ACCIDENT ALERT SYSTEM

PROJECT REPORT SUBMITTED BY

P J ROSHAN (ASI18CS091)
SRIVATHSAN (ASI18CS104)
VISHNU S NATH (ASI18CS113)
V KRISHNADEV (ASI18CS115)

Under the guidance of

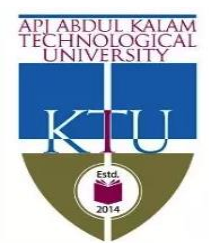
DIVYA K S
Assistant Professor, Computer Science and Engineering

In partial fulfillment of the requirements
For the award of the degree of

BACHELOR OF TECHNOLOGY

in

Computer Science and Engineering



The APJ Abdul Kalam Technological University

Adi Shankara Institute of Engineering and Technology, Kalady

June 2022

ACCIDENT ALERT SYSTEM

PROJECT REPORT SUBMITTED BY

P J ROSHAN (ASI18CS091)
SRIVATHSAN (ASI18CS104)
VISHNU S NATH (ASI18CS113)
V KRISHNADEV (ASI18CS115)

Under the guidance of

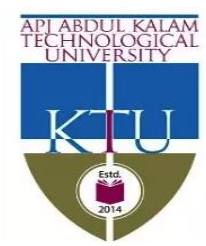
DIVYA K S
Assistant Professor, Computer Science and Engineering

In partial fulfillment of the requirements
For the award of the degree of

BACHELOR OF TECHNOLOGY

in

Computer Science and Engineering



The APJ Abdul Kalam Technological University

Adi Shankara Institute of Engineering and Technology, Kalady

June 2022

CERTIFICATE

Certified that this is a bonafide record of the project entitled

"**ACCIDENT ALERT SYSTEM**"

Submitted by

P J ROSHAN (ASI18CS091)

SRIVATHSAN (ASI18CS104)

VISHNU S NATH (ASI18CS113)

V KRISHNADEV (ASI18CS115)

during the year 2021-22 in partial fulfillment of the requirement for the award of the degree of

Bachelor of Technology in Computer Science and Engineering

Internal Guide **External Supervisor**

Project Coordinator **Head of the Department**

DECLARATION

We undersigned hereby declare that the project report "**Accident Alert System**", submitted for partial fulfillment of the requirements for the award of degree of Bachelor of Technology of APJ Abdul Kalam Technological University, Kerala is a bonafide work done by us under supervision of **Prof. Divya K S.** This submission represents our ideas in our own words and where ideas or words of others have been included, we have adequately and accurately cited and referenced the original sources. We also declare that we have adhered to ethics of academic honesty and integrity and have not misrepresented or fabricated any data or idea or fact or source in my submission. We understand that any violation of the above will be a cause for disciplinary action by the institute and/or the University and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been obtained. This report has not been previously formed the basis for the award of any degree, diploma or similar title of any other University.

KALADY SIGNATURE:

DATE: 29-06-2022

P J ROSHAN

SRIVATHSAN

VISHNU S NATH

V KRISHNADEV

ACKNOWLEDGMENT

At the very outset we would like to give the first honors to God, who gave the wisdom and knowledge to complete this seminar.

Our extreme thanks to **Dr. Suresh Kumar V**, Principal for providing the necessary facilities for the completion of this seminar in our college.

We sincerely extend our thanks to **Prof. R. Rajaram**, Dean Projects & Consultancy for all the help, motivation and guidance throughout the completion of this project.

We also like to extend our gratitude to **Dr. Manish T. I.,** HOD CSE for all the help, motivation and guidance throughout the project.

We wish to extend our sincere thanks to our project coordinator **Dr. Sanaj M S.** and our Project Guide **Prof. Divya K S**, for their valuable guidance and support throughout the project.

We also wish to thank all teaching and non-teaching faculty of the Computer Science and Engineering department for their cooperation.

We also thank our parents, friends and all well-wishers who supported directly or indirectly during the course of this project.

CONTENT

VISION AND MISSION OF THE DEPARTMENT

VISION

Nurturing globally competent Computer Science and Engineering graduates capable of taking challenges in the industry and Research & Development activities.

MISSION

- Imparting quality education to meet the needs of industry, and to achieve excellence in teaching and learning.
- Inculcating value-based, socially committed professionalism for development of society.
- Providing support to promote quality research.

ABSTRACT

Accidents have been a major cause of deaths in the present world. Over 1.3 million deaths happen each year from road accidents, with a further of about 25 to 65 million people suffering from mild injuries as a result of road accidents. This happens mainly due to the lack of timely help reaching the accident victims. So, in this project, we are building a system where if an accident has occurred, the hospital and other users who have registered are informed immediately. The IOT based system is designed to be installed in vehicles and provide immediate help to accident victims. The design consists of a collision detection hardware system installed in vehicles and an application in the smartphone of users who can provide immediate help to the victims such as hospitals, emergency services etc. in case of accident occurrence. This project report covers the various existing systems, its limitations and how it has been overcome in the designed system. The report also explains the working of the system and its applications designed in the project. It also covers the future scope of this project which further enhances the features of this project.

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

API	Application Programming Interface
ECU	Electronic Control Unit
GPS	Global Positioning System
IoT	Internet of Things
JSON	JavaScript Object Notation
OBU	On-Board Unit
SDK	Software Development Kit
VANET	Vehicular Ad-hoc Network
V2I	Vehicle-to-Service Unit
V2V	Vehicle-to-Vehicle communication

CHAPTER 1
INTRODUCTION

Accidents have been a major cause of deaths in India. More than 80% of accident-related deaths occur not due to the accident itself but the lack of timely help reaching the accident victims. In many situations the family members or emergency services are not informed in time. This results in delayed emergency service response time, which can lead to an individual's death or cause severe injury. Here we are building a system where if once an accident has occurred, the nearest hospitals are informed immediately. The aim of our project is to detect accidents accurately and to reduce the response time of emergency services in situations like traffic accidents.

