

**ITRAFFIC**  
**SMART TRAFFIC IDENTIFYING SYSTEM**

Project Id - 19-127

Project Proposal Report

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**12<sup>th</sup> March 2019**

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**SMART TRAFFIC IDENTIFYING SYSTEM**

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(Project Proposal Report submitted in partial fulfillment of the requirement for the Degree of Bachelor of Science special (hons) in Information Technology)

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**March 2019**

## Declaration

We declare that this is our own work and this proposal does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of our knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgment is made in the text.

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The supervisor/s should certify the proposal report with the following declaration.

The above candidates are carrying out research for the undergraduate Dissertation under my supervision.

Signature of the supervisor

Date

## **Abstract**

Traffic congestion is a huge problem that face by the people in developing countries. It differs in the degree and varies from place to place according to the population and the infrastructure of that country. In Sri Lanka internet usage has grown at a significant rate. Also lots of people's internet visits happen via mobile device.

As a solution for the traffic congestion application proposed to use Global Positioning System (GPS) technology to track the places where traffic jams are placed. Also we are going to create a mobile application and via this we can give accurate information to drivers about the traffic ahead on their way. Then they can get rid of the traffic congestion and reach their destinations without facing any trouble. Also by using this application we can get to know if a user met with an accident. So in that case service provider gets immediate actions to solve that issue. This application identifies accident by using machine learning techniques. The device used by the driver must be switched on in every time and all sounds will be recorded using the microphone. Noisy sounds will be removed by using audio processing.

This proposed application is given with the aim of reducing traffic congestion on developing countries.

**Key Words:** Global Positioning System (GPS), Machine Learning, Audio Processing

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# 1. INTRODUCTION

## 1.1 Background

The rapid growth of vehicle ownership is one of the main key feature to identify the economic growth of a country. But on the other hand is an indirect effect of the traffic congestion. In day to day life everyone goal is to reach their destination without wasting their time and money. But in current infrastructure provided resources are limited. Even though the current traffic light systems control the traffic at intersections, many times it occurs congestion or accidents due to its poor performance.

According to the motor traffic department of Sri Lanka it shows that there is an increase of vehicle population in last 8 years.

CLASS OF VEHICLE	2008	2009	2010	2011	2012	2013	2014	2015	2016
MOTOR CARS	381,448	387,210	410,282	468,168	499,714	528,094	566,874	672,502	675,982
MOTOR TRICYCLES	406,531	443,895	529,543	667,969	766,784	850,457	929,495	1,059,042	1,062,447
MOTOR CYCLES	1,760,600	1,896,021	2,100,832	2,354,163	2,546,447	2,715,727	2,988,612	3,359,501	3,381,726
BUSES	81,050	81,789	84,280	88,528	91,623	93,428	97,279	101,419	101,655
DUAL PURPOSE VEHICLES	196,236	197,516	209,228	242,746	280,143	304,746	325,545	365,001	366,831
MOTOR LORRIES	263,407	271,230	282,033	294,479	304,924	309,449	313,300	318,656	319,001
PRIME MOVERS	2,842	3,025	3,318	3,891	4,174	4,313	4,483	4,799	4,818
LORRY TRAILERS	6,150	6,260	6,552	7,047	7,346	7,495	7,658	7,868	7,877
LORRY OTHERS	1,887	1,910	2,299	3,523	4,666	5,422	6,230	7,444	7,515
AMBULANCES	2,019	2,090	2,143	2,201	2,267	2,559	2,670	2,702	2,706
HEARSEs	317	332	347	369	399	410	428	442	442
L.V.TRACTORS	244,990	258,755	276,039	296,112	314,562	325,334	332,404	342,381	343,263
N.A. TRACTORS	693	879	958	958	958	958	958	958	958
L.V.TRAILERS	42,823	44,156	46,457	49,578	53,020	55,286	57,298	59,426	59,721
TOTAL	3,390,993	3,595,068	3,954,311	4,479,732	4,877,027	5,203,678	5,633,234	6,302,141	6,334,942

Figure 1.1: Vehicle Population[1]

As the number of vehicles on the roads is rapidly increasing and it takes longer to reach one's destination. Because of that Sri Lankan's spend more time on the roads, paying more for fuel.

So we need an ultimate solution to reduce this traffic issue. It requires a smart mechanism that deals with the problem with the current traffic controlling system.

## **1.2 Literature Review**

There are some Literature survey on existing applications and systems with nearly capabilities and functionalities prior to the proposal our research project. Some of the eminent researchers are reviewed here.

### **A. Automatic vehicle accident detection and messaging system using GSM and GPS modem**

In this research paper they have described the way in which a traffic accident is diagnosed and how people are informed about the crash. They use the accelerometer as a car alarm application. Using that application System can detect danger drivers. And also they use as a rollover or a crash detector of a vehicle after an accident. The server identifies an accident using accelerometer signals. If vehicle met with an accident vibration sensors detect the signal and Micro electro mechanical system [MEM] will detect that vehicle rolls over or not. Then send a signal to ARM Controller. Using GSM Modem Microcontroller sends alerts about location to police, and rescue team. Once the message is received, a police vehicle can reach that location if there is a minor accident, the driver informs all relevant sections that the driver will not be in danger. So they can avoid wasting time. Their main technical components are Vibration sensors, Micro Electro Mechanical System (MEMS) accelerometer. In the future, they will use a Wi-Fi webcam based on the need to improve this system.[2]

