

# **SMART ACCIDENT DETECTION AND RESCUE SYSTEM**

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering.

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## **APPROVAL**

This Project/internship titled “**Smart Accident Detection and Rescue System**”, submitted by Saikot Bairagi, ID No: 152-15-5642, Pranto Karmokar, ID No: 152-15-6002, Anuprova Mondal, ID No: 152-15-5992 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 02-05-2019.

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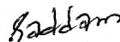
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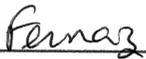
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## DECLARATION

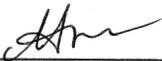
We hereby declare that, this project has been done by us under the supervision of **DR. FERNAZ NARIN NUR**, Assistant Professor, Department of CSE Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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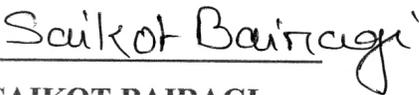
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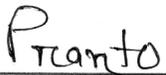
  
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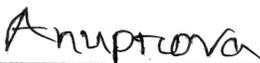
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Finally, we must acknowledge with due respect the constant support and patients of our parents.

## **ABSTRACT**

In our modern life, accidents are one kind of part of our everyday life. We can less the accident but we cannot stop this forever. Accident can be occurring any time anywhere. Sometimes people cannot reach hospital on time after accident occur. It happens because of lack of information about hospital, traffic jam, less support of ambulance. To ensure the safety of people this kind of situation we are going to implement a project “Smart Accident Detection and Rescue System”.

If any accident occurred, this information sent to web server and from the web server we can sent message towards his/her parent, traffic control room, police station, other vehicles by an application. The can see the location of that place where the accident occurred. The vehicle of this road can also use the alternative road by using google map. Nearest ambulance also knows that matter by wireless server. By controlling traffic, the ambulance can reach the accident sport and rescue very quickly. Main outcome of this project that we can safe many lives.

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# CHAPTER 1

## Introduction

### 1.1 Introduction

In today's world the number of vehicles are increasing day by day. So that road accident is increasing day by day specially in urban area. It took lots of lives every moment. There is no technology invent to avoid the accident. We don't even know where, when the accident occurs in our life. Most of the time the life of the victim depends upon the mercy of other people. Sometimes people don't want to involve any kind of police case problem by helping that victim. Sometimes people don't have enough time to help that victim. There are so many reason, people don't want to or can't help the victim. In the meantime, victim left his/her last breath. Because the victim cannot reach the hospital timely. Most of the time the people of victim's house don't know that news at the proper time. It is not easy to trace the accident spot in metropolitan area. We are trying to solve all this problematic situation.

Now, we are focusing on an automatic accident detection and rescue system using IOT by which the parent or related people will notify on time. There are also notify the nearest police station and traffic control server at the real time of accident occur. Nearest ambulance also notifies through internet with location where the accident occurred. We can ensure that the victim reaches the hospital on time without other mercy.

## **1.2 Motivation**

Many people died every year on road accident. Nothing will be compared with the value of human life. "No one will die by road accident" that is our moto. We can use technology to make our lifestyle better. Our country is developing day by day, we will have to unanimously with technology. So, we have to find a solution of this situation. In this project, we are using Internet of things (IOT) concept to make sure save the victim life, which one is in danger by road accident.

## **1.3 Rationale of the Study**

Bangladesh has crossed over from Least Developing Countries (LDCs) by achieving all the 3 conditions and about to be recognized as developing countries economically and socially [1]. The country is prospering through info and Communication Technology (ICT). Government and personal organizations are step by step developing with fashionable technology like Industrial automation. Besides business and technological development, our style is additionally developing. we have a tendency to are partaking fashionable technologies in each aspects of our life for a sensible and convenient life.

By using smart accident detection in our vehicles, we can contribute to the ongoing development of our education system. Besides that, it will mitigate most important city problem traffic jam along with some common problems of all people in the world. This study in intended to make the accident detection system smarter and it can give the solution to loss valuable life.

## **1.4 Research Questions**

Road accident is a critical structure for our country. Road safety also a big deal of our national concern. When accident occurs, most people do not know the exact location and time. Sometimes, victim's life depends on other mercy. For road accident, approximately 1.3 million people die each year. In last year (2018), approximately 2400 people died on road accident in Bangladesh. Ambulance can not reach the exact accident spot on time, for this reason victim cannot admit in the hospital timely. When ambulance don't reach the accident spot timely, victim died on the accident spot or on the way to hospital.

Most important stakeholder of this system is the driver who drives ambulance. Driver have to know the exact location of accident spot. Using a Smartphone is more user-friendly for a driver to drive though the location.

In addition, there are other reasons too,

- Smartphone SMS is easy to use.
- We are able to get SMS in offline mood

## **1.5 Expected Outcome**

Our main goal is to develop real time rescue system that it will help an accident victim to reach the hospital on time without another people mercy. We will know if any kind of force is applied through the load cell. We will also provide SMS service to other people, so that they can see the exact location of accident spot and use the alternative way. We will provide safety of victim life.

## 1.6 Report Layout

This report consists of five chapters, and this section provides insight of all five chapters.

- Chapter one contains introduction, motivation and expected outcome of the study.
- Related research work is discussed on chapter two. It also provides problem scopes of the research.
- In chapter three, requirements of the proposed system, system architecture and system flow diagram are provided.
- In chapter four describes our proposed system design, implementation and testing.
- Lastly, chapter five provides conclusion, limitations, comparison and future study.

## **CHAPTER 2**

### **Background**

#### **2.1 Introduction**

In this era of science and technology, we are involving internet with nearly everything from computer to mobile phone. Due to high demand and modernizing civilization, inventors, researchers are connecting more things to the internet. This tendency results a new concept called Internet of things [2].

Communication is no longer limited to human to human envelopment where IoT introduced machine to machine communication. A machine will conduct with another machine when not direct human involvement through the internet. This thought is still in its initial stage of mercantile purpose, but few industries e: g: home and industrial automation, transportation are showing interest on this.

Now a day, we are connecting home appliances, other daily necessity factors to the internet using IoT concept so why not any kind of vehicles. This study aims to develop a smart accident detection system by connecting any vehicles to the internet.

#### **2.2 Related work**

This is neither an original nor a new plan. There are so many implementations like this system after Introducing of Smart City Concept. However, this new plan for smart accident detection and rescue system with proper navigation and real-time visualization on map.

In this paper [3] proposed a system, which is accident detect using three axis acetometer sensor to the cloud server. It is automatically dispatching the nearest ambulance by processing the GPS coordinates and providing specific route to the certain accident spot. By using the android application, ambulance driver can reach the spot quickly.