Here we have a model which uses parameters of sensors fitted in the vehicle to determine if an accident has occurred and notifies the concerned people to provide help as soon as possible. It is an IoT based project that consists of a hardware device which works along with an android application to provide emergency services to accident victims. This document lays out a plan for an Accident Alert System specifying the software requirements and the algorithms used in accomplishing the objective of the project.

1.1 INTERNET OF THINGS (IoT)

The Internet of Things, or IoT, refers to the billions of physical devices around the world that are now connected to the internet, all collecting and sharing data. Connecting up all these different objects and adding sensors to them adds a level of digital intelligence to devices that would be otherwise dumb, enabling them to communicate real-time data without involving a human being. The Internet of Things is making the fabric of the world around us smarter and more responsive, merging the digital and physical universes. An IoT ecosystem consists of web-enabled smart devices that use embedded systems, such as processors, sensors and communication hardware, to collect, send and act on data they acquire from their environments. IoT devices share the sensor data they collect by connecting to an IoT gateway or other edge device where data is either sent to the cloud to be analyzed or analyzed locally. Sometimes, these

devices communicate with other related devices and act on the information they get from one another. The devices do most of the work without human intervention.

1.2 FIREBASE

The Firebase Realtime Database is a cloud-hosted NoSQL database that lets you store and sync data between your users in real time. It is a big JSON object which the developers can manage in real-time. By using a single API, the Firebase database provides the application with the current value of the data and updates to that data. Real-time syncing makes it easy for our users to access their data from any device, be it web or mobile. The Realtime database helps our users collaborate with one another. It ships with mobile and web SDKs, which allow us to build our app without the need for servers. When our users go offline, the Real-time Database SDKs use local cache on the device for serving and storing changes. The local data is automatically synchronized, when the device comes online.

1.3 THUNKABLE

Thunkable is a free platform to build iOS, Android, and web apps without code. Creators can design their user interface and how their apps look by moving design features called “components” around a simulated phone screen. Instead of typing computer instructions, Thunkable creators drag blocks to program what the app should do when the user interacts with the app.

CHAPTER 2
LITERATURE SURVEY

There are many accident alert systems available on the market and a number of projects have also been developed for the same cause. Even though the motive behind all these systems is to save people's lives, they differ in technology, complexity, cost etc.

In [1], a prototype of the smart helmet called Konnect is described. An integrated network of sensors, Wi-Fi enabled processor, and cloud computing infrastructures are utilized to build the smart helmet for accident detection and notification. The helmet is designed to detect an accident and immediately alert emergency contacts. A 3-axis accelerometer is used to continuously monitor the head orientation of the driver and the helmet's position and hence calculate the possibility of an accident. When the threshold limit is exceeded a text message containing the location of the driver is automatically initiated to the emergency contacts.

In [2], the system makes use of fog technology to achieve a quicker response time. For accident detection purposes, it employs android devices, and instead of using extra hardware, it utilizes built-in sensors of android devices. Data gathered from sensors is processed for accident detection on end nodes. This results in a system that is cost-effective and provides a quick real-time response.

In [3], The major objective of the plan is to generate a method that decreases the cost of deployment. VANET is the most beneficial answer to the critical obstacle since modern cars are implemented with wireless interfaces. A communication technology V2I (vehicle to service unit) and V2V (communication between vehicles) are used to provide rescue services. VANET is a vehicular ad-hoc network that is composed to manipulate vehicles in the network environment with an inexpensive deployment charge. This technology is applied to disseminate the message in the vehicular environment to transmit an alert to the neighboring vehicles to report the collisions and utility of another path, so an ambulance will take the less congested path to provide rescue services in a collision situation. The OBUs are used to detect the accident and

send the alert message to the server unit.

In [4], the purpose of the research was to design and implement an automated system that uses smartphones to detect vehicle accidents and report them to the nearest available responders to help counter these emerging problems and reduce casualties as much as possible. The detection system would help reduce fatalities due to vehicle accidents by decreasing the response time of emergency services. The system will also provide other emergency services like Fire Brigade, Police Department and Medical emergency services.

Table 2.1: Comparison of various Accident Alert System Researches

Title	Research Contribution	Limitation
Konnect: An Internet of Things (IoT) based smart helmet for accident detection and notification	The accident detection system communicates the accelerometer values to the processor which continuously monitors for erratic variations. When an accident occurs, the related details are sent to the emergency contacts by utilizing a cloud-based service. The vehicle location is obtained by making use of the global positioning system	False accident alerts, Accident occurrence confirmation
Fog Computing based Automated Accident Detection and Emergency Response System using Android Smartphone	The system uses built-in sensors of the android device for detecting accidents. Data gathered from sensors is processed for accident detection on end nodes. In the Response phase, the location of the user's smartphone is tracked through GPS, which is then forwarded to the nearest hospital and the nearest ambulance. SMS is forwarded and the ambulance is guided through the shortest path to the site of the accident.	The evaluation is based on simulation and simulation can't account for every scenario and situation in the real world. Hence, the limited scope of simulation also limits the generalization of this solution and places constraints on the achieved results.
A VANET-IoT based accident	In this paper, a novel architecture for accident	In this study, the researchers do not focus on

detection and management system for the emergency rescue services in a smart city	management systems is proposed. Two protocols, random waypoint mobility and RPL routing protocol are implemented for transmitting the message for accident detection and management. A fusion concept of IoT and VANET was used in this system	producing an efficient solution to manage the accident event.
Accident detection and smart rescue system using an Android smartphone with real-time location tracking	This uses an onboard accelerometer sensor to detect an accident and generate an emergency alert and send it to the nearest emergency responder and will also send an SMS to emergency contact containing the location coordinates of the accident	The responder needs to have the application installed on his smartphone to receive notification of accident alerts.

2.1 EXISTING SYSTEMS

Listed below are few of the available accident alert systems in the market.

