

REAL-TIME SPEED ANALYZER

Under the supervision

of

Ms. Richa Sharma
Assistant Professor
CSE Department
by

Group G37

Vaishali Garg(79)
Kritika Sharma(112)
Kunal Sharma(120)
Urvashi Dhangar(136)

Department of Computer Science & Engineering
Bhagwan Parshuram Institute of Technology
PSP-4, Sec-17, Rohini, Delhi-89

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Chapter 1: Introduction

In recent times, driving has become an important part of our lives. Driving is the controlled operation and movement of a vehicle, including cars, motorcycles, trucks, buses, and bicycles. Permission to drive on public highways is granted based on a set of conditions being met and drivers are required to follow the established traffic laws in the location. The Driving type is classified into two types: aggressive and non-aggressive driving.

Aggressive driving refers to dangerous driving that disregards safety and courtesy. Recently it is a great subject for study and research as it is directly correlated to accidents. It includes excessive speeding, sudden lane changes, and hard breaks.

Speed thrills but kills. If we speed, we will be liable to a hefty amount of Rs.4000 depending on the type of vehicle we are driving[4]. The high-speed limits are often the cause of accidents leading to serious injuries and death. The speed limit should be in control so that we can avoid accidents caused by high-speed driving, pollution, and the high cost of operation and insurance (speed ticket). Hence, it's not surprising to see the authorities' imposing penalties on traffic rule violators, with the severity of the punishment varying as per the nature of the offense. Many drivers exceed the posted speed limits. Sometimes this may be intentional, sometimes it is unintentional.

The old traffic fine for speeding was Rs.400 but as per new traffic rules, the fine for speeding is Rs.1000 for LMV and Rs.2000 for Medium Passenger Vehicle[4]. In order to avoid violation of max speed and speed tickets, we have created an application that addresses the problem of speed detection using the GPS measurements (distance and time elapse) owned by the users/ drivers in the vehicles and will generate voice messages for speed alerts[3].

GPS stands for Global Positioning System. It is basically a radio navigation system that provides the location and time information using the radio waves sent between satellites and receivers. Using this one will be able to receive data from four or more of the 28 satellites in orbit that are dedicated for geolocation use.[8]

Chapter 2: Problem Statement & Feasibility Study

The aim of our project is to predict vehicle speed using mobile phone GPS, and alert users at various speed levels set by them. The alert of the speed limit will be given using a dynamic voice message at a regular interval of time till the user reduces/decreases the speed. The major problem in this approach is that we will be using mobile phone GPS which is less efficient as compared to professional GPS. Apart from this, we will be adding weather conditions and temperature specifications as per the user's current location.

Objectives:

- Using mobile phone GPS for calculation of real-time speed of user's vehicle
- Implementation of audio alert system
- Applying audio alert system in order to inform the user of current speed
- Creating an interface to display speed and weather details to the user
- Creating a user-friendly application

Applications:

- Finds its an application in the virtual driving assistant that helps users to restrict the speed of vehicle hence preventing over-speeding and helping users to avoid speed tickets

Challenges:

- Using mobile phone GPS for real-time speed detection will surely be a challenging task because phone GPS is less efficient
- Implementing dynamic audio alerts
- Improving the efficiency of mobile phone GPS using various ways
- Creating an interface that will display users speed and weather details as for user's current location

Feasibility Study

The major challenges we face when we came across this idea were finding the best suitable way both in terms of efficiency as well as cost efficiency we wanted to include some hardware components like IoT, Arduino, etc but then the factor of cost again came into play, and questions like why would a user use such product if it cost separately when he buys a new car or there exists cars and other vehicles with similar hardware devices then what is the purpose of this project. Basically, what we are trying to do is to make an application that is efficient, user friendly, and also cost-effective, so we started our research into the same.

The basic idea to calculate speed apart from IoT and other devices was to use a front camera(dash cam) present in the car. The idea revolves around the video recorded by the dash Cam, that video is processed in order to compute the speed of the vehicle but the major problem here is the quality of video lightning conditions, high processing time and physical parameters of surrounding may be unknown[1]. If we try to tackle every of the above problem the one major issue still remains is the amount of time required to process the video in order to determine the actual speed in order to tackle this issue we will need a processor that can process the video with the speed of light as processing or video in works dividing the video into frames and comparing the pixels of every frame to eventually calculate the rare time speed again the problem was it was not cost-effective and the efficiency of this was depending on the factors like video quality lightning conditions processing unit used etc.

To counter this problem of processing the video frame by frame and reducing the processing time, we took into consideration another approach which involves extraction of optical flow from the live video from the dash Cam basically optical flow is the pattern of apparent motion of objects, surfaces and is enough visual scene[2], in other words, it can be defined as the distribution of the apparent velocity of movement of brightness pattern in an image, so this process approach helped in improving efficiency as well as worst cost-efficient see, but the problem with this approach was it was depending on the external device that is camera other than users mobile phone. Now our aim was to remove dash Cam from the consideration in simple words using mobile GPS to calculate spherical speed[3]. First of the challenges faced in this approach for mobile phone GPS are creational GPS which have less efficiency than professional GPS[4]. The mobile phone- based GPS measurement displays much less accuracy as compared to professional-grade receivers[4]. To work to overcome this and improve the efficiency of our system we will use filters. This approach is not only simple, cost-efficient and time-efficient but also a good way to make mobile phones self-sufficient devices.

Chapter 3: Hardware and Software Requirements

Hardware Requirements:

- Processor – i3/i5/i7 x64 Bit Minimum 2.
- Hard Disk – 8 GB + at least 2 GB for Relational Database System
- Memory – 2 GB RAM minimum, 4 GB RAM recommended
- Internet Access

Software Requirements:

- Windows 7 above and Preferred, Linux OS, Ubuntu 14.04
- JDK 7 or above
- NetBeans IDE
- Relational Database Server, MYSQL Preferred
- Apache Tomcat Server
- GPS Location Access

Chapter 4: Workload Matrix

Student Name	Role / Responsibility	Time Taken To Achieve The Task Assigned
Kunal Sharma	<ul style="list-style-type: none">• Research• Coding	<ul style="list-style-type: none">• 8 weeks
Kritika Sharma	<ul style="list-style-type: none">• Documentation• Coding	<ul style="list-style-type: none">• 8 weeks
Vaishali	<ul style="list-style-type: none">• Coding• Research	<ul style="list-style-type: none">• 10 weeks
Urvashi Dhangar	<ul style="list-style-type: none">• Coding• Documentation	<ul style="list-style-type: none">• 10 weeks

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