In this paper [4] proposed that through push on a switch the accident will be detected. After accident occurred the airbag will open and auto lock the breaks. Then buzzer will be on. By GPS Module, microcontroller get the coordinates of location. Then GSM send this accident information to this victim family. They can take immediate action and also ambulance.

In this paper [5], a smart rescue system is proposed with an android application. The user will under the automatic monitoring all time, if the user wants, they can turn off this system. This system will detect any kind of jerk and generate an alert, if it is false the user can cancel this. If the user doesn't cancel this alert under 15 seconds then victim location will get by API. Then nearest emergency responder will recue the victim.

In this paper [6] describe, an intelligent traffic light system (ITLS) where ambulance can move easily without traffic. By GPRS 3G modem traffic team will be get the location of ambulance. If the ambulance is near to the traffic junction then the corresponding signal will be green. There is an LCD display is used the situation of the processing.

In this paper [7] proposed that accident will be detected using the GPS, GPRMC, MCU by speed monitoring algorithm. If accident occur then the place of accident, speed before accident, day, time all thing will be available through SMS using GPRS.

Detection of accident by pushing switch in Dhaka city is difficult. It is also difficult to detect accident by measuring speed for the jam in the Dhaka city. For this reason, we are using load cell.

## **2.3 Research Summery**

In our study, we are intended to find an efficient solution of accident detection and rescue system for Dhaka city considering current system available so that current system can hold it easily. We will consider economical and overall condition of our country. It will take time replace all the vehicles into smart vehicles and it will be costly. So, we will use existing vehicles in current system with load cell and microcontroller.

For internet connection, we will use Wi-Fi module. Equipment's for Wi-Fi is relatively low cost than cellular network. We will use GPS sensor for vehicles to get current location.

## **2.4 Scope of the problem**

This study focuses on finding a way to develop a smart accident detection and rescue system to reduce the life risk of victim after accident occurred.

### **Less waiting times:**

The victim does not wait for the ambulance too longer because the ambulance reaches the spot by knowing the real time and location of accident.

### **Easy to track:**

By this system, we can easily track the accident place using GPS. For this, ambulance get the update information of accident and rescue the victim as soon as possible.

### **Decrease harassment:**

If accident occurs then the road will be blocked, other people are victims of harassment. The people know the alternative route of their destination without using that road. They can easily reach their destination without harassment.

**Low cost:**

Normally, the cost of doing this project, our cost is lower than other systems.

## **2.5 Challenges**

**Network connectivity**

In our country, network connectivity system is little slow than the other country. There is a problem getting the internet connection in dynamic vehicles. Availability of wi-fi for all vehicles will be challenging for this system.

**Data store in server**

In this system, huge raw data need to store in database. To insert this huge raw data is challenging for this system.

**Unpredictable traffic jam**

The status of the road can not be predicted exactly. So, after receiving the data of accident, ambulance can not reach that place for unpredictable traffic jam.

**Load cell**

The gauge can be damaged if it used for the pressure measurement of highly reactive or corrosive materials. If the diaphragm use is of plastic then the load cell can not measure the high pressure.

## **CHAPTER 3**

### **Requirements analysis for the Proposed System**

#### **3.1 Introduction**

Requirement analysis is consisting of some approaches taken to determine especial property, demands, expectation by intimating with the system users. It requires combination of hardware, software.

#### **3.2 Architecture of Proposed System**

In this proposed system, accident detection will be detecting with load cell. At first, when an accident occurs, load cell detects the collision. After the detection, GPS sensor send accident location to microcontroller. Then microcontroller read numbers from database server via WIFI module. At last, microcontroller send SMS to the Smartphone to get information of accident.

In fig-3.1, Accident detection system consist of some sensors, microcontroller, WIFI module is a single board of development board.

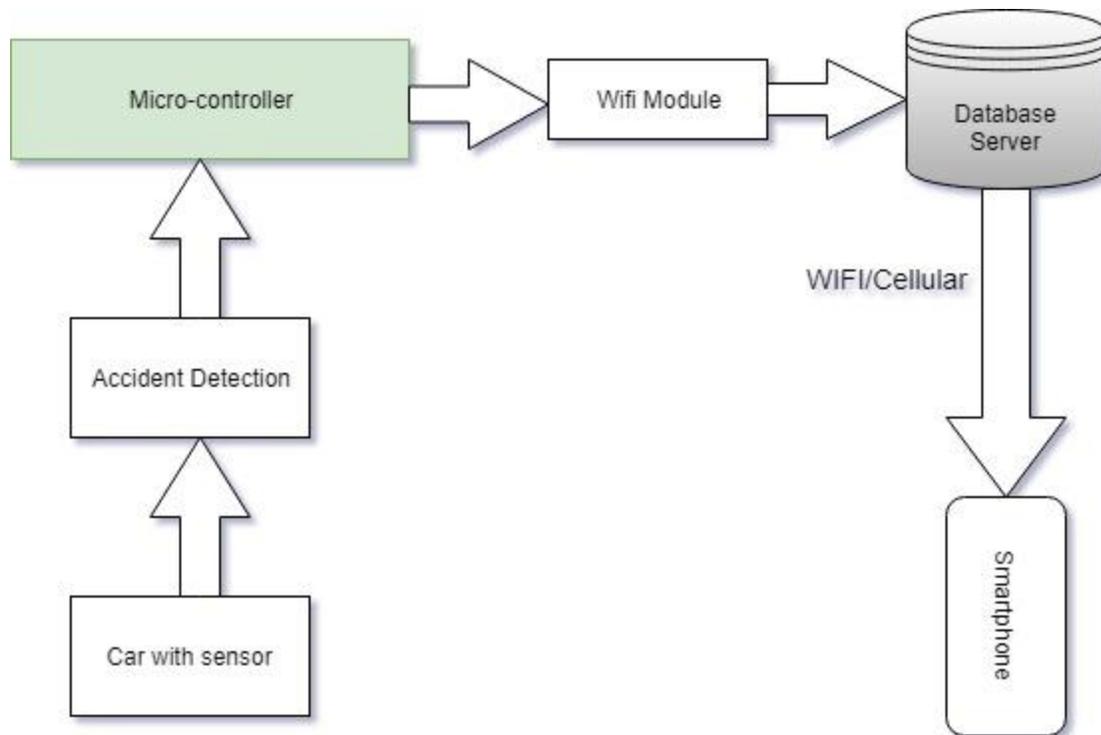


Fig-3.1: Architecture of Proposed System

### 3.3 Data Flow Diagram for The Proposed System

In fig-3.2, data flow diagram of this system is given below. At first, sensor check collision. Then it checks accident occurs or not. If accident does not occur, then it does not run any operation. But if accident occurs, then sensor get location and send it to microcontroller. Microcontroller will collect numbers that which was previously stored in the database. After that, microcontroller send SMS to accident location to the users.

