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Smart Vehicle System for Over-Speeding Detection

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ABSTRACT

All over the world, road accident results in fatalities of 1.3 million a year and in India, it is 11 percent of the global road crashes. In the year 2013, we had about half a million road accidents resulting in 137,572 fatalities and 4,90,000 serious injuries. Most accidents occur due to distracted driving and over speeding. Mostly in highways, many drivers neglect the speed limit and drive with 10-20 KMPH over the speed limit. According to this statistics, 36.8% accidents are due to over speeding. Hence, we are proposing a system in which speed monitoring of every vehicle can be done and reported directly to higher authorities. The system uses the hall-effect sensor to read the current speed of the vehicle and record the speed and coordinates of the vehicle in the database situated in the cloud. The system can then analyze the data to see which vehicles over-speeded at which location at what time and generate the map of the ride where the user can see the over-speeding statistics of the vehicles. Further, the system can be used for two-wheeler vehicles where in cases where parents can track the over-speeding stats of their children.

Keywords: *Over-Speeding, Smart Vehicle System, IoT, Safer Traffic, Android.*

1. INTRODUCTION

In India, National Crime Records Bureau (NCRB) released a report on deaths due to accidents (for the year 2014). According to this report, 50 accidents are happens in India per hour in which 16 people were losing their lives. In 2014, near about 450,898 accidents were reported resulting in 477,731 people with injuries and 141,526 people were lose their lives. According to this report, 2.8% accidents are due to the poor weather conditions, 2.6% are due to the defect in car, 5.3% due to careless driving, 41.5% are due to the diving under alcohol and while 47.9% accidents are due to the over-speeding of vehicle.

The system implemented detects the speeds of individual vehicle and reports to the higher authorities. Such system may help reduce the accidents. Occurring due to over-speeding and may lead to safer traffic.

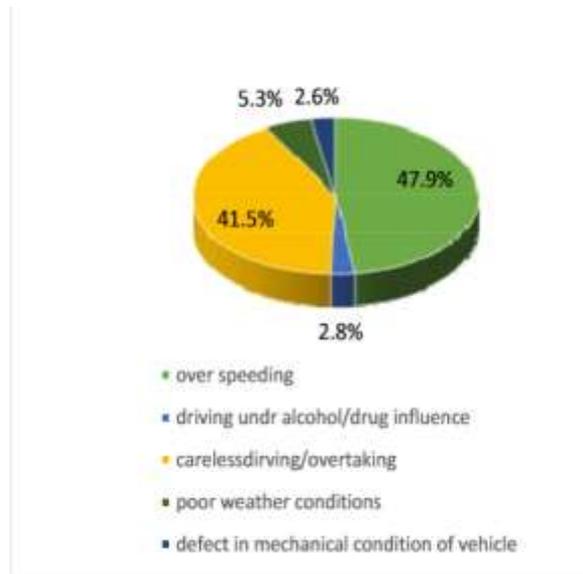


Fig 1: NCRB Report (2014)

The system may be useful for cab aggregators such as Ola and Ubers and other travel companies. And may further if implemented in every vehicle may lead to safer traffic. We would be creating android application which will show the status of the vehicles if the vehicle is over-speeding. The idea is to attach a hall-effect sensor in every vehicle to detect the rpm of the speed and send it to the server. The server can then analysed the speed and coordinates data at the current position.

2. SYSTEM ARCHITECTURE

In this system, we are using the hardware as well as software. We attach the Hall-effect sensor on the wheel of the vehicle. Hall-effect sensor helps to detect the rotation of the wheel of vehicle. One the basis of the rotation, we can easily calculate the speed of the vehicle.

The speed reading is send to raspberry pi. Raspberry pi is connected to server through internet.

The android app is also connected to server through internet due to this whatever operation perform on the speed reading that result will be display on android app. Android app is for the driver and the higher authorities. Following figure 1 shows architectural diagram of the system:

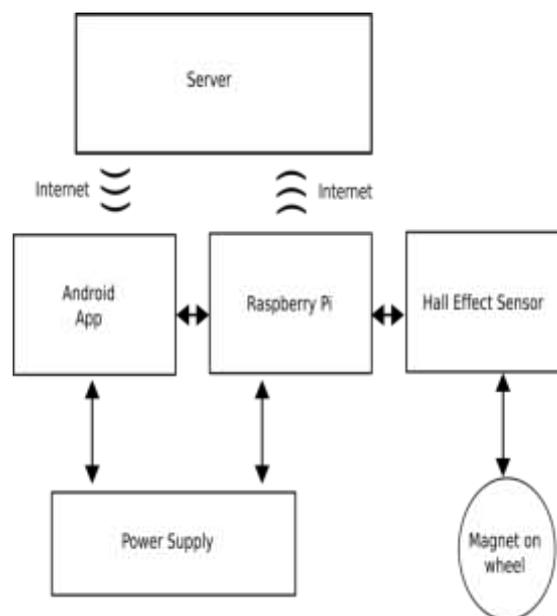


Fig 2: Architecture Diagram of System

The proposed system needs the hardware and software components to implement it. System required software components are as follows:

- A. Django
- B. Android

C. Flask Server



Fig 3: Software

- A. **Django:** Django is a high level python web framework that enables rapid development.
- B. **Android:** Android is a mobile operating system based on the Linux kernel developed by Google for the smartphone and tablets.
- C. **Flask:** Flask is a written in python and it is a micro web framework. Flask is based on the Werkzeug toolkit.

