



SMART SPEED MONITORING AND ROAD SAFETY SYSTEM [REPORT]

DEPT. OF ELECTRICAL & COMPUTER
ENGINEERING

CSE 499 A
Section : 08
Faculty : MSK 1
Senior Design Project

Team Light Year
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1. INTRODUCTION AND MOTIVATION

The two student of Ramiz Uddin High School died and some students of the same school were injured badly by road accident. This is not the only the one of its kind of carelessness and reckless driving caused accident in which people are dying. Over 2400 deaths on roads has already happened till December this year which mostly occurred because of the buses and other vehicles violating the laws and restriction like the incident above. Therefore that accident motivated road safety movement started with the students along with people all over the country and that lead us to do something about it and resulted to this project.

The road accidents mainly occurs because of bad conditions, services and violation of the regulations specially speed limit violating and hard brake while over speeding.

To reduce the problem we are going to design and create a complete system which will address the main problems behind those accidents and give us the common peoples (our users the passengers) a common platform to do something about it(By creating peer pressure). Our project contains mainly of two modules:

1. An integrated device (for the vehicles)

- ✓ **ID (Integrated Device):** To be set up in the vehicle to monitor and measure the speed, brake, location and send these real time data to the server.

2. An android application (for users).

- ✓ **MA (Mobile Application):** To give the review about the vehicle to create the peer pressure, real time data extraction and show the data on the application.

Therefore the project's targets are :

- ✓ Design a vehicle speed and brake smart monitoring system
- ✓ To reduce the road accidents
- ✓ Improve the transportation system to decrease life loss
- ✓ Ensure the road safety

2. BACKGROUND RESEARCH AND SIGNIFICANCE

There are a lot of projects work done focusing on road safety, road management and vehicle monitoring .a lot of organization did a lot research on the road safety. We worked on many papers to make an efficient project so; we worked on the draw backs and insufficiency to the satiate the need of the community.

In Netherlands there have a work on 'Intelligent speed adaptation (ISA) and road safety'. They have introduced an ISA system consists of GPS to determine the car's position, a CD-ROM in the car containing information of a road network including the prevailing speed limit of each road section, and feedback to the driver. The main objective of this on which this article is based on, is to provide policy makers with information regarding the potential savings in safety of ISA. This information is important for policy makers in their decision making. The main objective of ISA is to reduce speeding on the whole urban and rural road network and so to reduce speed and speed differences. The ultimate goal is a reduction in the number of road accidents and casualties. . They have mentioned in their studies that, an ISA system consists of a GPS receiver in the car that determines the position of the car on a road network. For ISA the speed limit information of every road section is added to the

road network information. So the in-car system knows its position on the road network and the prevailing speed limit. The driver receives feedback about impending speeding.

There have another work done in India on 'Over speed monitoring system'. The main objective of this article is to manage the overall city traffic with in speed limit and using less man power with auto warning to the driver and take auto action if necessary. This system calculates the speed and GPS coordinates continuously and these GPS coordinates help to find out the area in which the vehicle has been present and the maximum speed allowed in the respective area. The speed and the coordinates of vehicle calculated are continuously stored in a memory card. If the speed of any vehicle exceeds the speed limit, the driver is alerted through a buzzer indicating the same. If the driver still does not drive within the speed limit, an SMS, which contains the vehicle registration number, GPS coordinates at where he exceeded the speed limit, is sent to traffic authorities. Accordingly an over speed ticket can be issued against the same vehicle.

In 2005, ITS Council has published a paper on 'Smart cars on smart roads' to create the revolution in transport system. The ITSS's constitution defines ITS applications as "those systems utilizing synergistic technologies and systems engineering concepts to develop and improve transportation systems of all kinds" Their objective is to create a revolutionary dynamic transportation system, ITSS is adopting several of research and applications. They have provoked intelligent vehicles and roads, intelligent spaces and agent based control, intelligent vehicles and roads intelligent spaces and agent based control.

Bangladesh has high road fatality rate and most of the people lives under poverty. It is hard to

adopt the advancement of the technologies in vehicles to ensure road safety. On the other hand, people are not enough eligible for investing on the intelligent vehicles and to cope with the innovative technologies as well.