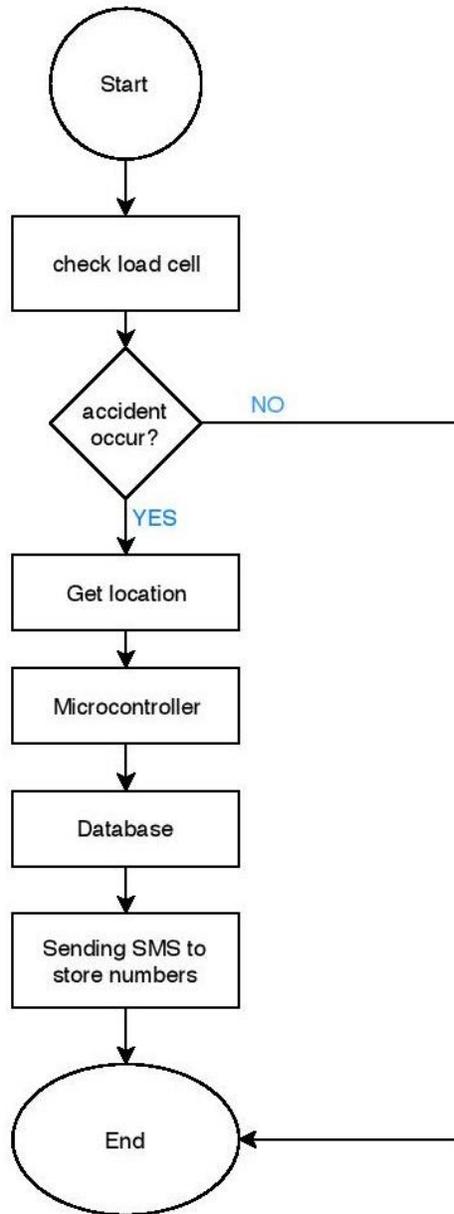


Fig-3.2: Data Flow Diagram of the proposed system

### 3.4 Use case diagram

The fig-3.3 showing the use case diagram, authority can track drivers. Authority can collect phone numbers, can send SMS to send user. Authority can also view the map. User can see the road direction and map.

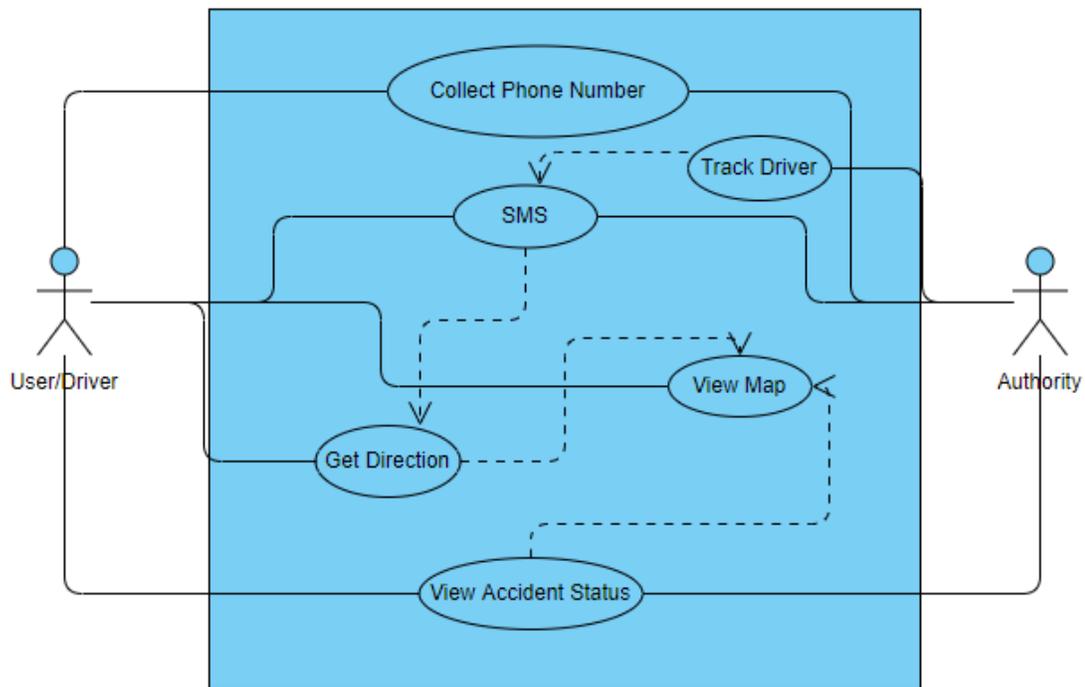


Fig-3.3: Use Case Diagram

### 3.5 Use Case Description

#### For Smart Vehicles

Table 3.1 shows use case description for accident detection using load cell with precondition and post condition. It also provides trigger, basic path and exception path.

TABLE 3.1 USE CASE DESCRIPTION – ACCIDENT DETECTION.

<b>Use case name</b>	Accident detection of any vehicles
<b>Trigger</b>	Accident is occurred
<b>Pre-Condition</b>	System should be in Active state.
<b>Basic Path</b>	Load cell send data to microcontroller.
<b>Post Condition</b>	Reading is stored for the further need.
<b>Exception Path</b>	If the load cell pressed unexpectedly

#### Sending Update to Server

Table 3.2 shows use case description sending update to server with trigger, pre-condition, post-condition and exception path.

TABLE 3.2: USE CASE DESCRIPTION-SENDING UPDATE TO SERVER.

<b>Use Case Name</b>	Sending update to server
<b>Trigger</b>	When the state of accident is changed.
<b>Pre-Condition</b>	Smart vehicles must be connected to the server.
<b>Basic Path</b>	Microcontroller processes data and send it to the server.
<b>Post-Condition</b>	Successfully update.
<b>Exception Path</b>	Fails to update.

### Show Real-Time Accident Status on Map

Table 3.3 shows use case description for real time accident status on map. In this case, the system has to be active with connection of the internet.

