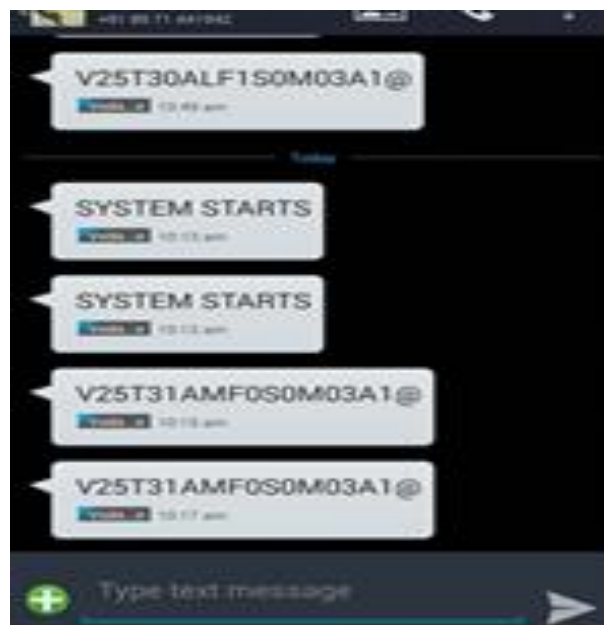
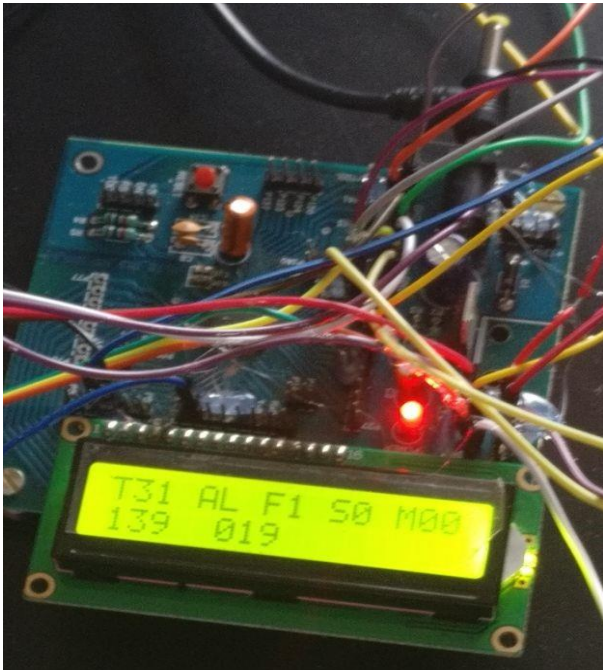
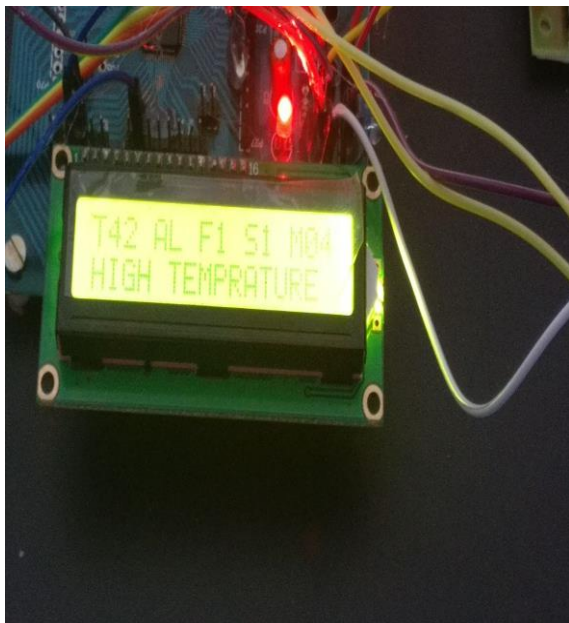


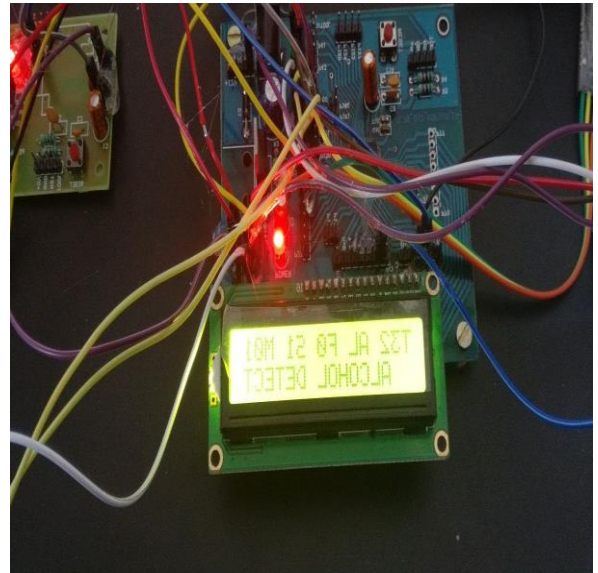
Figure 4. Confirmation Message to Registered Number