2.1.1 Ajjas Maximizer

Figure 2.1: Ajjas Maximizer

Ajjas is GPS tracking, Accident alert & Theft protection device that helps safeguard your vehicle against theft & informs your loved ones in case of an accident. It is initiated every time the engine is switched ON. Ajjas device initiates a call to 3 emergency contacts when the 2-wheeler meets with an accident. When the 2-wheeler is parked and experiences a fall, the user is notified.

Ajjas comes with inbuilt SIM. We do not cut any wires of the vehicle and it doesn't consume any battery when the vehicle is not moving & the engine is off.

2.1.2 CARTRACK Car Crash Alert System

Figure 2.2: CARTRACK Car Crash Alert System

Crash Alert is a rapid response alert system that enables faster notifications and emergency reactions in your time of need. The system reacts in the event of vehicle accidents, through the real-time analysis of telematics data and 24/7 emergency support center. The claims of the device are fast, precise accident location gathering and stolen vehicle recovery.

2.1.3 SOSmart Automatic Car Crash Detection System

Figure 2.3: SOSmart Automatic Car Crash Detection System

SOSmart detects car accidents using the internal sensors (Accelerometer and GPS) of your smartphone and sends notification to pre-selected emergency contacts. The app automatically starts monitoring when the vehicle starts moving. It is designed using real car crash data from the National Highway Traffic Safety Administration. The app also provides a list of nearby hospitals and shows you directions to get there as quickly as possible. It will produce a loud alarm on the phones of emergency contacts and has a good user interface as well.

CHAPTER 3
SYSTEM DESIGN

3.1USE CASE DIAGRAM

Use case diagram is used to show which operations are performed by the user and which operations are performed by the system.

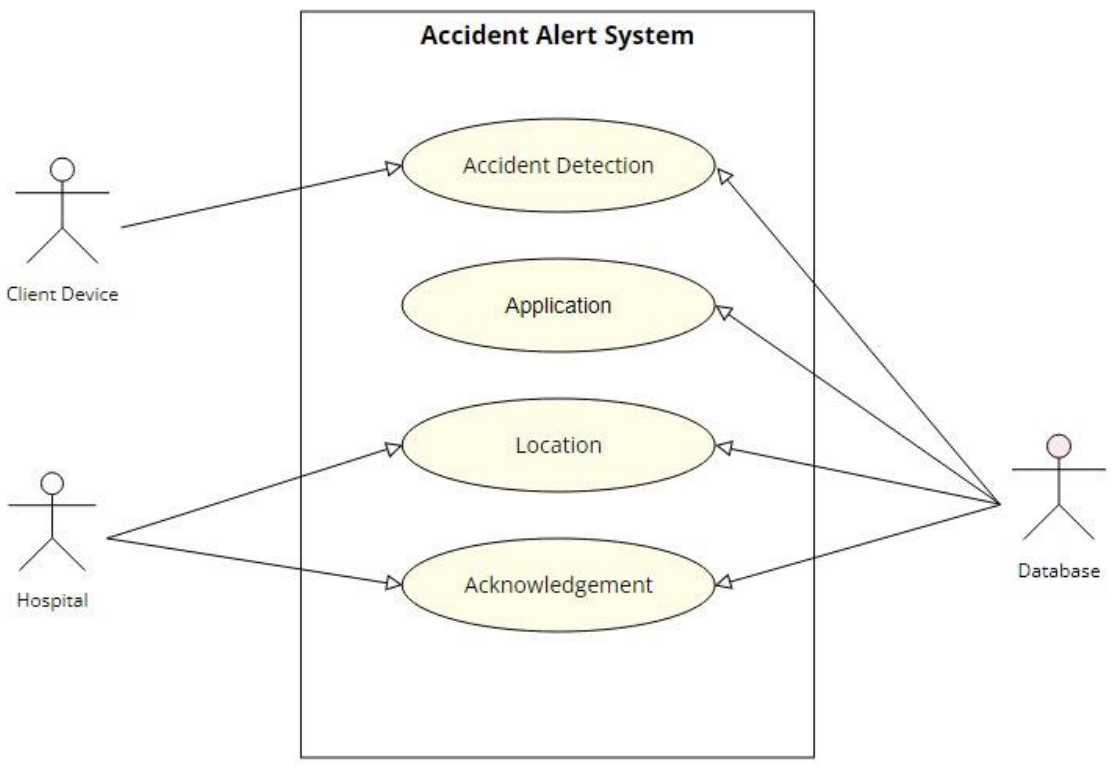


Figure 3.1 Use Case Diagram

3.2.STATE DIAGRAM

State Diagram describes the behavior of the system. It contains a finite number of states to show the working of the system.

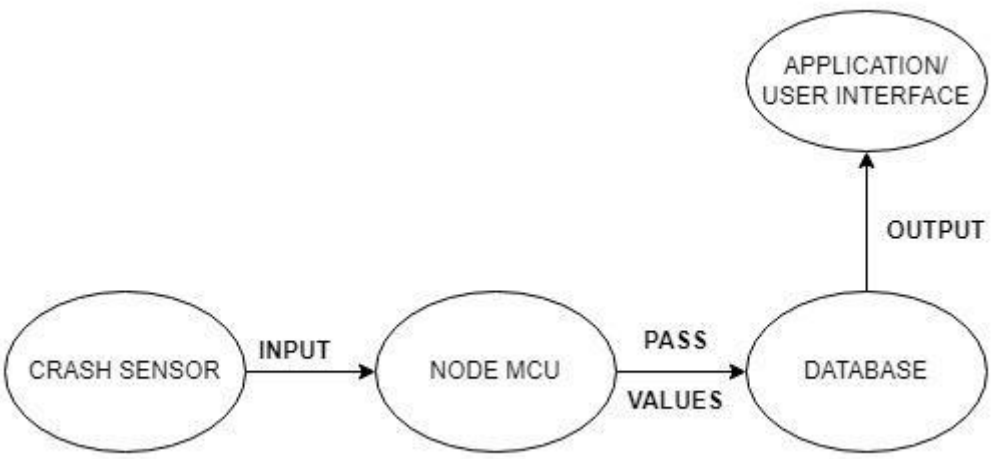


Figure 3.2 State Diagram

3.3 ACTIVITY DIAGRAM

Activity Diagram shows the active flow of the system. In the diagram the flow of our project on how the data flow is shown.