TABLE 3.3: USE CASE DESCRIPTION-SHOW REAL-TIME ACCIDENT STATUS ON MAP

<b>Use Case Name</b>	Show Real-Time accident status on map.
<b>Trigger</b>	User successfully connected with the system.
<b>Pre-Condition</b>	GPS of the device should be turned on.
<b>Post-Condition</b>	User can see the real-time accident spot Icon through the map.
<b>Exception Path</b>	Icon will not appear if there is no active connection.
<b>Others</b>	Icons will keep updating according to accident status.

## Get Direction and Distance to Accident PLACE

Table 3.4 shows use case description for providing distance and direction. In this case, user has to click on the icon and map will draw a path to the accident Place.

TABLE 3.4: USE CASE DESCRIPTION-GET DIRECTION AND DISTANCE TO ACCIDENT PLACE.

<b>Use Case Name</b>	Get Direction and Distance to Accident Place
<b>Trigger</b>	User/Driver clicks to SMS link
<b>Pre-Condition</b>	GPS of the device should be turned on
<b>Basic Path</b>	Map will draw a path between user's current location and that accident place location. Map will be also shown the distance Kilometer and time of travel.
<b>Post-Condition</b>	Not applicable.
<b>Exception Path</b>	If GPS of user's device is turned off, map will unable to get the current location of the user. So, no direction will be drawn.

## Adjust Map View

Table 3.5 shows use case description for adjusting map view. In this case, user can see map page and click on zoom-in and zoom-out button to adjust map view.

TABLE 3.5: USE CASE DESCRIPTION-ADJUST MAP VIEW

<b>Use Case Name</b>	Adjust Map View.
<b>Trigger</b>	User click on Zoom-in or Zoom-out button.
<b>Pre-Condition</b>	User must be clicking the link sent by SMS.
<b>Basic Path</b>	Zoom-in or Zoom-out map view for better fit of map view on display.
<b>Exception Path</b>	If system reaches to maximum or minimum zoom level, more adjustment will not happen.

### 3.6 Equipment for Proposed System

NodeMCU ESP8266 WIFI IOT development board

Ks0021Load cell

NEO-6M GPS Module

SIM800L GSM Module

#### 3.6.1 NodeMCU ESP8266 WIFI IOT development board

NodeMCU is an open source platform. It runs by ESP8266 WIFI SoC and hardware based on ESP-12 module. For creating project with WIFI, it is very useful. It has built in USB to serial chip upload codes. It has USB-TTL included, can be programmed simple or powerful Arduino IDE. It has event-driven API and it also has PCB antenna [8].

In fig-3.4, ESP8266 WIFI development board, microcontroller, WIFI module, flash chip is shown.

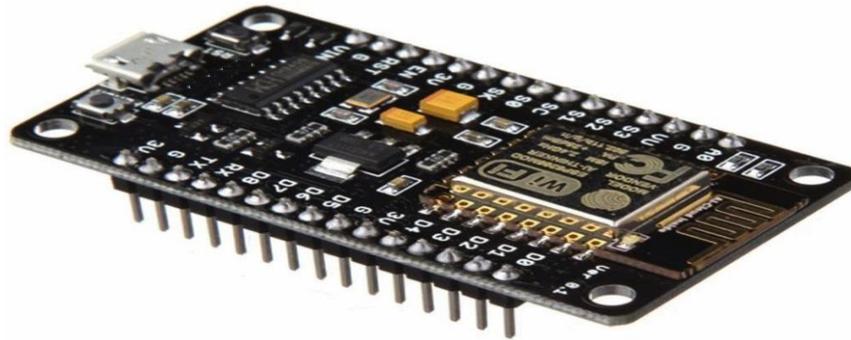


Fig-3.4: NodeMCU (ESP8266) WIFI development board

### 3.6.2 Load Cell

A load cell is known as a transducer and it is used to create electrical signal. It converts force into measurable electrical output. A load cell is made by using an elastic member (with very highly repeatable deflection pattern) to which a number of strain gauges are attached. There is a total of four strain gauges which are bonded to the upper and lower surfaces of the load cell. When the load is applied to the body, the elastic member deflects and creates a strain at those locations due to the stress applied. As a result, two of the strain gauges are in compression, while the other two are in tension [9].

In fig-3.5 Load cell is shown.

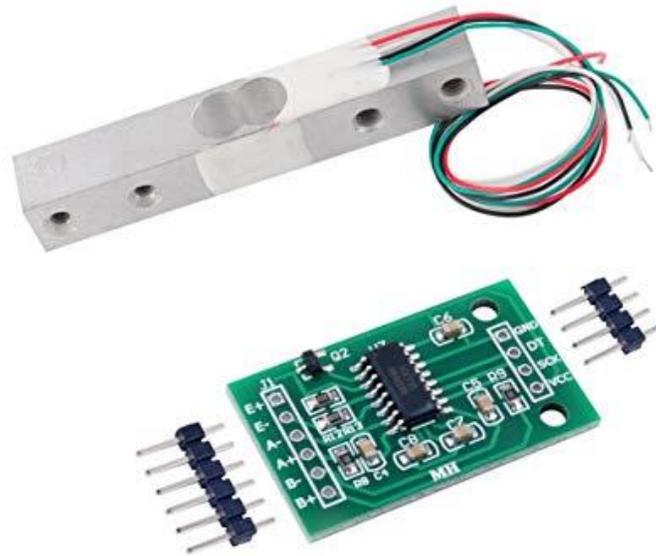


Fig-3.5: Load Cell

### 3.6.3 NEO-6M GPS Module

This is a complete GPS receiver which has built-in ceramic antenna which gives strong satellite search capability. Anyone controls the status by power and signal indicators. When the main power turns out, the module can save the data. It has built-in EEPROM to save the perimeter data. It also has data backup battery and RS232 TTL interface [10].

In fig-3.6, GPS module with ceramic antenna are shown



Fig-3.6: NEO-6M GPS Module

### 3.6.4 SIM800L GSM Module

SIM800L is using for GPRS transmission, sending and receiving SMS, making and receiving voice calls. It has lower power consumption, support real time clock. It also supports micro SIM Vehicle [11].

In fig-3.7, GSM Module are shown



Fig-3.7: SIM800L GSM Module

## **Platform used for Accident Control**

Platform: Arduino

Language: C

Tools: Arduino IDE

## **Arduino IDE**

In our system, we are using Arduino IDE to program microcontroller that is using into any kind of vehicles



Fig-3.8: Arduino IDE

Arduino is an open source platform which consists of both programmable circuit board and a piece of software that is known as Arduino IDE (Integrated Development Environment). This IDE runs on computer and used to writing, compiling and uploading program to many varieties of physical board. Using special rules of code structure C and C++ languages are supported by the Arduino IDE.