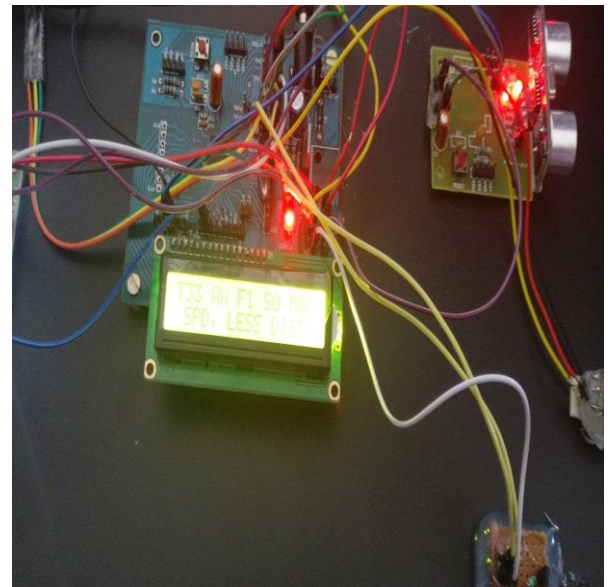
**Figure 5.** Recording the Information such as Speed, Engine Temperature, Presence of the obstacle, Alcohol Content, and Mistakes Done by the Driver



