# Vehicle Monitoring System using the Internet of Things

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## Abstract:

In this modern and fast moving world, it has become a basic necessity to be constantly aware of youngster`s safety. When youngsters are just eligible to drive, it is important to keep monitoring their driving to where they are going and at what speed. Therefore, parents might put constraints to where they should go and at what speed by notifying them periodically.

In this work, we plan to develop a vehicle event monitoring system using IoT Technologies. Along with tracking of various events related to driving, we would also develop an emergency/panic button and install fire sensor in the car which would send an emergency message to the parent`s mobile number and relevant ERT's during abnormal situation.

## Introduction:

- Car accidents are the leading cause of teenage deaths. Drivers aged between16 to 21 are nearly 9 times more likely to have an accident than middle-aged drivers.
- Project`s primarily purpose is teenager`s safety while driving. She/he should be able to immediately alert the parents and concerned ERT`s by pressing the button when in danger.
- Detection of emergency like fire at early stage and automatic alert should be sent to relevant ERT`s.
- Parents can also ensure their teenager`s safety by putting a restriction on the speed limit and monitor their location with features like geo-fencing.

| Software Requirements | Hardware Requirements |
|---|---|
| Raspbian OS (v Jessie) | Raspberry Pi 3 B |
| Android Studio (v 2.2.3) | Flame/ Fire Sensor |
| Python (v 2.7) | GPS Module |
| Microsoft Visio 2016 | Push Button |
| MySQL | Cooling Fans |
| Google Firebase | Power Bank |
| Twilio | GPS Antenna |
| Latex | LEDs |
| Firtzing | Connecting Wires |

**Table 1:** Software and hardware requirements.

## Project Description:

- Flame sensor, push button and GPS Module are connected to Raspberry pi which is powered through power bank. These will send alert message to parent`s mobile and ERT`s with current location of Raspberry Pi.
- All the data collected from the sensors will be saved and updated regularly in the MySQL database in the Raspberry pi locally. Real time data will also be pushed to Google Firebase every 30 seconds.
- After analytics performed at the Firebase, alert message and relevant information is sent to an Android application.

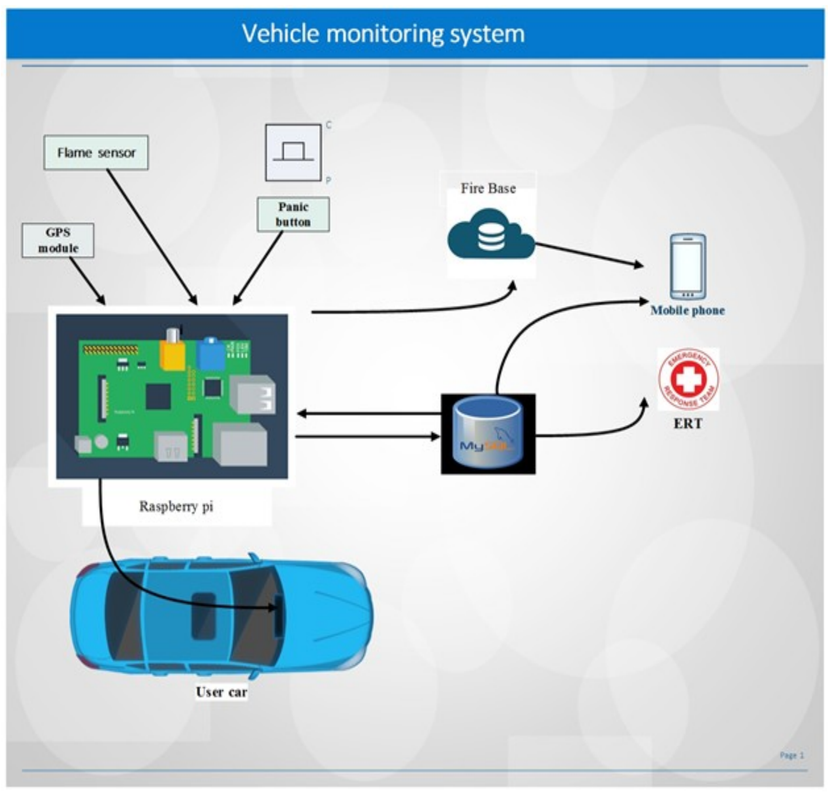


**Figure 1:** Complete Architecture of Project.

## Project Setup and Functionalities :

### Sensing System :

Our IoT system contains the Raspberry Pi. Various devices like Flame sensor, Push Button and GPS module are connected to Pi.