### **B. GPS and Map Matching Based Vehicle Accident detecting System**

In this research paper they have described how to diagnose a traffic accident based on GPS technology and how people are informed about that accident. They mainly focus about Speed, time and direction. Many lives could have been spared if emergency services could receive accident information timely. In here they use map matching algorithm and vehicle speed data and send accident location to an Alert service Center. The system gets speed and position in every 0.1s. Using above data map matching algorithm find if the vehicle is on the road. Every 01.s system compares previous speed and current speed using microcontroller unit. Once the speed falling down safe calculated speed system will identify it is accident situation. And also system checks if the vehicle is one the road using a map matching



algorithm. From this way they can reduce generate wrong information. They send accident information using GSM networks to other parties. [3]

### **C. Accident detecting system using smart phones**

In this research paper they have described how to diagnose a traffic accident based on heart beat sensor base mobile phone technology. Once accident happened heart beat sensor measures him/her heart beat rate. Then after system will filter background noise and identify only sound of pulse. The microphone would need to be held near to the heart or somewhere and process audio signal. After counting the time between each pulse to get the pulse rate. Normal person's heartbeat rate is 60 to 100 beats per minute (BPM). If there are any variations from normal heart beat system will identify that may be an accident or not. If not system prompted to respond by touch or voice. If the driver doesn't response, system will generate SMS and send that message Emergency Service. [4]

### **D. GSM/GPS Assisted Road and Traffic Congestion Detection System**

With this system users can know the traffic condition on the road using GPS and GSM. So users can use alternative routes as well. So the speed sensor of vehicle a controller can get the current speed of the vehicle. When that speed falls below a present threshold the controller is informed the vehicle location. When such a vehicle speed decreasing happens in few vehicles white's locations are contiguous each other the controller identifies there is a traffic grid lock in that location. So then controller informs other users about the grid lock. Then they can use alternative routes to save their times. [5]

### **E. Detection of traffic congestion and incidents from GPS trace analysis.**

This research paper contains detecting traffic congestions and incident from GPS data. They get those GPS data using GPS trackers or drivers smartphones. They manipulate the GPS and place in the road map. They assign this system to each road segment of the map and a traffic state based on the speeds of the vehicle, it sends to the users traffic alert based on the classified segments. Their traffic alert contains the affected area, a traffic state. They give example for traffic state. eg: Incident, slowed

traffic, blocked traffic and they give estimated velocity of vehicles in the area for users alerts. They said this proposed system is give valuable support in traffic management for municipalities and citizens. They said their very important for urban and non-urban areas. Their experimental analysis was performed using a combination of simulated GPS data and real GPS data from city. Their result of the incident detection rate 91.6% and an average detection time lower them 7 mins.[6]

#### **F. Algorithm for detection of Hot Spots of traffic through analysis of GPS data.**

This paper contains the traffic congestions and they said the traffic congestion is one of the major problem in various transportation systems, Also they said traffic will arise immediately when special or sudden incident or special events. They said special locations and road incidents increase traffic congestion. GPS data provides sufficient information for identifying general traffic patterns. Patterns will be average speed on specific road, abnormal behavior change directions. GPS has become a more reliable, accurate economically feasible and most recent positioning technology to be used for travel time data collections. Their research aim to identify the special location of the city. They said special locations or those area of the city which are always congested and where the flow of traffic is slow or that traffic is moving very slowly or vehicles are completely stopped.[7]

#### **H. Traffic congestion detection based on GPS floating car data.**

They said congestion has been a major challenge to the urban traffic system. They used GPS floating car data (FCD) method to detect traffic congestion information is studied. They used data for experimentation. This data extract from traffic congestion information of a big city in China. They extract that thing through GPS data processing, map matching travel speed estimation and after that they show all those details inside the map. They said the GPS floating car technology to collect traffic information becomes more cost effective to collect traffic information in a large scale. They said compared with the traditional fixed detection devices such as (inductive loops, video cameras and radar based sensors) floating car data technique can collect traffic information more accurate and wider in real time. They said that they consider using GPS floating car data to detect traffic congestion information.[8]

## **I. Performance analysis of data encryption algorithms.**

The main goal of any design data encryption algorithm is to protect the data from unauthorized people. When using this data encryption algorithms to practical applications, mainly we have to concern in performance and speed wise. In this research paper they provide a comparison between most commonly used algorithms. They are DES (Data Encryption Standard), 3DES (Triple DES), BLOWFISH and AES (Rijndael). In this research paper the comparison has been conducted through these algorithms by running in several processes in various sizes of data blocks. Then they evaluate the speed of data encryption and decryption. Also, these algorithms running through in different software and hardware platforms. So they conclude the research paper by mentioning BLOWFISH is the best performing algorithm among other algorithms that used to do comparing. It concerns security against unauthorized attacks and the speed to data encryption.[9]

## **J. DES, AES and Blowfish: Symmetric Key Cryptography Algorithms Simulation Based Performance Analysis**

Security is the most challenging problem in the network applications. In this paper provides a comparison between DES, AES and Blowfish algorithms. It mainly concern about the behavior and the performance of the algorithm with different data loads are used. The comparison is made on the basis of these parameters. They are speed, block size and the key size. Simulation program is implemented by using Java.[10]

## **1.3 Research Gap & Research Problem**

### **1.3.1 Research Gap**

Although accidents are a common occurrence in roads, a proper detection, identification and notification capabilities are lacking in most of the existing road based solutions as elaborated in the literature. The proposed iTraffic is a solution which enhances the user experience in road navigation covering some of the important factors in traffic creation such as number of vehicles, accidents, emergency environment.

Even though there are existing proposed applications available, they do not address most of the problems that the proposed system is going to address. Proposed mobile application consists of many features as a solution for the main issues people faced in day to day life due to traffic congestion.