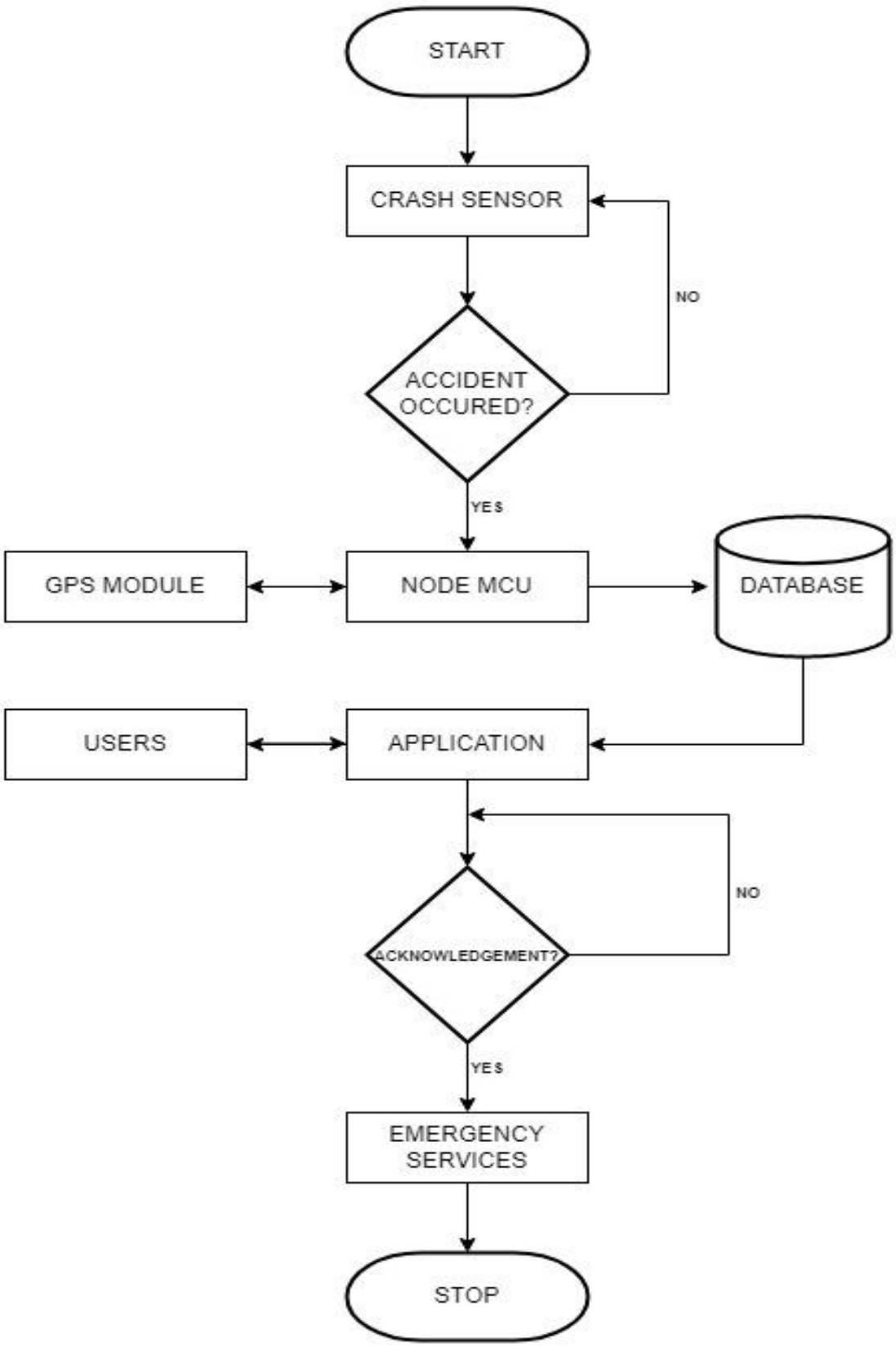


Figure 3.3 Activity Diagram

3.4 SEQUENCE DIAGRAM

In the sequence diagram step by step sequence of steps is shown.