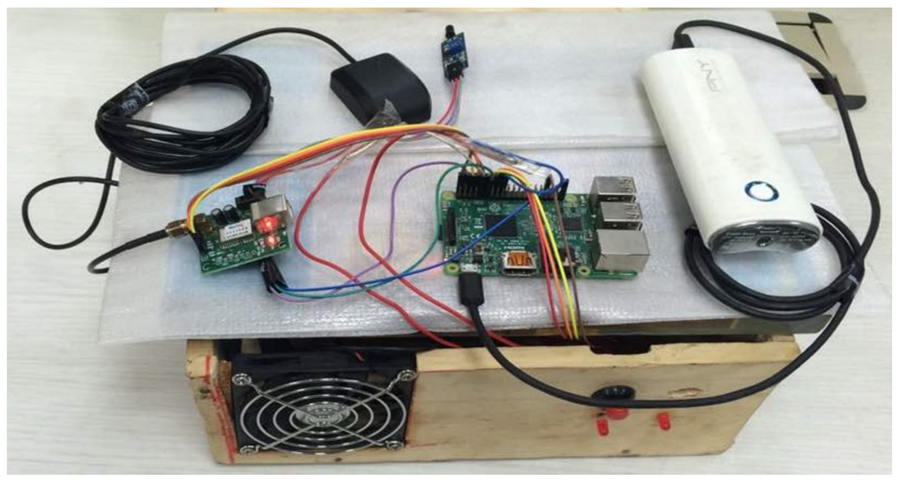

**Figure 2:** Project Hardware Setup.

### Panic Button :

It helps driver to send alert message to parent's mobile device and corresponding ERT`s which will contain car number and current vehicle location in form of URL which will point to the Google Maps showing the vehicle current location.

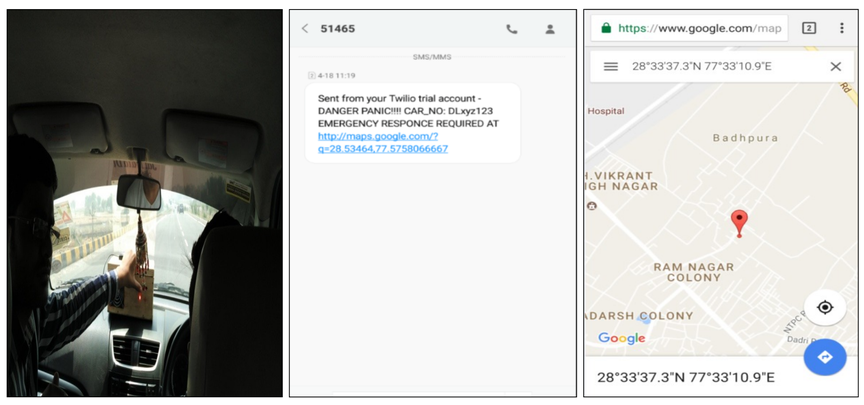


**Figure 3:** Push Button pressed, message alert sent with URL which show location on Google Maps.

### Fire Detection Feature:

It will detect flames near Raspberry Pi at early stage. LED will start blinking, alerting driver to move out of the vehicle. Message alert will be sent on parent's mobile device and ERT (Fire dept.) will contain car number and current vehicle location in form of URL which will point to the Google Maps showing the vehicle current location.