- Register all users.
- Indicate the movement of the vehicles on the map.
- When a user met with an accident give a voice and text messages to emergency numbers provided by the user in the registering process.
- If the user in traffic in a public transportation service we show them the nearest taxi they have to reach their destinations by using alternative roads.

Features	Pick me	Google map	Proposed App
Registering users	✓	✗	✓
Show all the alternative roads to users.	✗	✓	✓
Indicate the movement of the vehicle in the map.	✗	✗	✓
Ahead traffic situation	✗	✓	✓
Search friends location,	✗	✗	✓
Send alerts to emergency numbers when a user met with an accident.	✗	✗	✓
Send alerts to the drivers who use the same road that accident happened	✗	✗	✓
Send alerts to the drivers who are in ahead when an emergency vehicle coming in their road.	✗	✗	✓
Ahead weather forecast	✗	✗	✓

Table 1.1 - Comparing existing application and our application features

### **1.3.2 Research Problem**

Day to day busy lifestyle people use their private vehicles to do their works. So that private vehicles usage gets increased. According to that, traffic is also getting increased. Drivers are going their way but they don't know whether the traffic congestion is available or not. So that traffic jams can be seen around main junctions in Colombo area. As a 3<sup>rd</sup> world developing country this will be a big issue.

Even though the current traffic light system controls the traffic at intersections, many times it occurs congestion or accidents due to its poor performance. If the driver is aware that there is traffic congestion ahead of him, he will use alternate roads to avoid it. But there is no accurate way to get these details for a driver.

Also, when a vehicle met with an accident, there is no application to detect it. If drivers get to know there is an accident happened on their way they can rid of that road. so that it will not make traffic congestion.

## **2.0 OBJECTIVES**

### **2.1 Main Objectives**

#### **1. Introduce a mobile application to minimize traffic congestion.**

The proposed applications identify the traffic situation ahead of the user and suggest alternative roads that can be used for to get rid of the traffic to reach their destination.

#### **2. Prediction of the likelihood of the occurrence of an accident**

When a user met with an accident, service provider will send a voice and text messages to to the emergency numbers that user provide. Also alerts will be sent to the nearest police station and the hospital. So that they can get immediate actions to recover the person who met with an accident.

### **2.2 Specific objectives**

#### **1. Real-time and accurate traffic visualization**

In the mobile application users can get their location and the service provider will show ahead traffic situation. The details on the map are very accurate because the map is updated in every 0.5 seconds. So every small movement of a vehicle can be detected and map will be updated according to that.

#### **2. Development of mobile application facilitating crowdsourcing**

As the application is going to use GPS technology to trace the location we can get accurate details of users. So registered people can search their friends' location by using this application. As it is a privacy information service provider will ask permission from the user before showing the location searcher.

#### **3. Alternate path suggestion based on weather and traffic data**

People who are using this application will mention the place that they want to travel. So service provider will give ahead weather conditions to them by analyzing the road they are use reach their destination.

#### **4. Implementation of lightweight security algorithm for data protection**

In the proposed application people have to be registered before using application. So the data given by them will be stored in the database. Also service provider keeps location details of the users, so we have to keep that data in a secure way. For that secure data transmission algorithm are used to encrypt the data. Because of that outsiders can't access the database.



### 3. METHODOLOGY

This section includes detailed descriptions about the techniques and mechanism employed to make “ittraffic” a reality. The descriptions include how software implementation of our project is carried out, what are the materials and data needed, and how they will be collected. It also includes time frames and schedules that are required in achieving its objectives. In addition to them, the research areas that we have identified to carry out this project are explained rationally.

#### 3.1 System Overview

The proposed system consists of a mobile application mostly focused on normal drivers ,passengers , Emergency vehicle drivers , policemen and etc. And this application will helpful to reach destination safely and quickly. Our mobile application can interact with drivers who like to reach their destination more efficiently and safely.



Figure 3.1-System Overview

## 3.2 Functionality of the project Main Components

### 3.2.1 Vehicle detection and informing process.

#### (i) Register

Initially, GPS tracker is installed in every vehicle and vehicles are registered with vehicle registration number, vehicle type and other details. When a user installs the mobile application user needs to register by adding NIC, Name, Phone number and other necessary details.

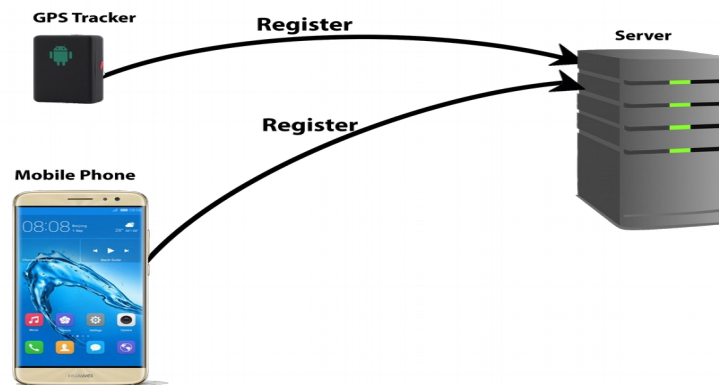


Figure 3.2-Registration Process

#### (ii) Show vehicle on the map

As GPS trackers are installed on every vehicle GPS data sent to the server. Then the server will be sending location details if vehicles upon user requests. And the user can see vehicle locations on the map.