**Figure 6.** LCD Displays High Temperature When it reaches To Threshold Level

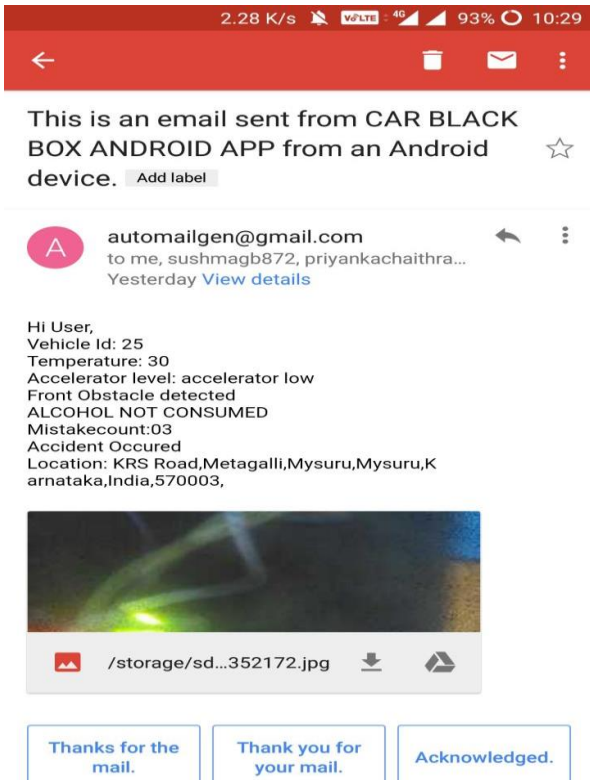


**Figure 7.** System Showing the Presence of Alcohol Content

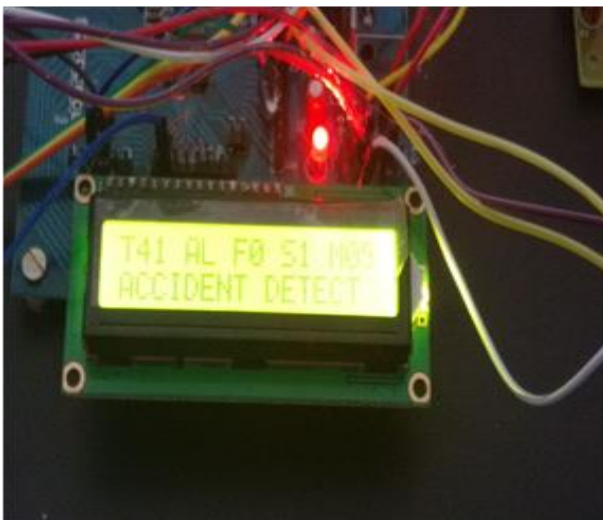


**Figure 8.** LCD Displays Front Obstacle Detection and Guides the Driver for Safe Driving

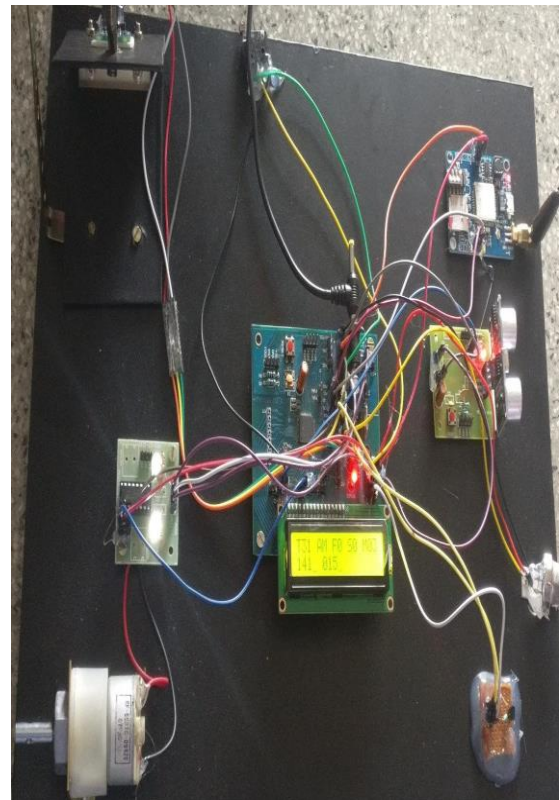




**Figure 9.** E-Mail Received from GSM via SMTP Showing Various Parameters and Exact Location of the Accident



**Figure 10.** Snapshots which are Related to Accidents and Send This Information Along with snaps to Police Server and Emergency Centers



**Figure 11.** Model of the Smart Black Box

## VI. ACKNOWLEDGEMENT



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## VII. CONCLUSION

Smart black box unit controller will be used to receive and transmit the collected evidences data over wireless network by using, GSM transmission which indeed is collected at police database server using SMART BLACK BOX controller and receiver. The collected parameters are vehicle id, speed,

engine temperature and date and time of accidents are collected respectively from the prototype designed. Smart Black Box application aims to help accident investigators and medical insurance company to perceive the cause of the accidents this should help investigator to speed up their investigation process and provide fast results. Helps to alert emergency medical service team to reach at required location in shortest time as it uses the GPS and GSM it can track the current location.