The Arduino Platform is very popular among users and developers.

Arduino products are distributed as open source hardware and software and are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL) [12]

Some reason of using Arduino IDE is given below:

- It is open-source and extensible software.
- It has a large community all over the world.
- It is cross-platform IDE.

## **Platform used for phpMyAdmin**

Platform: phpMyAdmin

Language: php

Tools: Laptop, MySQL, phpMyAdmin server

## **phpMyAdmin**

In our system, we have used to phpMyAdmin serve we use phpMyAdmin because of making complex SQL queries easier. Also, it works with different operating systems. We can easily search globally in a database or a subset of it and creating complex queries using query-by-example (QBE). We can administer multiple servers. [13]

## CHAPTER 4

### System Design, Implementation and Testing

#### 4.1 Introduction

In this section, we are going to discuss out practical approach has been taken to solve the problem. Proposed system shows expected outcome. When an accident occurs, this detection will start with load cell. Authority know the state of accident. Then the authority tracks the driver of ambulance and sent offline SMS. SMS contains the location of accident and the driver will get direction to go that spot. Other user whose number store in database will get the SMS with the information of accident. They can see the accident place and use alternative way.

Alert system will update in future before the accident occur. Wi-Fi module will help through provide internet.

#### 4.2 System Design

This study was focused on creating a smart rescue system when accident occurred. We driven an experiment in a prototype which covers Dhanmondi area of Dhaka city. Location coordinates of vehicle are manually measured using GPS sensor and this location placed on database through microcontroller. These coordinates consist of latitude and longitude value, it will show the place of vehicle exist.

In figure-4.1 and 4.2, we are showing propose rescue plan for a city and the smart car. Proposed model for IoT based accident detection and rescue in a city is shown. This smart accident detection system is place into vehicle. Ambulance will rescue the accident victim from those vehicles when the vehicle made a crash.