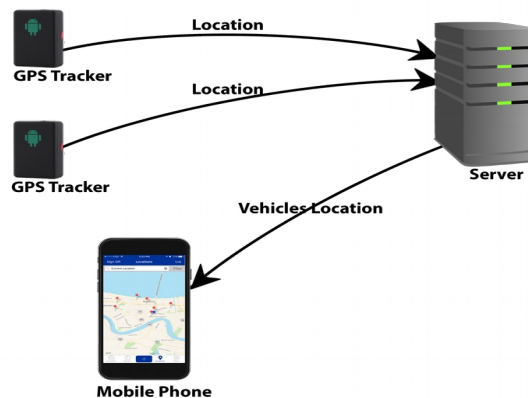


Figure 3.3 - Map Updating Process

### (iii) Show ambulance and emergency vehicle

When an emergency vehicle is going on the road the system analyzes the GPS data and send a voice message to the vehicles on the of emergency vehicle. So that the drivers will know that an emergency vehicle is approaching and they can give the way for it.



Figure 3.4 - Emergency vehicle identification

### (iv) Trace vehicle

Here are assuming that all the vehicles have are trackers installed. If a user wants to know and or follow a friend on the map user can send a request to that person. Then if the person accepts the request the user will be able to see the friend on the map and follow his/her path.



Figure 3.5 - Establish communication between two vehicle

**(v) Travel as fast as possible**

- **For passengers :**

When a passenger is waiting for a vehicle if there is traffic on the road the user will get a suggestion showing the best route and the best transport method. If there is a taxi around the user will be able to send request to a taxi driver which is not currently having a passenger. Then taxi driver will see the request with the location and details. So the driver and user can communicate and full fill their needs.

- **For user who drives vehicle :**

If the user is driving a vehicle and has the mobile app installed, he/she will be getting a suggestion showing the best route to go by avoiding traffic and considering the distance between user's location and the destination.

We are hoping to use A\* algorithm as our shortest path finding algorithm. A\* search algorithm is one of the best and popular algorithm which is use in path finding and graph traversals. This algorithm used for increase efficiency of finding shortest path in web based map and games.

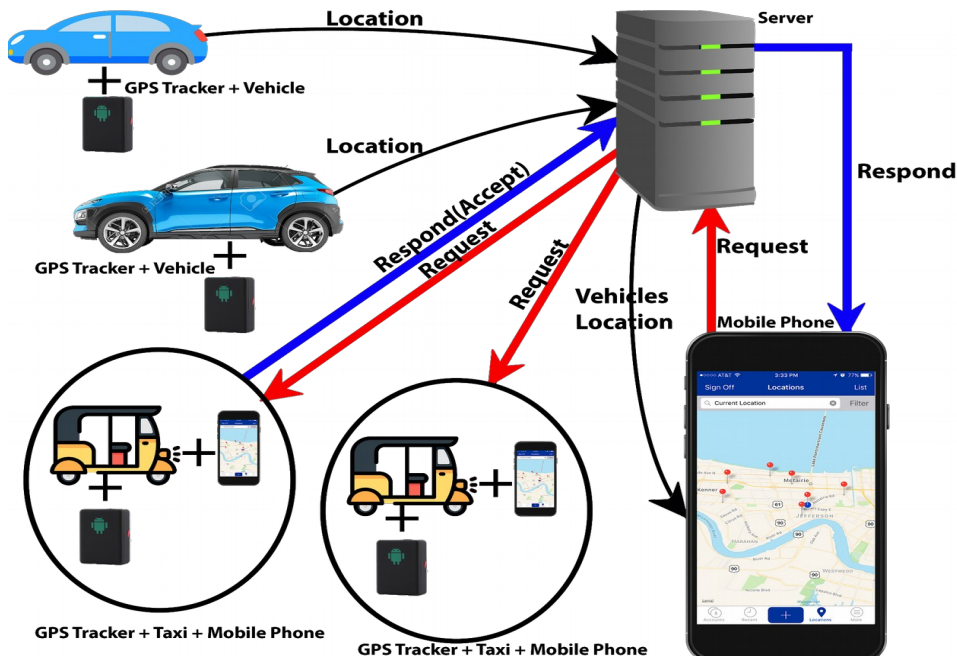


Figure 3.6 - Taxi and public Transportation management

#### (vi) Weather forecast

The users who have installed the mobile app will get alerts about the weather condition of the road ahead of them to acknowledge them to prevent accident due to bad weather conditions.

Technologies – Google geocasts

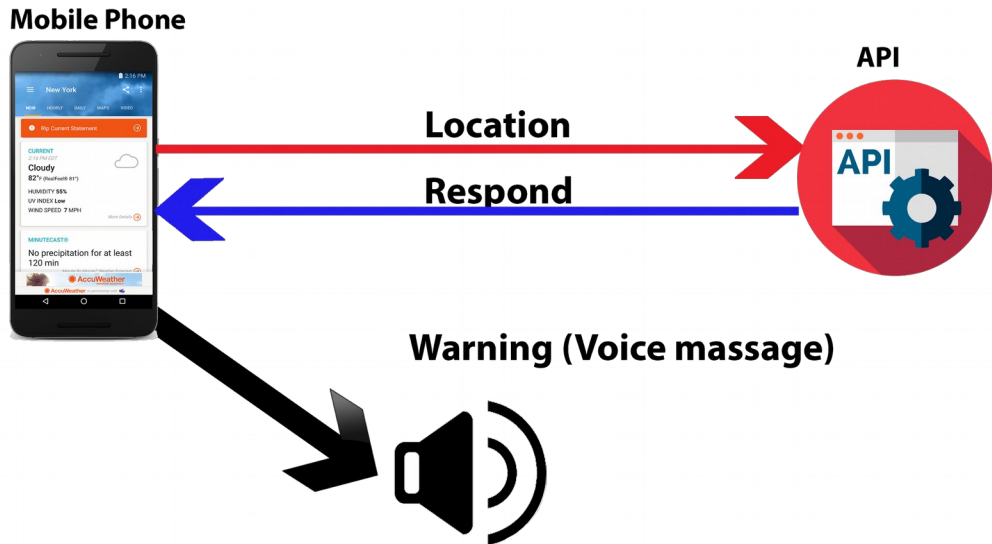


Figure 3.7 - Weather forecast

#### 3.2.2 Server side data manipulation and tracking process.

##### (i) Data passing and manipulation

This function is based on entire project. we have server for synchronizing data from app to back-end and vice versa. Mobile app is engage with back-end for do request and response. So, we use web service API for passing data between mobile app and back-end.