System required hardware components are as follows:

- A. Raspberry Pi
- B. Hall-effect Sensor
- C. GPIO pins



Fig 4: Raspberry Pi

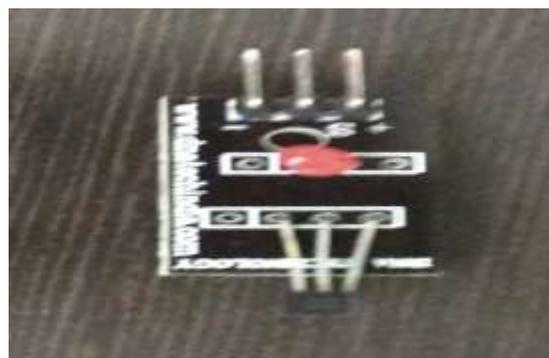


Fig 5: Hall-effect Sensor



Fig 6: GPIO Pins

- A. **Raspberry Pi:** Raspberry Pi is a small and affordable processor that you can use for practical projects and learn programming through fun.
- B. **Hall-effect sensor:** A Hall effect sensor is a transducer which work on the basis of variation in magnetic field strength. It is used for proximity switching, positioning, speed detection.
- C. **GPIO Pins:** GPIO pins are also known as General-purpose input/output (GPIO) is a generic pin which are mounted on an integrated circuit or computer board whose function is to take the input from user and provide the output the user.

3. IMPLEMENTATION

Proposed system consist of one android application and one hall-effect sensor, one raspberry pi. The android application is for the vehicle driver. The data fetches by the hall-effect sensor and then it will send it to the raspberry pi. Raspberry pi will send it to the server through the internet.

One the server the certain operations are going to perform based upon the higher authority. After performing those operations on that data the result will be send to the android application as well as to the dashboard which is for the higher authority. Dashboard also shows the statistics which will be helpful for the higher authority to take the decision. The android application will display all the reading related to the speed of the vehicle and also show whether the vehicle is over-speeded or not. The application also shows that whether the driver is or not.

When the android application is started it will look like this.

Some screenshots of the android application are as follows:

When higher authority wants to add the new driver then firstly they have to register it by filling all the details such as driver name, phone number, vehicle model, vehicle number, password, location. The registration window of the application is look like this

After filling all the details of the driver by the higher authority, driver is able to login to the application using the login id and password.

Once the driver is login to the application, he is able to start the drive. When the driver login then at that time the current speed of the vehicle as well as whether driving of vehicle is safer or not is shown to the driver through the android application.



Fig 7: Driver Registration Window

The window shows the current speed of the vehicle as well as it will display the whether the vehicle is over-speeded or not.

When the driver start the driving of vehicle, then at time the our system start the working.

When the reading from the raspberry pi is start to come to the server then at time server perform the operation on it and send the result android application. The android application window will be look like this after the starting of the driving



Fig 8: Android window before starting the driving

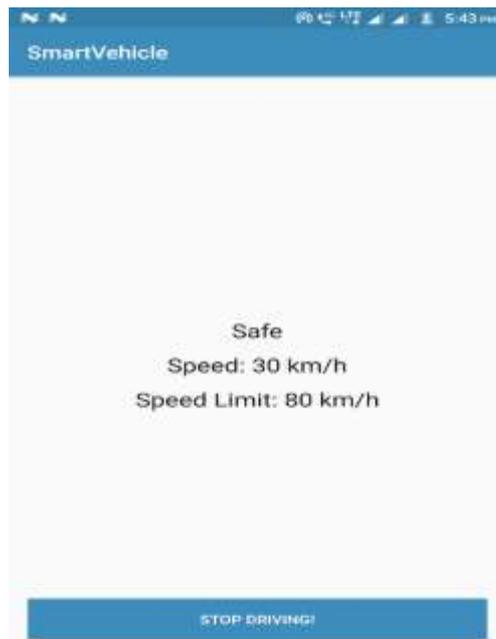


Fig 9: Android window after starting the driving

4. CHOSEN TECHNOLOGY

The technology that we have used for completion of this project are Django to create the dashboard for the higher authority. We are using Android to create an android application. Also we are using Flask server which is light-weight python server. For storing the reading related to the car as well as storing the driver location, driver details into the database we are using the MySQL. MySQL will help to store the data related to driver and the speed of the vehicle into the database.

We are using the raspberry pi processor which is present in the car. We are using the raspberry pi because it is more powerful than the Arduino processor. So if anyone wants to extends the project then he can able to extend it.

5. FUTURE SCOPE

The proposed system in future can be used to reduce the accident. Also it lead to the safer traffic. Proposed system will also help to the parents to track their children and know how they drive the vehicle.

Also this system may be used by the car service provider such as Ola and Uber to make traffic safer and provide better service to their customer.

6. CONCLUSION

Our system will help to monitor and detect the Over-Speeding of vehicle. Further this system may be used when parents want to track how their children drive vehicles. Also this system will help to make traffic safer. This application may be widely used in Android smartphones as they have become common and affordable for all.

7. ACKNOWLEDGEMENT

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