Comparing to these projects, our project is bit similar one but we are not only emphasis on speed limit but also measuring the hard brake, real time communication and location tracking through an installed device. In addition, we give more emphasis on android app by which we can track a passenger, get real time information about speed limit, hard braking, driver review, service review etc. One more thing, as we are going to use this device and apps for our country's perspective, so we will try to keep the cost affordable comparing to the existing market devices. Smart speed control and road safety initiative idea has been adopted from the upcoming ITSS researches and projects in the context of Bangladesh and we will keep it cost efficient. It will use GPS for location tracking, GSM module for speed and to communicate as well. Speed controlling device and hard brake monitoring will ensured the better performances. The application will provide the agent based communications and ratings which will help the user to create a peer pressure on services providers. Bangladesh has high road fatality rate and most of the people lives under poverty. It is hard to adopt the advancement of the technologies in vehicles to ensure road safety. On the other hand, people are not enough eligible for investing on the intelligent vehicles and to cope with the innovative technologies as well.

3. METHOD AND DESIGN

The overall view is given bellow and after that the breakdown of the two modules is elaborated.

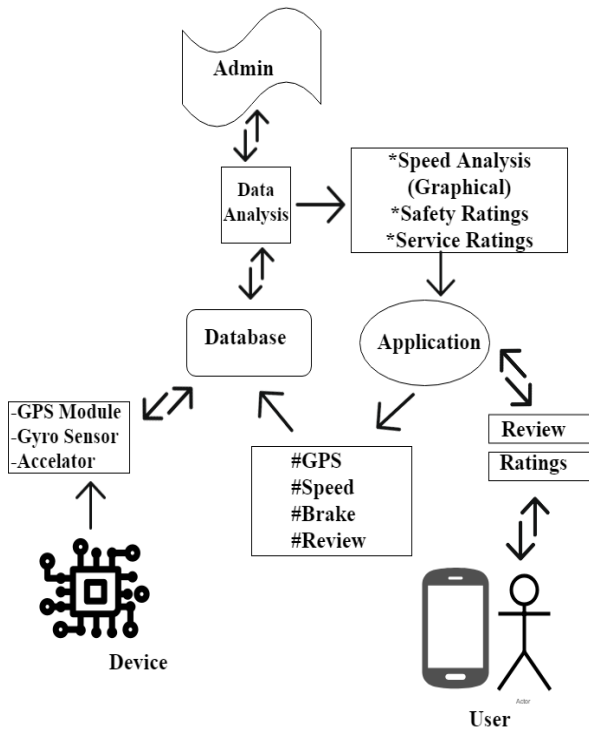


Figure: Block Diagram (Overall Project)

3.1 INTEGRATED DEVICE :

We have to build the physical device and it will include the followings:

- 3.1.1. GPS (Global Positioning System) Module
- 3.1.2. Accelerator sensor (or we can use the one integrated with the vehicle)
- 3.1.3. Gyroscope Sensor (Pressure sensor)
- 3.1.4. Arduino UNO (Data extraction)

To extract data from device there will be a microcontroller or other necessary system based work.

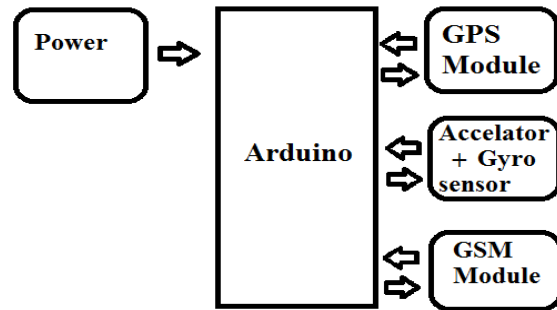


Figure: Block diagram (Device)