Following figure indicate how data passing works:

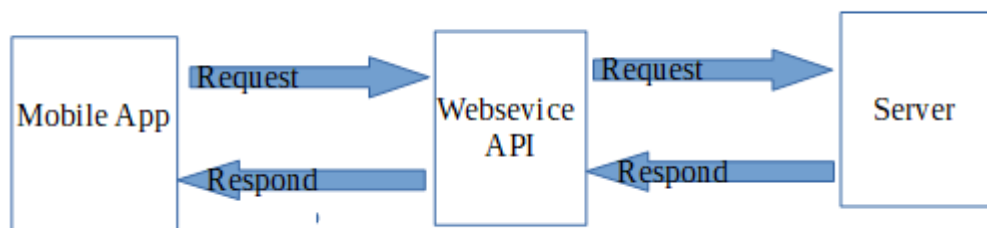


Figure 3.8: Passing GPS through web service api

## (ii) Vehicle Tracking and identifying

We use arduino for detecting or identifying vehicle's position on Google maps. Before positioning or detecting a map, we have GSM shield to connect to the internet, send and receive send. This GSM shield module not working without implements the GSM library.

After we use GSM module all disables functions are enable as follows

- GSM phone
- Receive voice calls
- Send and receive SMS

We use these as components

- Arduino
- Node MCU
- GSM Module
- GPS (Global Position System) Module
- Connecting Wires



Figure 3.9 - Arduino

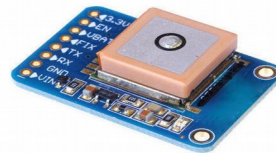


Figure 3.10 - GPS Model



Figure 3.11- GSM Model



Figure 3.12 - Node MCU

Application grab the gps location using from those components and send those gps location to web server. Following image explains how data processing using arduino.

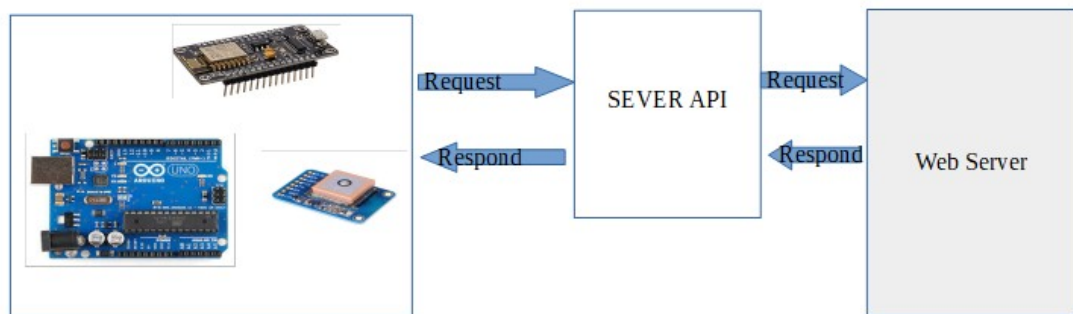


Figure 3.13 - GPS Receiving from tracker

### (iii) Payment Integration

Payment handling provide for getting new features from released app. We are not giving entire facilities for client.

We use payment gateways for integration all payments.