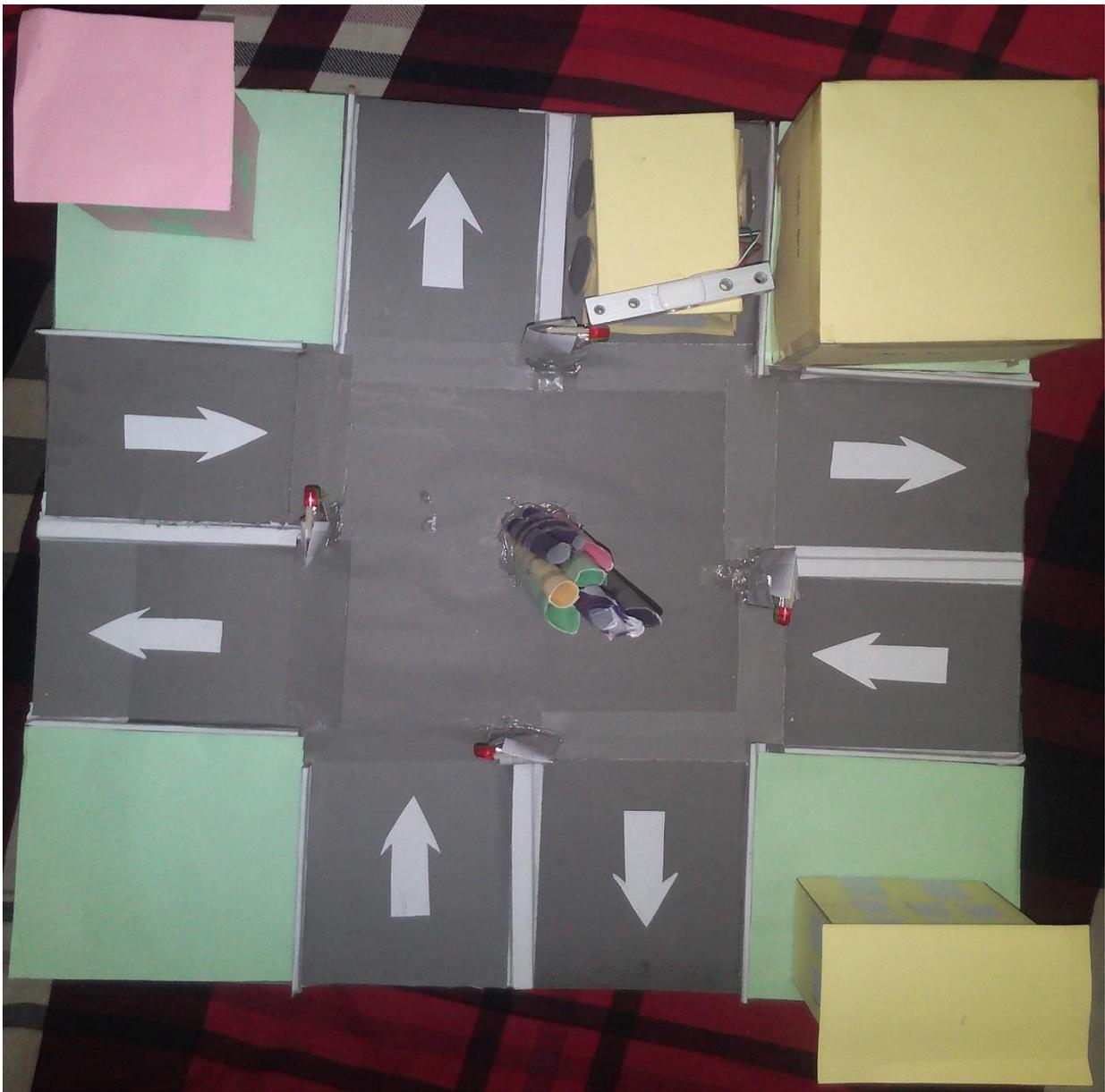


Fig-4.1: Proposed rescue plan for a city

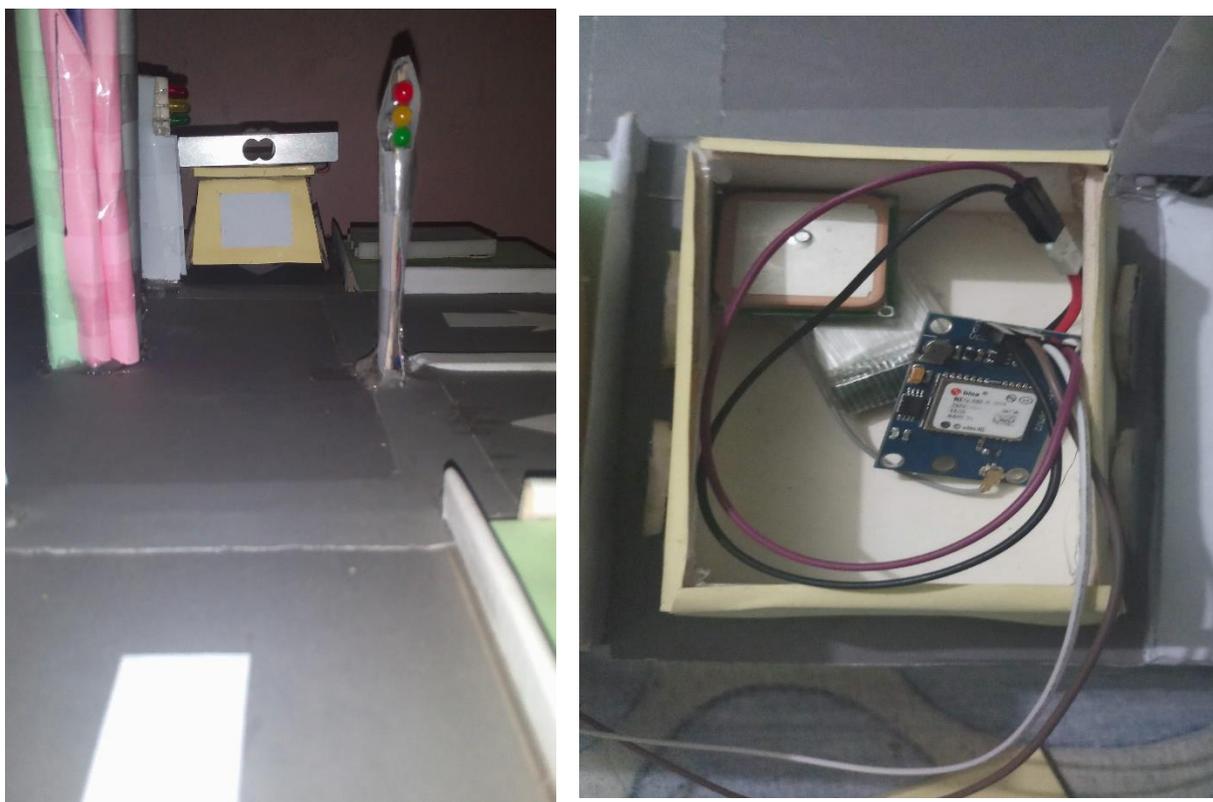


Fig-4.2: A smart car

In this smart car, there will be a load cell in front and back of the car. There will be a GPS sensor inside the car. GPS have a relation with the load cell through the GPS will be able to accurately identify that place where accident will occur.

### 4.3 Implementation of the Proposed System

#### Collision detects

In the figure-4.3, we use load cell for detecting the collision. When any vehicles push from the back and front of the car, then load cell detects it as collision. Load cell is one type of sensor which gives it output value.



Fig-4.3: Collision detect by load cell

## Location detects by GPS

In the figure-4.4, GPS Module is shown in below. GPS Module is working when any collision is detected by the load cell. When any collision is occurred, GPS Module is checking the current accident place. GPS Module is in the car so that it is easily to locate the accident place.

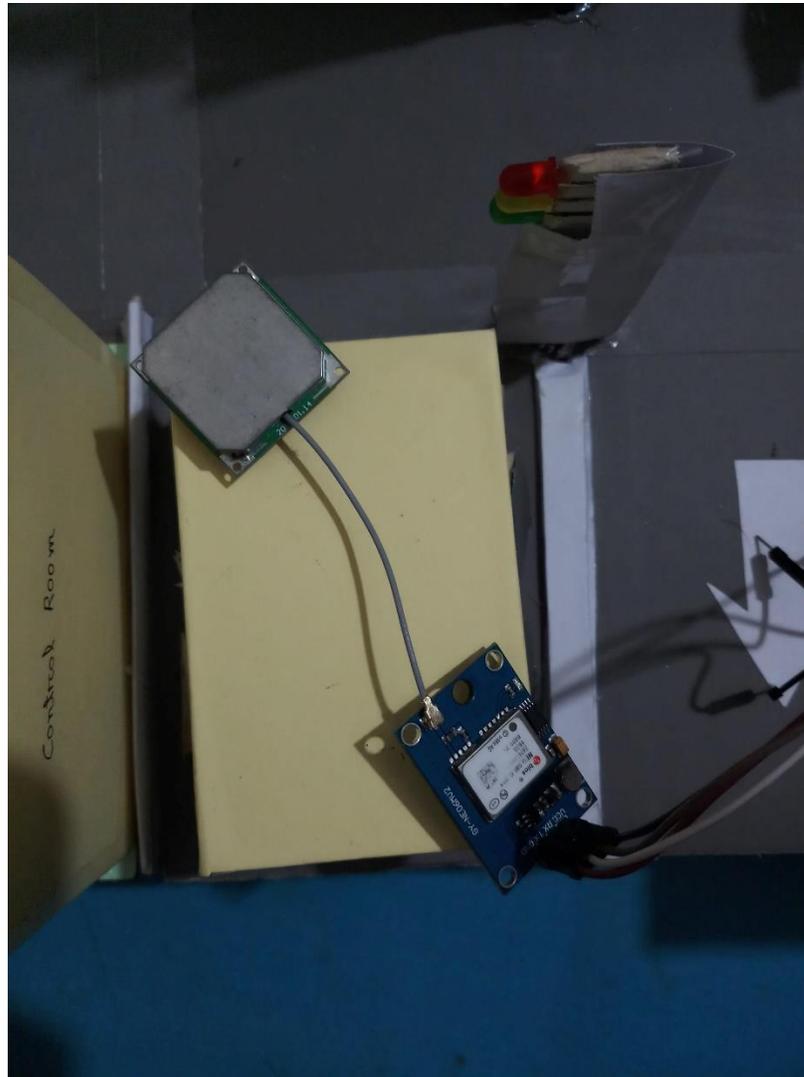


Fig-4.4: Location detection

## Database collection

In the figure-4.5, database is using in this figure. After getting current accident location by GPS Module, system will check which number of users of this system is previously stored from database. We use phpMyAdmin as local server to store the user contact number which is operate by XAMPP.