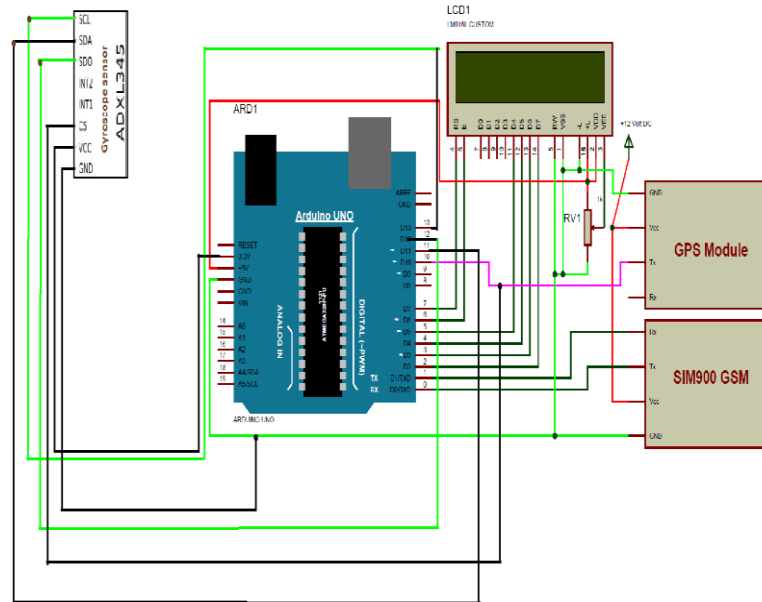


Figure: Circuit Diagram (Device)

3.1.1. GPS (Global Positioning System) Module

The Global Positioning System (GPS) is a network of about 30 satellites orbiting the Earth at an altitude of 20,000 km. Once it has information on how far away at least three satellites are, your GPS receiver can pinpoint your location using a process called trilateration

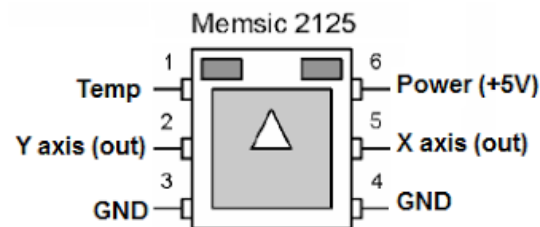
- To track vehicle in real time
- Real time location tracking

Alternative implementation:

There is no other circuit or module that is alternative of GPS.

3.1.2. Accelerator sensor (or we can use the one integrated with the vehicle)

An instrument for measuring the acceleration of a moving or vibrating body.



Alternative implementation:

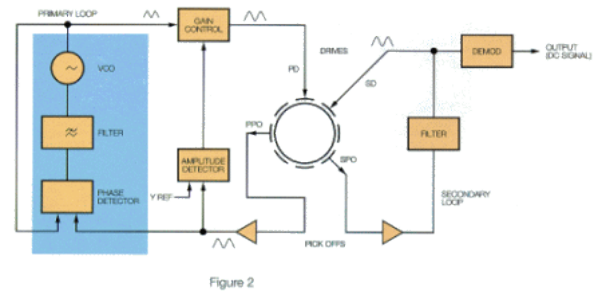
The alternative implementation of accelerometer is piezo sensor. But as Bangladesh is not as developed as other developed countries, the availability of piezo sensor is less and it would be very expensive. So to make the device cost efficient we prefer to use accelerometer.

3.1.3. Gyroscope Sensor (Pressure sensor) :

The vibration gyro sensors sense angular velocity from the coriolis force applied to a vibrating object. The motion of a pair of sensing arms

produces a potential difference from which angular velocity is sensed. The angular velocity is converted to, and output as, an electrical signal.

- To measure speed and acceleration



Alternative implementation:

The alternative implementation of gyroscope sensor is speedometer. Gyroscope sensor is more accurate and it would also give the value of angular movement and with the help of accelerometer it will also monitor the braking system. Moreover it is cost efficient and available in Bangladesh.

3.1.4. Arduino UNO (Data extraction) :

The Arduino UNO is an open-source microcontroller board. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and is programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable.

Alternative implementation:

There is a lot of other micro controller module available as alternative of Arduino. Among them raspberry pi is one of them. But arduino is preferable because it is cost efficient and it does not need high voltage. It can work in milli-volts. Whereas raspberry pi cost double and it uses linux operating which is more complex.