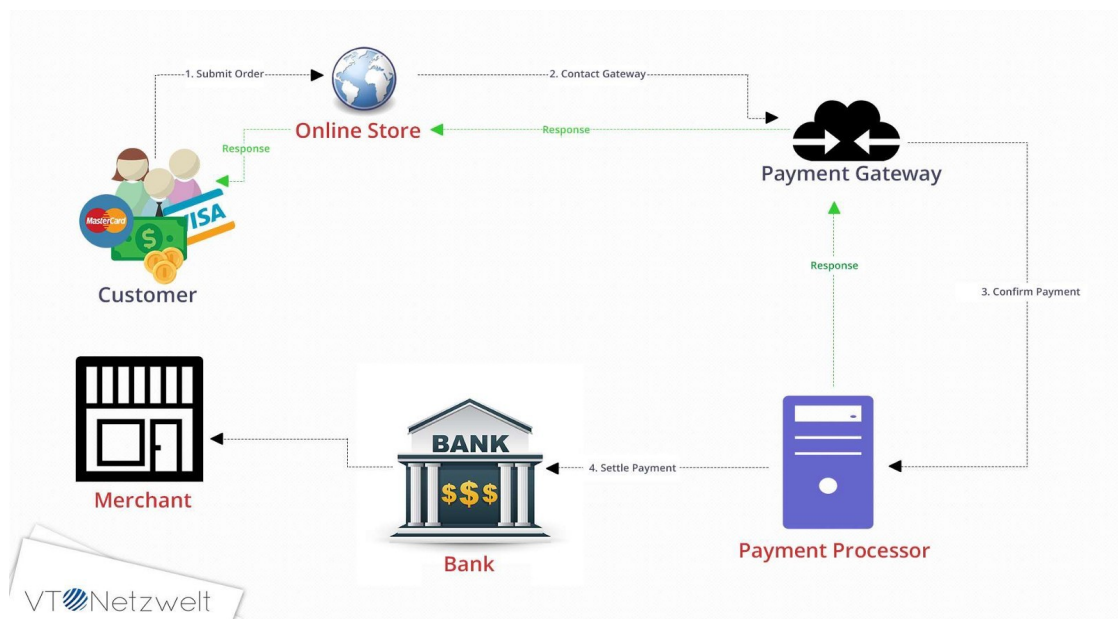


Figure 3.14 - Payment Handling



#### (iv) Map Matching Algorithm

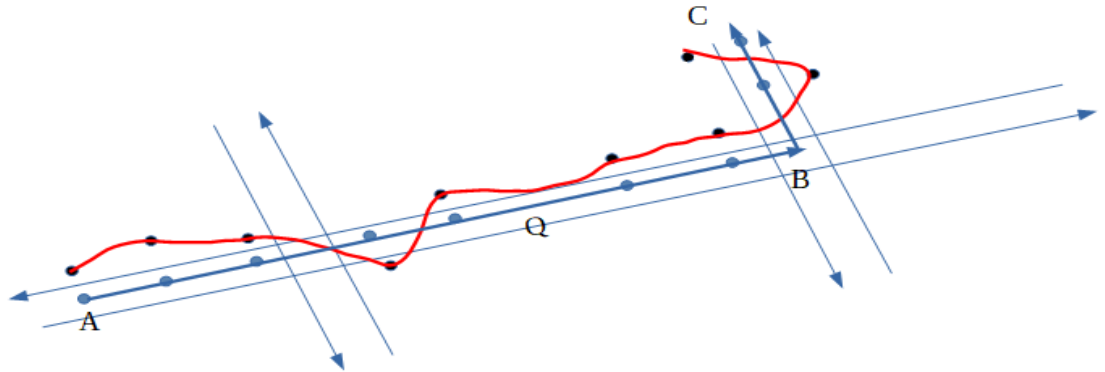
This algorithm is one of the best algorithms for gps road map and locating information to obtain the real position of vehicles in a road network. We are decided to choose this algorithm for our system.

As we know, sometimes gps coordinates are wrong. We experimented in **Pick Me** app, we grab some issues like the real time vehicle is not show on the road in right manner, it show out of the road. So, we check the current vehicle gps and check original road gps. Actually we show the map to the client using correct gps location on the road. Figure 12 indicate how vehicle gps pointed to map.

According to Figure 12,

Red line indicates how vehicle moving using gps coordinates. We can see that road line not indicate proper manner. Because gps has noisy.

After use map matching algorithm, Appearance has been changed. A to B and B to C road line perfectly pointed.



**Figure 3.15 - Vehicle GPS point to point**

First grab the gps locations of the running vehicles and we pass those vehicle gps information into direction API. Because this API gives us the real road gps coordinates we can compare the vehicle gps location and direction road API location. Then implement an equation to calculate a correct gps to remove noises on gps coordinates.



### 3.2.3 Accident Identification

When a vehicle met with an accident in a crowded, vigorous environment, this application identifies it with by using audio processing. The device used by the driver must be switched on in every time and all sounds will be recorded using the microphone. Since the driver's personal conversations can also be tracked, he has the ability to disable it whenever he does not use the application.

Sounds that are taken by using the device will pass to server side and in there it is filter all noisy sounds in data. The system has stored previously happen vehicles, accident sounds in their database. We make a comparison with this data and the data we received from the device.

Using this approach we can identify whether the accident is happened or not by analyzing the audio which gets from the device.

- This is a diagram which identifying accident using Machine learning.

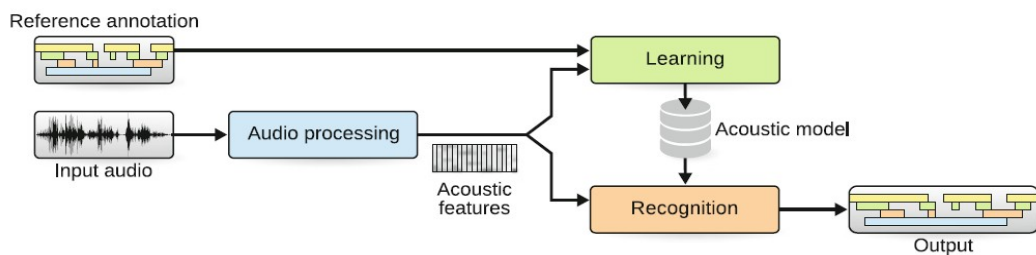


Figure 3.16 - Identify accident using machine learning

We proposed to develop a machine learning model for demonstrating this system. Removing noisy background sounds and identifying the exact accident audio will be done by this trained model. Using classification algorithms and Neural Networks, the dataset will be analyzed for selecting most suitable algorithm.

- This is Accident identifying sub system flow chart.