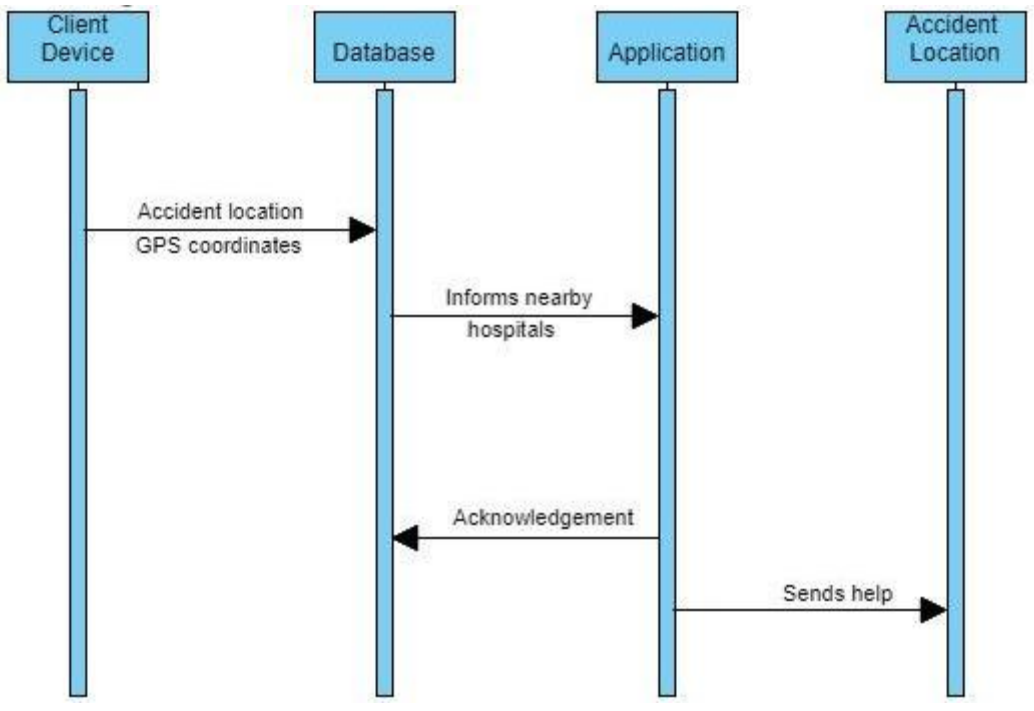


Figure 3.4 Sequence Diagram

3.5 CLASS DIAGRAM

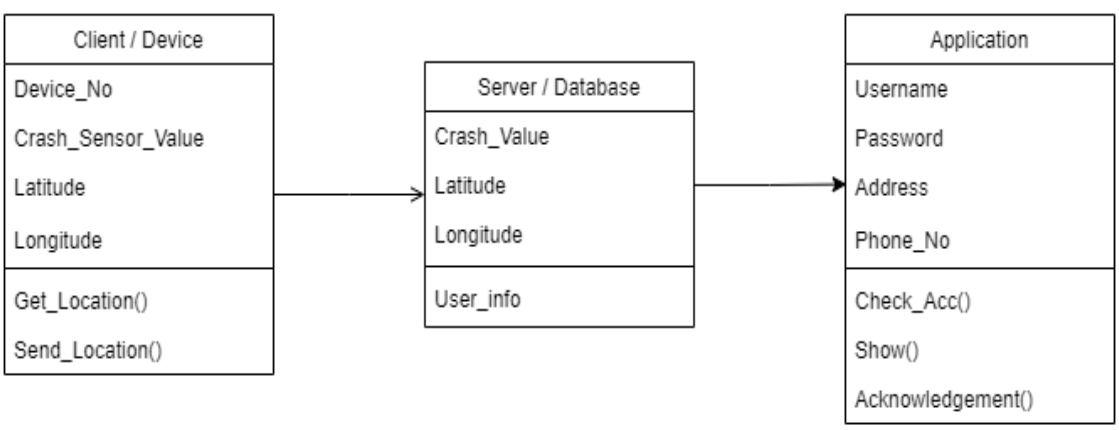


Figure 3.5 Class Diagram

CHAPTER 4
ARCHITECTURE OF ACCIDENT ALERT SYSTEM

The Accident Alert system consists of a hardware device and an application which works alongside. The hardware is an IoT based system which can be installed in client vehicles.