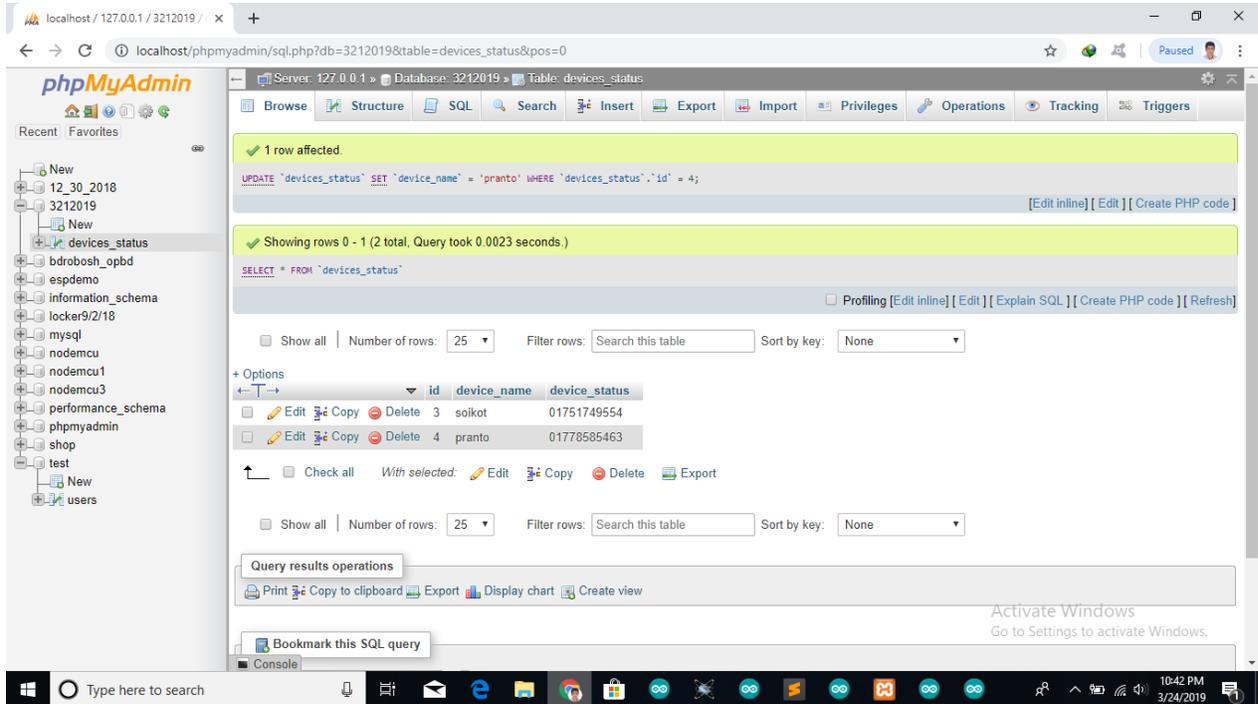


Fig-4.5: Database collection

## Sending SMS

In this figure-4.6, SMS send system by this system is shown. When system collecting the stored contact numbers of users, system will send SMS of accident location link to the users by GSM Module. GSM Module is using for sending SMS, voice call etc.

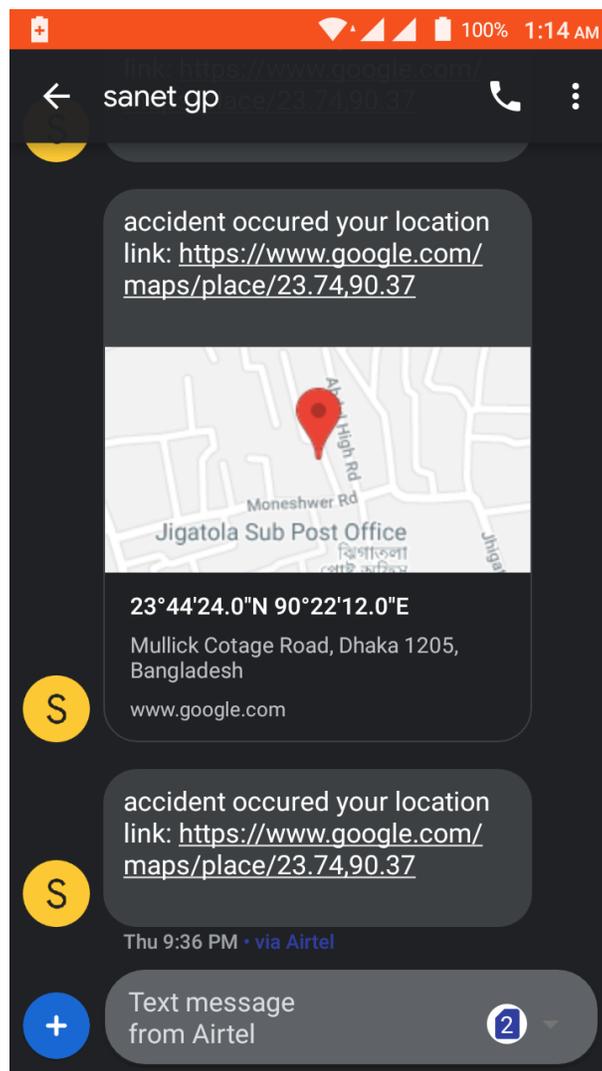


Fig-4.6: Sending SMS

## Show Location

In the figure-4.7, map is shown. When any users click the accident place link, the user see the place of accident by google map. By knowing the location, they can change their route to reach the destination place, ambulance will reach the accident location place to rescue the victims.



Fig-4.7: Location show

## 4.4 Testing

### Integration test

Integration testing is a level where individual modules are combined and tested as a group. It occurs after unit testing phase. Purpose of integrated testing is to expose faults in the interaction between integrated units [14]

Table 4.1 shows test cases, expected result and observed result for individual module of this system.

TABLE 4.1 INTEGRATION TEST

Test Case	Expected Result	Observed Result	Test result
When the accident occurred, Load cell should be able to detect the accident.	Can detect accident.	Can detect accident	Pass
GPS Module of this system should be able to detect vehicle location correctly	Location should be exact	Location is exact	Pass
GSM Module of this system should be able to send SMS.	SMS will be sent	SMS has been sent	Pass
Microcontroller should be able to send data to server using Wi-Fi Module.	Can send data to server	Can send	Pass
Microcontroller should be able to retrieve data from the server.	Can retrieve data	Can retrieve data	pass

TABLE 4.1: INTEGRATION TEST

## System test

System testing of software or hardware is conducted in complete and integrated system to evaluate its compliance with its specific requirements. System testing takes all integrated modules that have passed integrated testing as its input. System testing aims to detect any inconsistency between the units integrated together [15].