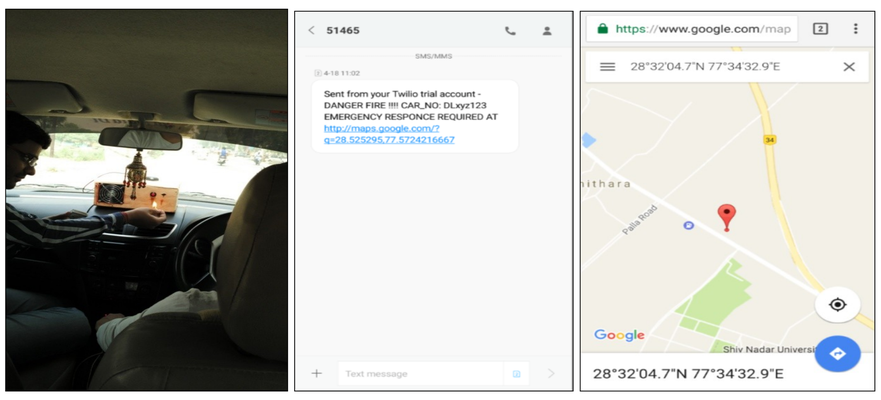


**Figure 4:** Fire tested, message alert sent with URL which show location on Google Maps.

## Parental Control Application Features:

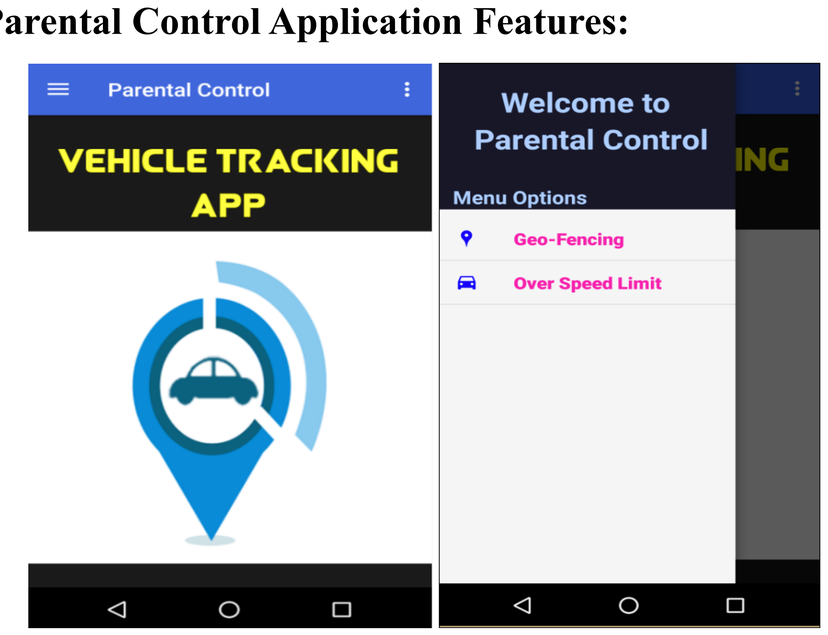


**Figure 5:** First view of the app which has logo, name and navigation bar. It contains two features: Geo-Fencing and Over Speed Limit.

### Geo-Fencing:

Monitoring the location of vehicle by creating a virtual geographic boundary around a particular location. After every 30 seconds, current location of the vehicle will be pushed from Google Firebase in the real time, shown by red marker. In this way it depicts the complete trail of the path taken by vehicle. It enables application to trigger a response when the vehicle leaves/enters the particular area.