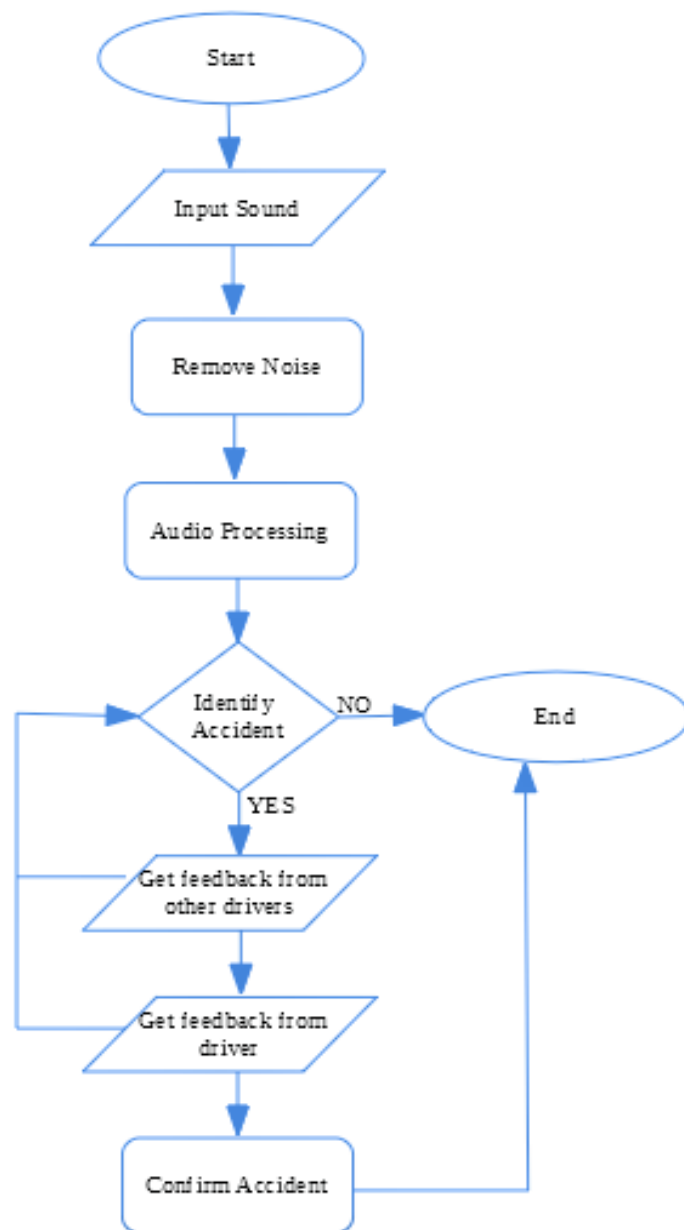


Figure 3.17- Order of the detecting an accident

### 3.2.4 Evaluate the best existing secure data transmission and storing methods

Data are transferred through various communication mediums. Among them smartphone has become the most typical and popular mobile device in recent years. With the rapid growing of internet and network applications, data security becomes more important than ever before. The proposed application is based on GPS technology. It traces the location of the users to get rid of traffic congestion. In database users locations and private data will be saved. So there is a major requirement to keep this data in a secure way to prevent the unauthorized access and attacks. There are many secure data transmission algorithms. Among them, we only consider AES, 3DES and BLOWFISH algorithms.

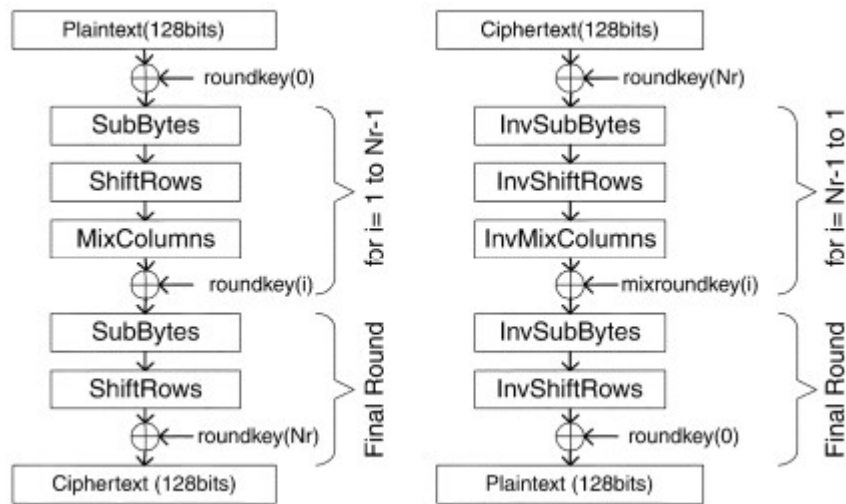


Figure 3.18 : AES Algorithm diagram [11]

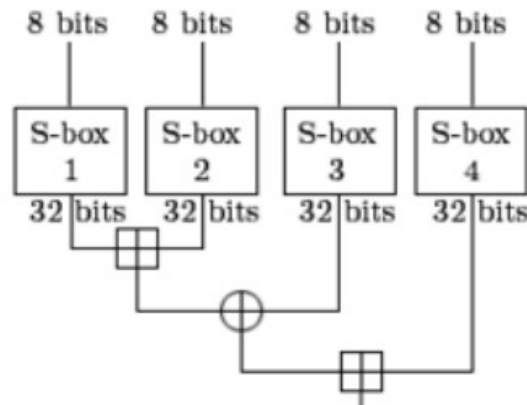


Figure 3.19 - BLOWFISH Algorithm diagram [12]

By considering these algorithms, BLOWFISH algorithm is used to implement the proposed application. This algorithm is in the public domain, allowing it to be freely used for any purpose. Blowfish is one of the fastest and secure block ciphers in general use. So that application and server will be implemented by using this algorithm.

### **3.3 Tools & Technologies**

- PHP Codeigniter/Laravel
- Vs code
- C,C++
- Curl
- ReactJS
- Mysql
- Arduino
- Android studio
- Photoshop
- Java
- Python
- Azure Machine learning studio
- Google Toolbox DataSet
- Kali Linux

### 3.4 Testing

When an accident happens that sound is detected by the microphone of the mobile device. So an accident sound will be input to the application to check whether that sound is identified as an accident sound. If it is identified as a crash sound, text messages and voicemails must go to emergency call numbers. Also the accident must show in the map in the correct location. If it happens according to the above procedure, testing is successful.