4.1 REQUIREMENTS

4.1.1 Hardware Requirements

1. Node MCU - ESP8266
2. GPS NEO-6m module
3. MEAS piezo electric sensor
4. LED
5. Connecting wires
6. Laptop

4.1.2 Software Requirements

1. Arduino IDE
2. Firebase Database
3. Thunkable
4. Google Cloud Console

4.2 CIRCUIT DIAGRAM

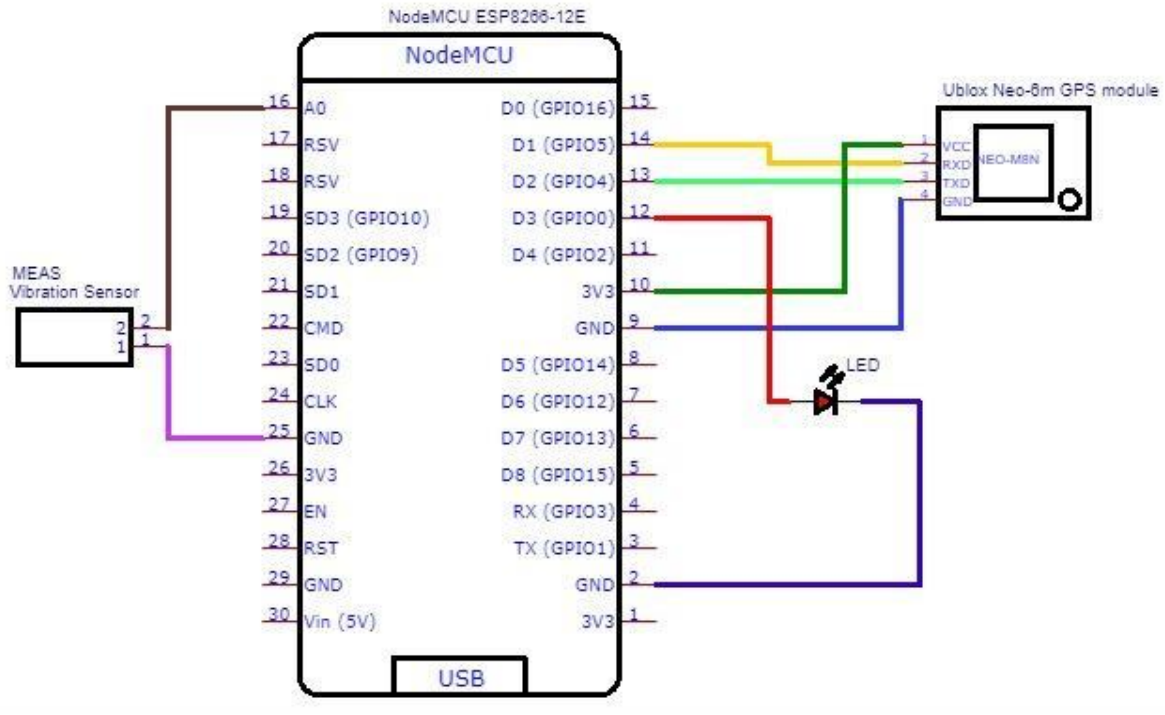


Figure 4.1: Circuit Diagram

4.3 NODE MCU CODE

```
#include <TinyGPS++.h>
#include <Arduino.h>
#include <SoftwareSerial.h>
#if defined(ESP32)
#include <WiFi.h>
#elif defined(ESP8266)
#include <ESP8266WiFi.h>
#endif
#include <Firebase_ESP_Client.h>
//.....
TinyGPSPlus gps;  // The TinyGPS++ object
SoftwareSerial ss(4, 5); // The serial connection to the GPS device

float latitude , longitude;
```

```
String date_str , time_str , lat_str , lng_str;
int pm;
//.....
//Provide the token generation process info.
#include "addons/TokenHelper.h"
//Provide the RTDB payload printing info and other helper functions.
#include "addons/RTDBHelper.h"

// Insert your network credentials
#define WIFI_SSID "<wifi_ssid>"
#define WIFI_PASSWORD "<wifi_password>"

// Insert Firebase project API Key
#define API_KEY "AIzaSyCamMZzBdByohzWrkAmN4YPYweMCrwy9_E"

// Insert RTDB URLefine the RTDB URL */
#define DATABASE_URL "https://trioacc-2531f-default-rtdb.asia-
southeast1.firebasedatabase.app/"

//Define Firebase Data object
FirebaseData fbdo;

FirebaseAuth auth;
FirebaseConfig config;

unsigned long sendDataPrevMillis = 0;
int count = 0;
bool signupOK = false;

const int PIEZO_PIN = A0; // Piezo output
int LED = 0; // Assign LED pin i.e: D3 on NodeMCU
void setup(){
```

```
 Serial.begin(115200);
 ss.begin(9600);
 pinMode(LED, OUTPUT);
 WiFi.begin(WIFI_SSID, WIFI_PASSWORD);
 Serial.print("Connecting to Wi-Fi");
 while (WiFi.status() != WL_CONNECTED){
  Serial.print(".");
  delay(300);
 }
 Serial.println();
 Serial.print("Connected with IP: ");
 Serial.println(WiFi.localIP());
 Serial.println();

 /* Assign the api key (required) */
 config.api_key = API_KEY;

 /* Assign the RTDB URL (required) */
 config.database_url = DATABASE_URL;

 /* Sign up */
 if (Firebase.signUp(&config, &auth, "", "")){
  Serial.println("ok");
  signupOK = true;
 }
 else{
  Serial.printf("%s\n", config.signer.signupError.message.c_str());
 }
 /* Assign the callback function for the long running token generation task */
 config.token_status_callback = tokenStatusCallback; //see addons/TokenHelper.h
 Firebase.begin(&config, &auth);
 Firebase.reconnectWiFi(true);
```

```
}
void loop () {
 //.....
 int piezoADC = analogRead(PIEZO_PIN);
 float piezoV = piezoADC / 1023.0 * 5.0;
 if (Firebase.ready() && signupOK ) //&& (millis() - sendDataPrevMillis > 15000 ||
sendDataPrevMillis == 0))
 {
  //.....
  while (ss.available() > 0)
  if (gps.encode(ss.read()))
  {
   if (gps.location.isValid())
   {
    latitude = gps.location.lat();
    lat_str = String(latitude , 6);
    longitude = gps.location.lng();
    lng_str = String(longitude , 6);
   }
  }
  //.....
  if(piezoV>=0.20)
  {
   Firebase.RTDB.setFloat(&fbdo, "test/CrashValue", piezoV);
   Firebase.RTDB.setDouble(&fbdo, "test/Lat", latitude);
   Serial.println(latitude);
   Firebase.RTDB.setDouble(&fbdo, "test/Lng", longitude);
   Firebase.RTDB.setInt(&fbdo, "Flag", 1);
   digitalWrite(LED, HIGH); // turn the LED on
   delay(2000); // wait for a second
   digitalWrite(LED,LOW);
  }
```

```
 }
}
```