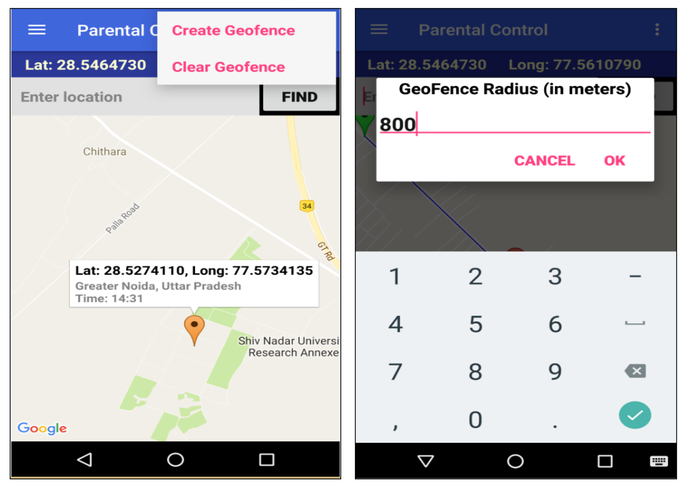


**Figure 6:** Creating the Geo-Fence of 800 meters around the location shown by marker.

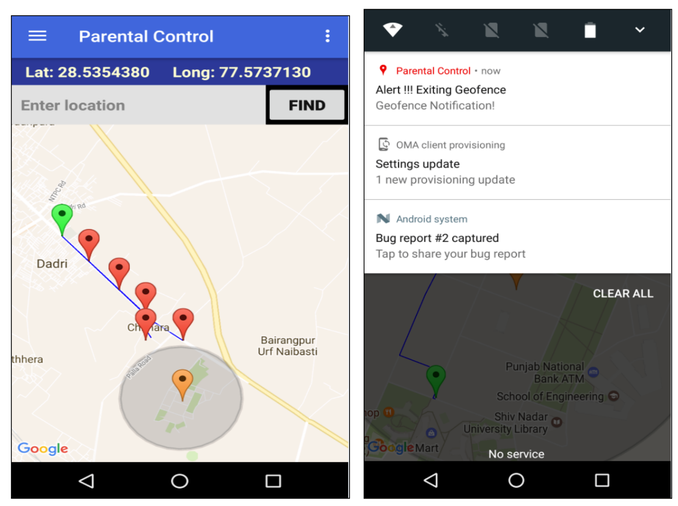


**Figure 7:** Complete trail of path taken by vehicle. Alert message generated when vehicle enters or exits the Geo-fence.

### Over Speed Limit:

We are required to set the permissible speed limit on the vehicle. After every 30 seconds current speed will be shown at the bottom. Message alert will be generated once vehicle crosses this speed.

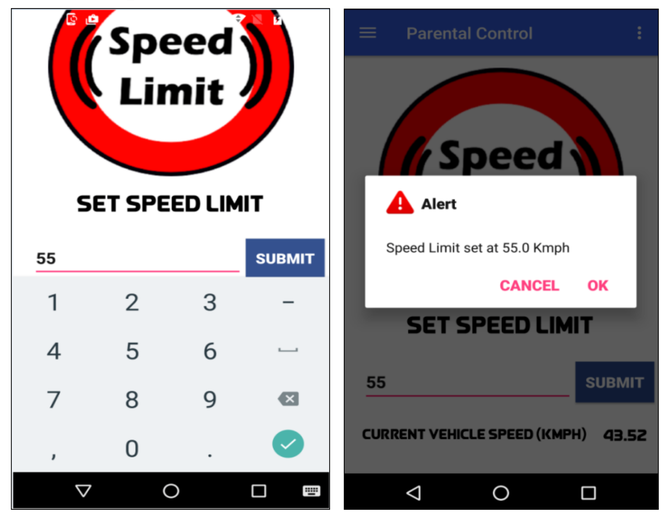


**Figure 8:** Setting the speed limit to 55, alert message will be generated when vehicle crosses the limit.

## Conclusion:

Our team has been successful in implementing features like panic button and fire detection. The team is able to send message alerts with the current location of vehicle. Moreover, the team has been successful in making an android application which has features like Geo-Fencing and over speed limit. The team has also been successful in showing the complete trail of path taken by the vehicle on Google Maps.

## Acknowledgement:

We express our gratitude towards our mentor Dr. Debopam Acharya for constant support and inputs. We are indebted to the whole Computer Science department for providing us valuable feedback.