Table 4.2 shows test cases, expected result and observed result of system testing.

TABLE 4.2: SYSTEM TESTING

<b>Test Case</b>	<b>Expected Result</b>	<b>Observed Result</b>	<b>Test result</b>
User should be able to get SMS from this system successfully.	Can get SMS	Get SMS.	Pass
User should see the accident location.	Can see location	See location	Pass
Ambulance should be able to get the direction to reach the accident place.	Will get the direction	Get the direction	Pass
Authority should be able to update server data.	Can update server data	Server data can be updated	Pass

## CHAPTER 5

### Conclusion, Implication for Future Research

#### 5.1 Conclusion

In our study, we proposed and accomplished a smart accident detection and rescue system for Dhaka city. This system will assure the accident spot. The ambulance will get the direction through map. So that, the ambulance reaches the accident place without facing any trouble and the victim will reach the hospital on timely. This system will show an alternative road without that accident road. So, other user can reach their destination easily and save their time. Hence, it will reduce life risk of the victim. After all, we may hope for a better solution of smart accident detection and rescue system.

#### 5.2 Limitations

Firstly, this proposed system can only work if the load cell give output. Secondly, if the load cell presses unexpectedly then the whole system will be activated and send SMS to users/drivers and they get in trouble. Thirdly, if any sensor does not work properly, accident information will not send to the user. Fourthly, we place the load cells in front and back of vehicles. So, load cell can not be able to detect side accident.

#### 5.3 Comparison with Existing Systems

TABLE 5.1: COMPARISON BETWEEN EXISTING SYSTEMS AND OUR PROPOSED SYSTEM.

Subject	Existing Systems	Our Proposed System
Accident detection element	In other systems, they do not use any accident detection sensor.	In this system, we use load cell to detect accident.

Direction to the accident spot	This feature is not available in current systems.	This system provides direction and travel time.
Cost Effectiveness	Somewhere not cost-effective because of using Bluetooth Module.	Comparatively, cost capability as we are using existing vehicles, low cost Wi-Fi Module.

**5.4 Implication for Further Study**

In our present system, we are sending SMS whose information has saved in database. But we can send SMS specially. In future, when the vehicles cross a certain distance, sensor will give alert message. In present time, traffic signal control by traffic server. But in future, this feature will be added in traffic server. So, when the accident occurred, traffic light will be controlled by traffic server for the ambulance. In the future, accident status will be shown on billboard by LCD.

## Reference

- [1] Learn more, available at << <http://www.dhakatribune.com/bangladesh/development/2018/03/10/developing-bangladesh-new-identity/> >>, last access on 17-03-2019 at 2.00pm.
- [2] Learn about IoT, available at << <https://www.internetsociety.org/resources/doc/2015/iot-overview> >> last access on 17-03-2019 at 11.00pm
- [3] Anisur Rahman khan, Pranav Suri, Supriya Patil, Tejaswani Sonawane, Tejashree A. Paigude “Automatic Accident Detection”. International Journal for Engineering Science and computer-, Volume 8, Issue March 2018.
- [4] Prof. Pankaj A Bhoite, Koli Gopal, Wadile Saga, Tejaswini Sisodiya, Patil Satish “Accident Detection System Using Arduino”. International Science and technology journal- Volume 7, Issue 4, 2018.
- [5] Arsalan Khan, Farzana Bibi, Muhammad Dilshad, Salman Ahmed, Zia ullah, Haider Ali “Accident Detection and Smart Rescue System using Arduino Smartphone with Real-Time Location Tracking”. (IJACSA) International Journal of Advanced Computer Science and Application. Vol 9 No 6, 2018.
- [6] K. Sangeetha, P. Archana, M. Ramya, P. Ramya. IOSR Journal of Engineering (IOSRJEN). Vol. 04, Issue 02(February. 2014)|| V5|| PP 53-57.
- [7] S.George Fernandez, R. Palanisamy, K. Vijayakumar “GPS & GSM Based Accident Detection And Auto Intimation”. Indonesian Journal of Electrical Engineering and Computer Science. Vol.11, No.1, July 2018, pp 336-361.
- [8] Learn more about NodeMCU ESP8266, available at<< <https://en.wikipedia.org/wiki/NodeMCU/>>>, last access 25-03-2019 at 10.00am.
- [9] Learn more about Load Cell, available at<<<https://www.brighthubengineering.com/manufacturing-technology/48962-what-is-a-load-cell-how-does-it-work/>>>, last access 25-03-2019 at 10.30am.
- [10] Learn more about NEO-6M GPS Module << [http://wiki.sunfounder.cc/index.php?title=Ublox\\_NEO-6M\\_GPS\\_Module](http://wiki.sunfounder.cc/index.php?title=Ublox_NEO-6M_GPS_Module) >> , last access 25-03-2019 at 10.45am.
- [11] Learn more about SIM800 GSM Module <<<https://lastminuteengineers.com/sim800l-gsm-module-arduino-tutorial/>>>, last access 25-03-2019 at 11.00am.
- [12] Learn more about Android IDE, available at << <https://en.wikipedia.org/wiki/Arduino>>>last access 25-03-2019 at 11.15am.
- [13] Learn more about phpMyAdmin, available at<< <https://en.wikipedia.org/wiki/PhpMyAdmin> >>, last access 25-03-2019 at 11.30am.
- [14] learn more about Integration Testing, available at<<[https://en.wikipedia.org/wiki/Integration\\_testing](https://en.wikipedia.org/wiki/Integration_testing)>>, last access 25-03-2019 at 2.00pm
- [15] Learn more about system testing available at << [https://en.wikipedia.org/wiki/System\\_testing](https://en.wikipedia.org/wiki/System_testing) >>, last access 25-03-2019 at 5.00pm
- [16] Learn more about GPS device available at << <https://www.electronicwings.com/sensors-modules/gps-receiver-module> >>, last access 27-03-2019 at 10am

## **APPENDIX**

### **Appendix A: Global Positioning System (GPS)**

We have repeatedly said that in our documents about GPS, now we are going to illustrate it in details. The Global Positioning System (GPS) is a network of about 30 satellites orbiting the earth. It was originally developed by US government for military navigation. But now, anyone can use GPS device such as mobile phone or GPS device to receive the radio signal broadcast from satellite. At least four GPS satellites are visible from anywhere on the earth at any time. Each satellite transmitting their position with time at regular interval. A GPS device can detect its location when it can detect distance of at least three satellites [16].

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