The map accuracy will be shown by creating a video. A member of the group is placed in the middle of the city and another member will travel to that place in a vehicle. The vehicle is travel, according to the proposed application. By creating a video to show the actual situation of the city and the traffic congestion shown by the application. If both are same the testing is successful.

Lots of hackers making their attacks to the data when the time of data transmitted. The D DOS attack is widely used for making these attacks. So by doing a D DOS attack to the implemented application, we can check whether the application is in secure level.

### 3.5 Software Development life cycle

The software development methodology which is going to be used is the agile scrum process. Agile scrum process facilitates lots of features which developers can use to develop a system in a flexible way. This process allows for requirement changes so easily as developers want to fulfill the customer's and service provider's new requirements. Since the research project are associated with a lot of changes, it is hard to follow a set sequence of developments such as the waterfall model. Scrum concentrates on task management within a team-based environment. As this project is done by a group of four members this methodology will help a team of performance all the activities and solve the problem faced by individual members. As well as that it facilitates a common understanding of each area of the project by conducting a daily scrum meeting.

#### The Agile Scrum Framework at a glance

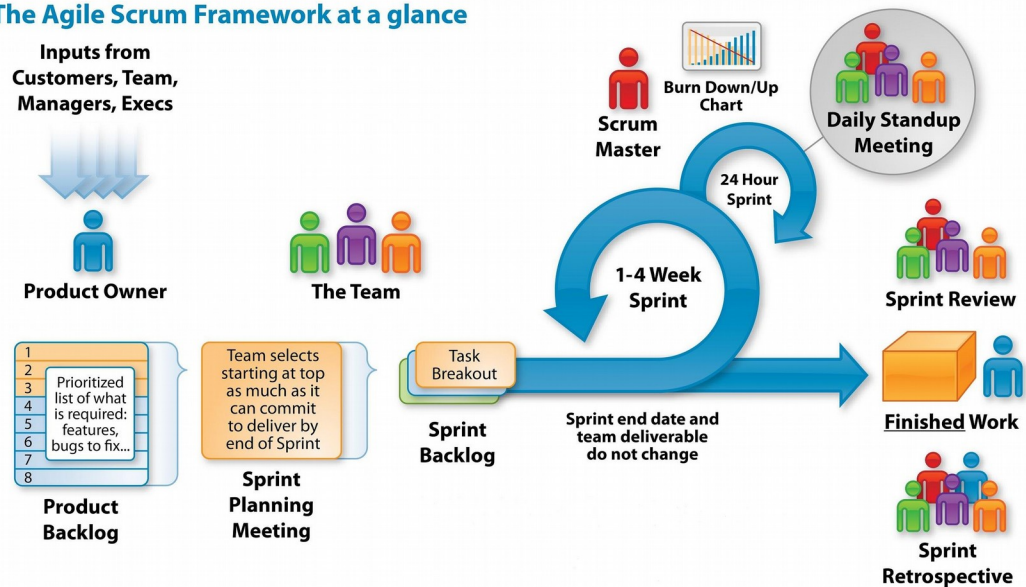


Figure 3.20 - Software development life cycle

#### 4.0 Description of personal & facilities

Member	Component	Tasks
Kavindu Geesara IT16008106	Accident Identification	<ul style="list-style-type: none"> <li>● Every vehicle speed difference is checked by using GPS technology</li> <li>● Analyze sounds by using audio processing with the use of machine learning techniques.</li> <li>● When an accident happens service provider will send text and voice message to emergency numbers given by the user in registering.</li> <li>● The service provider will be sent a message to the vehicles behind the accident.</li> </ul>
Kaveen Gunawardana IT16145276	Server side data manipulation and tracking process.	<ul style="list-style-type: none"> <li>● GPS tracker component for all vehicles GPS detection. Use this GPS tracker for detecting emergency vehicle and give an alert to the mobile application.</li> <li>● Managing server side for passing data using web server API. Server side is working for entire research.</li> <li>● Payment functions for app feature release. To take payment gateway for manipulating payment function.</li> </ul>

<p>Nipun Sachinthana T.A IT16119330</p>	<p>Vehicle detection and informing process.</p>	<ul style="list-style-type: none"> <li>● Give ahead traffic condition to drivers by text &amp; voice messages</li> <li>● Give ahead whether condition to drivers by text &amp; voice messages</li> <li>● Updated the map in every 0.5 seconds with vehicle vise.</li> <li>● Show alternative roads that can be used by drivers to get rid of the traffic situation if driver want.</li> <li>● Three-wheelers are shown and contact with people who use public transport facilities that are confronted with traffic congestion.</li> <li>● When an ambulance arrives on the road, the application will send a voice .message to the ahead vehicles.</li> </ul>
<p>S.D Wijewickrama IT16048638</p>	<p>Evaluate the best existing secure data transmission and storing methods</p>	<ul style="list-style-type: none"> <li>● Compare data transmission algorithms for finding the most suitable method for the proposed application. These things will be considered when selecting the method.</li> <li>● Implement the system using the selected method.</li> <li>● Finding the best ways to protecting the confidential details of the users and compare these methods for evaluating most suitable way to</li> </ul>



		<p>protect server details from unauthorized accesses</p> <ul style="list-style-type: none"> <li>● Implement the selected security mechanism for server.</li> <li>● Implementing other access control mechanisms for the system.</li> </ul>
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## 5.0 BUDGET

Description Of Expenses	Cost(Rs.)
arduino circuits	6,000.00
Printing and stationery cost	6,000.00
payment gateway	50,000.00
Others	5,000.00
Total expense	67,000.00

Table 5.1 - Budget

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## 7.0 APPENDICES

### 7.1 Gantt Chart