### VIII. REFERENCES

- [1] K. Malathi, S. Ravi Kumar, 2016 "Implementation of Car Black Box for Evidence Collection and Accident Locater using Embeded System".
- [2] Anupama R L, Chaitrashree N, Deepthi T, Manigandan J , May 2017."Evidence Collection Car Using Android Phone, Application".
- [3] Shital V. Vaidya, Prof. P. H. Chandankhede, International Conference On Emerging Trends in Science, Engineering Business and Disaster Management ICBDM 2016, Image Processing and Networking Volume:8Special Issue IV, Feb 2016, ISSN No:0973-2993
- [4] Pravin kumar, V. Anuragh, NLP Raju, "Accelerometer Based Vehicle Monitoring And Tracking System Using GPS", International Journal of Science, Engineering and Advance Technology, IJSEAT, Volume 2, Issue 11, ISSN2321-6905 November-2016.
- [5] Mr. Qianlong Wang, Mr. Yonjiiie Liu, Mr. Jinngen Liu, 2018 "Critical Areas Detection and Estimation towards Intersection related Driving Behavior Analysis".
- [6] Mr. Juber Mohamad, Shaphi Mulla, 2017. "Tracking and Emergency Detection of Inland Vessel using GPS-GSM System".
- [7] Swapna, Mukesh kumar, 2017. "Tracking and Emergency Detection of Inland Vessel using GPS-GSM System".
- [8] Monisha J Prasad, Arundathi S, Nayana Anil, Kariyappa B. S., "Automobile Black Box System For Accident Analysis", International Conference Of Advances In Electronics, Computers and Communications (ICAIECC) 2014.
- [9] Anoop Mathew, Joseph Kuncheria, Yadukrishnan S, Gifty Raju, Haritha Chandrasekhar, "Car Black Box", International Journal of Innovative Science and Modern Engg. (IJISME) ISSN: 2319-6386, Volume-2 Issue-11,October 2014
- [10] Kangsuk Chae, Daihoon Kim, Jaeduck Choi, and Souhwann Jung, "Evidence Collecting System from Car Black Boxes", School of Electronics Engg, Soongshil University, Seoul, Korea 2013.
- [11] Nicky Kattukkaran, Arun George, 2017. "Intelligent Accident Detection and Alert System for Emergency Medical Assistance".
- [12] Rekha S, Hithaishi B, 2017. "Car Surveillance and Driver Assistance Using Black box with the help of GSM and GPS".
- [13] A. Kassem, R. Jabr, G. Salamouni, and Z. K. Maalouf, "Vehicle Black Box System," in System Conference, pp. 1-6, April 2008.
- [14] D. Jiang, and L. Delgrossi, "IEEE 802.11p: Towards an International Standard for Wireless Access in Vehicular Environments" in Vehicular Technology Conference (VTC), pp. 2036-2040, May 2008.
- [15] Reeja S, Mr. Jayaraj V S, 2017. "An Embedded System for Traffic Rule Violation and Vehicle Crash Analysis Using Black Box".
- [16] X. Ni, Z. Yang, X. Bai, A. C. Champion, and D. Xuan, "DiffUser: Differentiated user access control on smartphones" in Mobile Adhoc and Sensor Systems (MASS), pp. 1012-1017, October 2009.
- [17] Olaf Henniger. EVITA: E-Safety Vehicle Intrusion Protected Applications. Technical report, EVITA, 2011.
- [18] Olaf Henniger, Ludovic Apvrille, Andreas Fuchs, Yves Roudier, Alastair Ruddle, and Benjamin Weyl. Security Requirements for Automotive On-board Networks. In Intelligent

- Transport Systems Telecommunications, (ITST), 2009 9th International Conference on, pages 641-646. IEEE, 2009.
- [19] Tobias Hoppe, Sven Kuhlmann, Stefan Kiltz, and Jana Dittmann. IT-forensic automotive investigations on the example of route reconstruction on automotive system and communication data. Lecture Notes in Computer Science(including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), 7612LNCS:125136, 2012.
- [20] David Hynd and Mike McCarthy. Final report: Study on the Benefits Resulting from the Installation of Event Data Recorders.2014.
- [21] Road vehicles - Controller Area Network (CAN) - Part 1: Data link layer and physical signaling. Standard, International Organization for Standardization, February 2013.
- [22] Gavin Lowe. Casper: A compiler for the analysis of security protocols. Journal of computer security, 6(1):53-84, 1998.
- [23] Rainer Makowitz and Christopher Temple. FlexRay- A Communication Network for Automotive Control Systems. In 2006 IEEE International Workshop on Factory Communication Systems, pages 207-212, 2006.
- [24] Chulhwa Hong, Truong Le, Kangsuk Chae, and Souhwan Jung. —Evidence Collection from Car Black Boxes using Smartphone'sl. 2011 IEEE, Annual IEEE Consumer Communications and Networking Conference.
- [25] Liewei Jiang and Chunxuan Yu. —Design and Implementation of Car Black Box Based on Embedded Systeml. 2010 IEEE DOI 10.1109/iCECE.2010.860.
- [26] Kangsuk Chae, Daihoon Kim, Seohyun Jung, Jaeduck Choi, and Souhwan Jung. —Evidence Collecting System from Car Black Boxesl.2010 IEEE.
- [27] Bhalerao Pournima. P\*, Prof. V. B. Baru, —GPS Tracking and Controller for Car Black Box on Fpgal, International Journal of Advanced Research in Computer Science and Software Engineering,2013.
- [28] S. M. Jung and M. S. Lim, “System on Chip Design of Embedded Controller for Car Black Box,” Information Technology Convergence, 2007. ISITC 2007. International Symposium on, Joenju, 2007, pp.217-221.
- [29] C. Patil, Y. Marathe, K. Amoghmath and S. S. David , “Low-Cost Black Box for Cars-India Educators” Conference (TIIEC),2013 Texas Instruments, Bangalore, 2013,pp.49-55.
- [30] C. Hong, T. Le, K. Chae and S.Jung, “Evidence collection from car black boxes using smart phones” Consumer Communications and Networking Conference (CCNC), 2011 IEEE, Las Vegas,NV,2011,PP. 836-837.