Raspberry Pi based Real Time Vehicle Accident Intimation with Alert Message and Image Capture

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Abstract. The tremendous development of Technology and opportunities resulted a sophisticated lifestyle for current generation peoples. A major effect of Technology growth yields to more person’s loss of life due to Traffic Hazards and Accidents occurring on routine basis. This paper suggests an ideal solution to this issue. The prototype uses a device which help us to know whether an Accident has occurred or not when the Car met with an Accident. Whenever an Accident occurs, it intimates to concerned people & Authorities by sending message. The present situation of the person will be captured and an Image will be send through e-mail along with its current Location & Temperature transmitted by e-mail and SMS.

Keywords: Raspberry, Vehicle, Accident, Message, Image

1. Introduction
With the growing population the use of Vehicles has become superfluous and this has led to increase the Traffic hazards, accidents resulting in loss of Life because due to lack of Emergency facilities. The purpose of the paper is to determine the location of vehicle when accident occurs using the prototype placed in the Vehicle and also to send information to people concerned.

![Figure 1 Global status report on Road safety issued by WHO, 2013](image-url)
To reduce the Human Death Ratio in Accidents a prototype model with Wireless Accident detection and alert messaging module in Vehicle which sends the information regarding, where the accident had occurred by using a GPS Module, Image of the person at that situation, Temperature of the vehicle will be send through an E-mail & SMS. Figure 1 displays the global status report on road safety issued by WHO, 2013. Figure 2 displays the global status report on road safety issued by WHO, 2015. Figure 3 displays about global traffic accidents by region issued by WHO, 2016.

2. Literature Survey
During 1969 on the Hanshin expressway a Traffic control system was adopted to maintain a smooth traffic flow and to ensure comfortable, efficient transportation & safety. The developed system has Four Television Cameras at a curved area in expressway where frequent accidents occurs and to experiment whether accidents can be detected using the images obtained from these cameras [1]. Cargo transport vehicles plays a vital role in every Countries supply chain &
economy. A dynamic monitoring system is designed using embedded controllers for achieving real time data acquisition, transmission and analysis [2]. Speed being the vital reason for accidents & the proposed system monitors the speed of the vehicle using GSM technology effectively with send the location of the incident [3]. A new type of automatic alarming device discusses about the detection algorithm for detecting occurrence of an accident. It also elaborates on accident detection and judging the crash types by checking the authenticity of the alert signals [4].

A hardware system was built to monitor the electric vehicle to avoid theft and traffic accidents issues using Internet of Things [5]. A system is developed using Android based application which detects an accident situation and send alert message to the nearest Police station and Hospital. The application is designed to obtain the outward force of the vehicle body. The proposed application hopes to reduce the false alarm rate [6]. The proposed system discusses about the methods to identify whether a person is in drunken state or not using sensor and also to determine the status of a vehicle is met with an accident or not by continuous monitoring to reduce accidents [7].

The current exponential traffic growth becomes the real challenge in real monitoring of vehicles and its safety. Various latest techniques in safety of passenger such as Airbags, ABS, Automatic braking and EBD assist in safety in travel. The proposed system detects and intimates on accident immediately to the emergency services [8, 12]. Accident is detected by Embedded technology using accelerometer sensor and the location of the vehicle is determines by android technology [9]. A low cost system is discussed to detect the crash and intimate the vehicle location to an emergency medical services for reduction in fatalities [10]. Real time monitoring of vehicle is done by the proposed design of Information Collection system. It collects and process the information such as speed, lights and braking system of vehicle [11, 13, 14].

3. Objective
In current scenario, occurrence of road accidents becomes a very normal situation and results in fatalities too. The reason behind it, is the delay in rendering emergency services to the affected and the occurrence of the accident. Initiating a nearest hospital or health services and to the alert to the relatives/friends becomes need of the hour to overcome the issue. The proposed prototype addresses these issues along with sharing the location of accident occurred along with the photo of the current status of the persons affected by the road accident to intended persons through email too.

4. System Design

![Figure 4 Block diagram](image)

Raspberry Pi Zero is the most popular single board Computer consisting of a SD card slot, Video outputs, Audio outputs, HDMI mini slot, USB port, GPIO header. Accelerometer, MPU 6050 used as a sensor for detecting the vibration when accident occurs. Temperature sensor, DS18B20 is used for detecting the Temperature of the vehicle. GPS is used for obtaining the
correct location where the accident had occurred. A Camera is provided for capturing the Image of the Driver at that particular moment. Figure 4 displays the block diagram of the module.

5. Hardware Details
Vehicle Accident Detection & Alert Messaging prototype device fixed in Car and accelerometer works when high of amount of pressure applied if Accident occurs and the prototype assist in determining the Driver’s location. If, the intensity of the accident is less, then the message will not be send. A Temperature Sensor, Camera and GPS works together whenever Vehicle met with accident. The Temperature sensor senses the vehicle temperature during accident and sends a message to the nearest Fire station if the temperature is high. Camera captures the Image of the Driver to determine the status during accident. GPS aids in determine the exact Location of accident occurred. Figure 5 displays the work flow of the prototype model. Figure 6 displays the prototype model.

![Figure 5 Work Flow](image1)

![Figure 6 Prototype model](image2)

6. Results & Discussions
Vehicle Accident Detection & Alert Messaging can overcome the drawbacks of currently
existing system. It is a very useful application which helps to know when a person met with accident. The system implementation focus on accident detection and thereby alerting them by intimating the assigned numbers through messages. Details such as Location, Image of the driver, Temperature of the vehicle will be included in the message, Both E-mail & SMS Will be send at the same time. The system consists of Temperature sensor, GPS, Accelerometer & Camera. GPS captures the Longitudes and Latitudes points of the location and it is sent to through SMS and email. Using Google map, the received longitude and latitude assist in fixing the accident occurred location. Figure 7, Figure 8 & Figure 9 displays the screenshot of SMS sent to Person 1, Person 2 & Person 3 respectively. Figure 10 display the screenshot of email notification sent.

**Figure 7** Screenshot of SMS sent to Person 1

**Figure 8** Screenshot of SMS sent to Person 2
7. Conclusion

Uncertainty exists in future of road safety and it is not same across various countries in globe. Countries should approach towards mature road safety approach for minimizing the deaths in road accidents. Vehicle Accident Detection & Alert Messaging can overcome the drawbacks of currently existing system. It is a very useful application which helps to know when a person met with accident. The system implementation mainly concentrates on accident detection and thereby alerting them by sending messages to the assigned numbers. Details such as Location, Image of the driver and Temperature of the vehicle will be included in the E-mail & SMS. In future enhancement of the prototype, the GPS coordinates of the accident location can be sent to nearest hospital and police station too.

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