4.4 NODE MCU ESTABLISHING CONNECTION WITH DATABASE

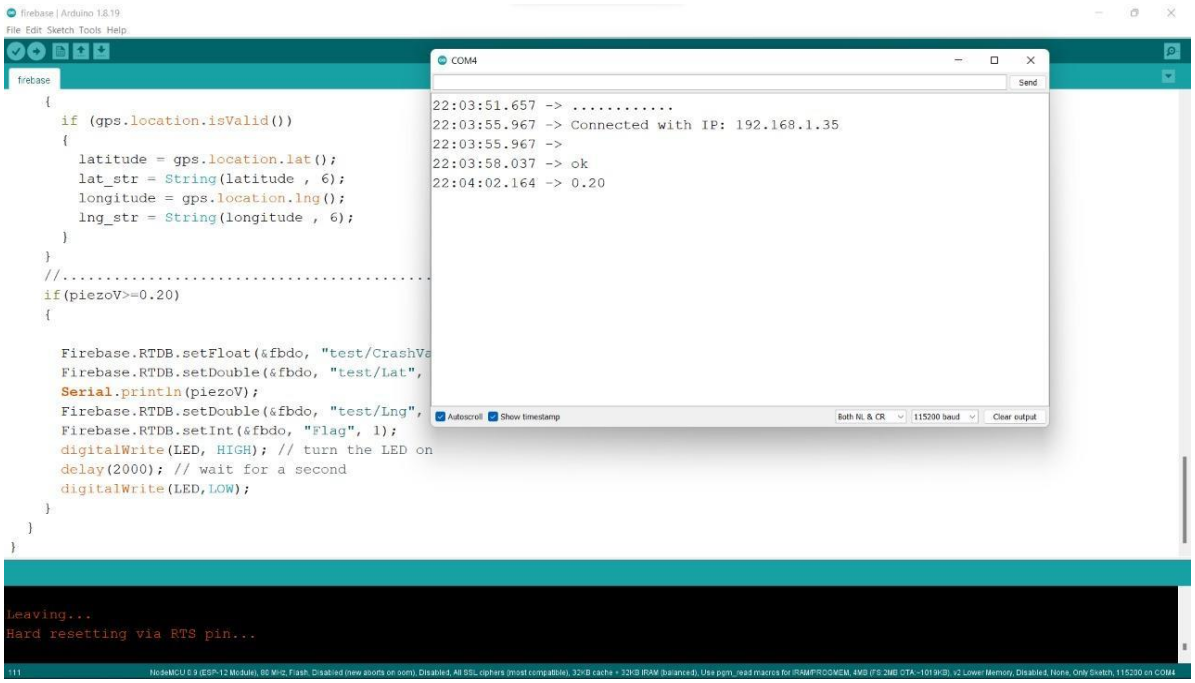


Figure 4.2: Interfacing NodeMCU with Arduino IDE

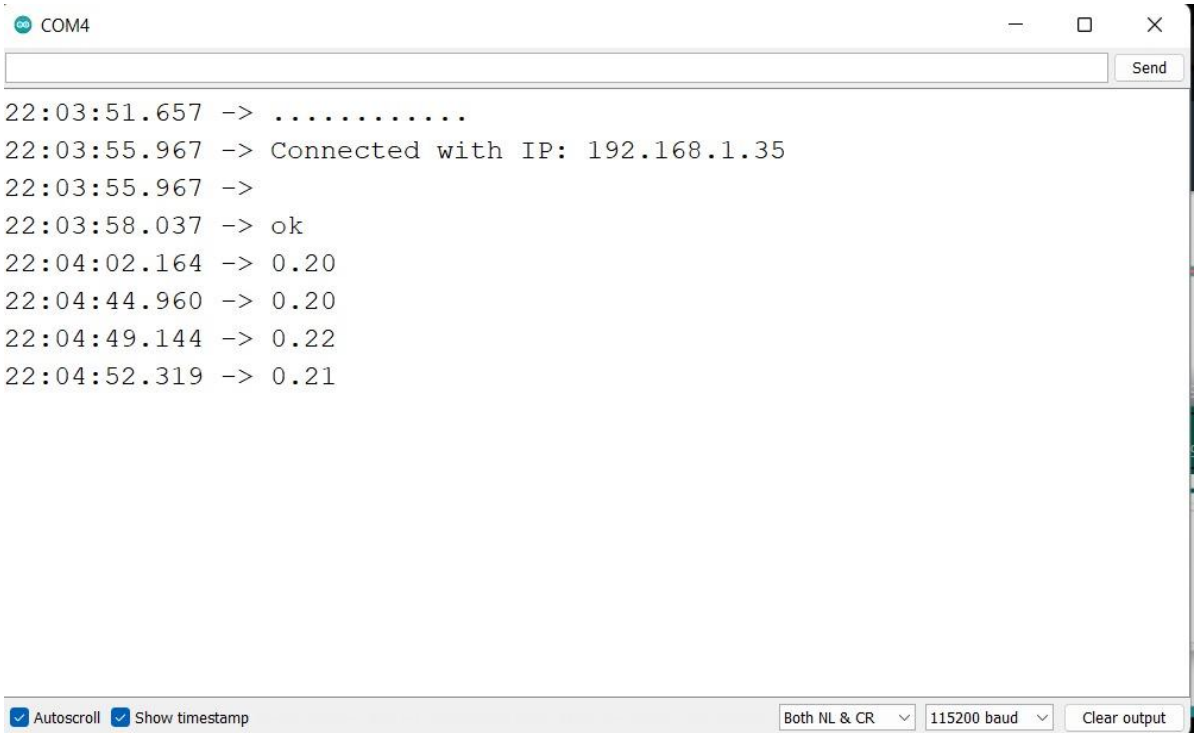


Figure 4.3: Connecting NodeMCU to a network

4.5 FIREBASE REAL-TIME DATABASE

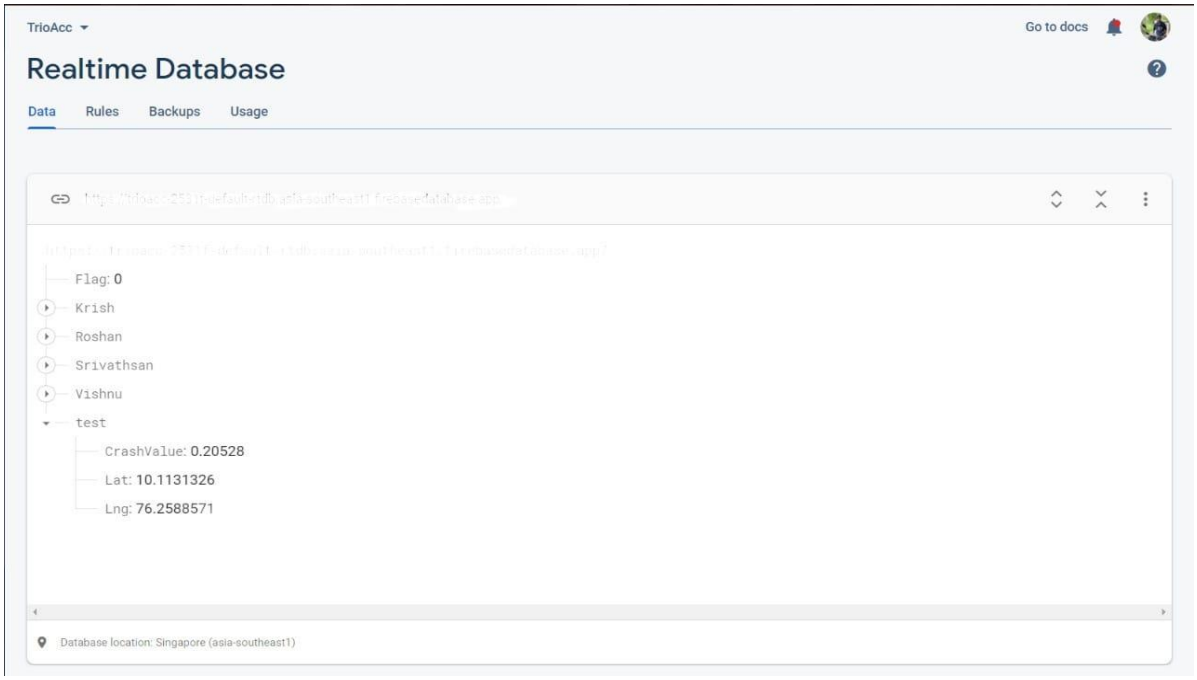