3.2 ANDROID APPLICATION :

For the android mobile device and it will include the followings specifications and steps:

Platform / OS: Android Operating system (For mobile devices) and Windows 7 to 10 (For PC's in BLUE STACK).

Target API Level: API 16 Android 4.1 [Jelly Bean]

(By targeting API level 16 and later this app will run on approximately 99.6% of android devices. Statistics by: Google Android Platform/API Version Distribution, December, 2018)

Development Environment (Tool): Android Studio.

Development Language: Java SE (Standard Edition).

Design Language: Extensible Markup Language (XML).

Simulator: Android virtual device (AVD).

Database: MySQL / Firebase.

GPS: API for Google's GPS.

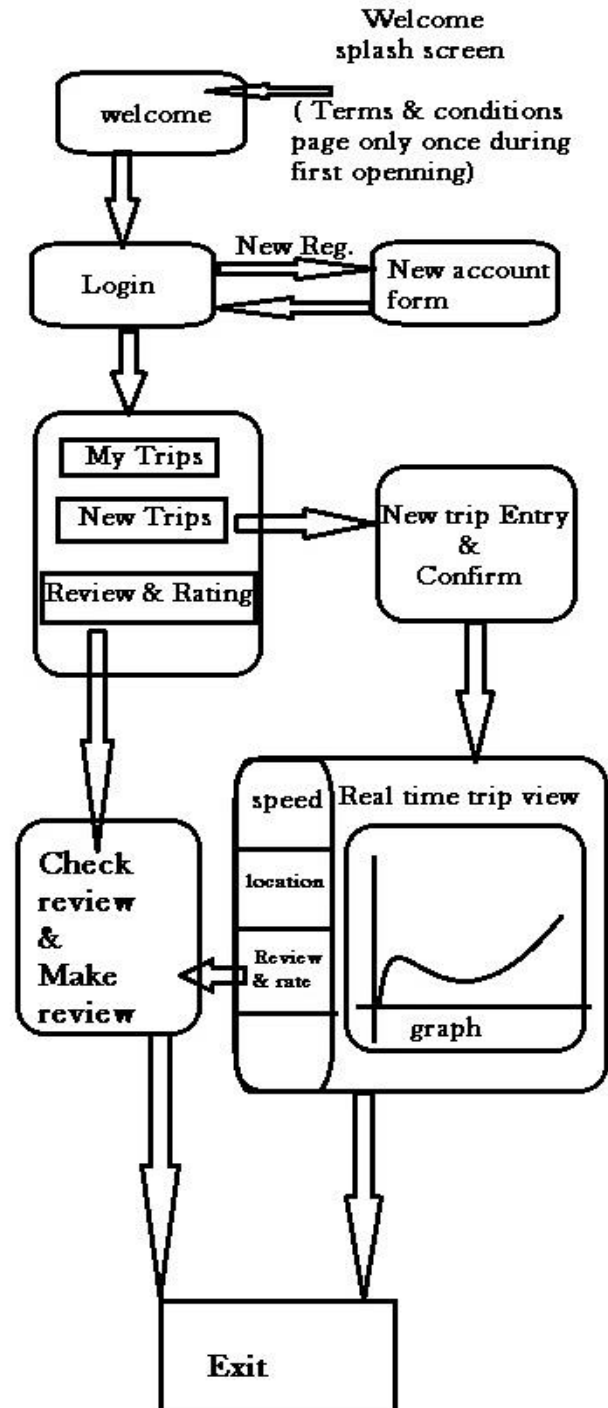
Number of Activity in App: 7 to 10 (With a splash screen).

App Size (Approximate): 5 to 10 MB

Alternative Implementation:

There is no exact alternative of our proposed application in a whole. But partially to see real time speed of a vehicle by the rider/driver/owner is available.

As for the “**Development Language**” of the app there are two main alternatives other than “java”; kotlin and C++. Among them the reason to choose only java is because kotlin is still not very mature as java and C++ is mainly used as support library which we don't have any need in this project.



4. REFERENCES

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