Figure 4.4: Firebase Real-Time Database

4.6 APPLICATION BACKEND

Figure 4.5: Thunkable Code Block for Home

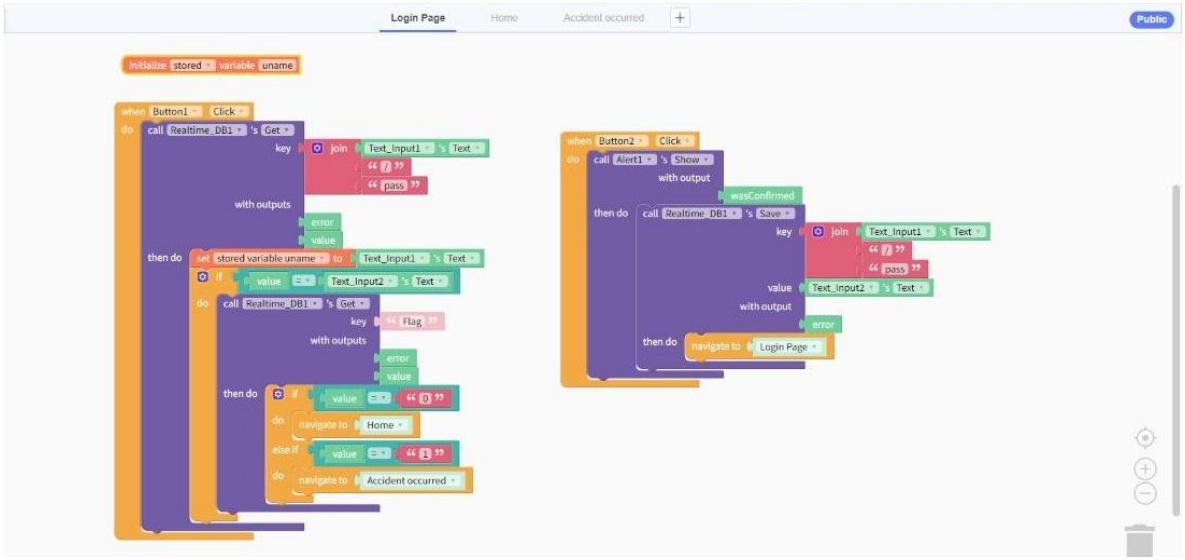


Figure 4.6: Thunkable Code Block for Login Page

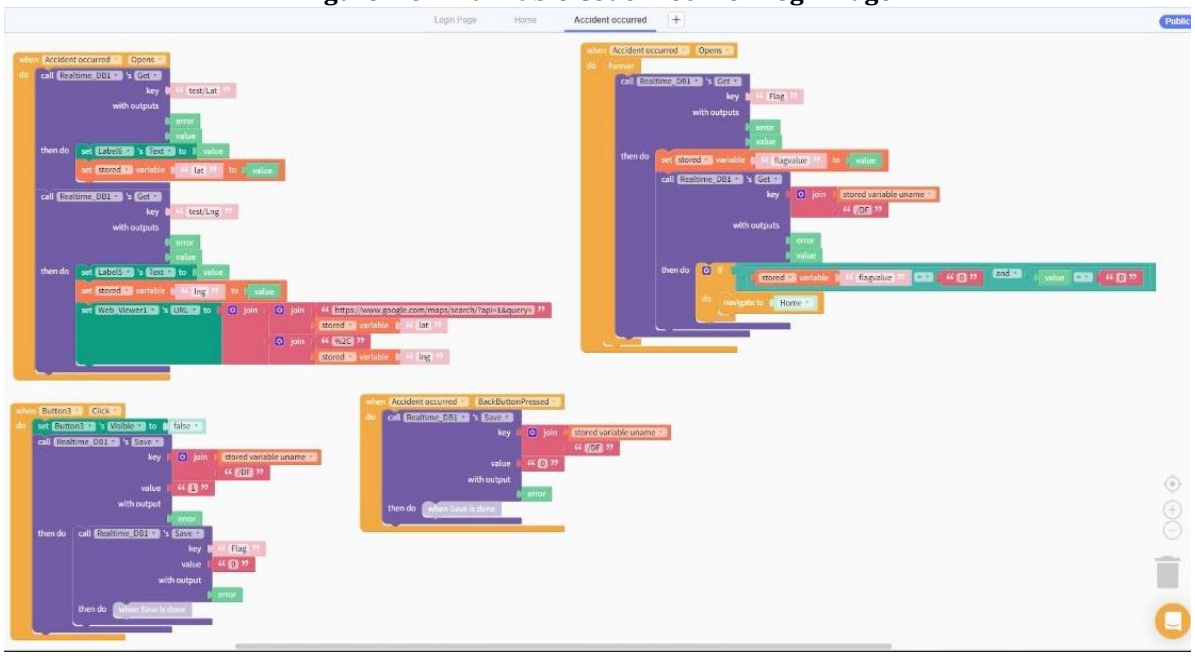


Figure 4.7: Thunkable Code Block for Accident Detection

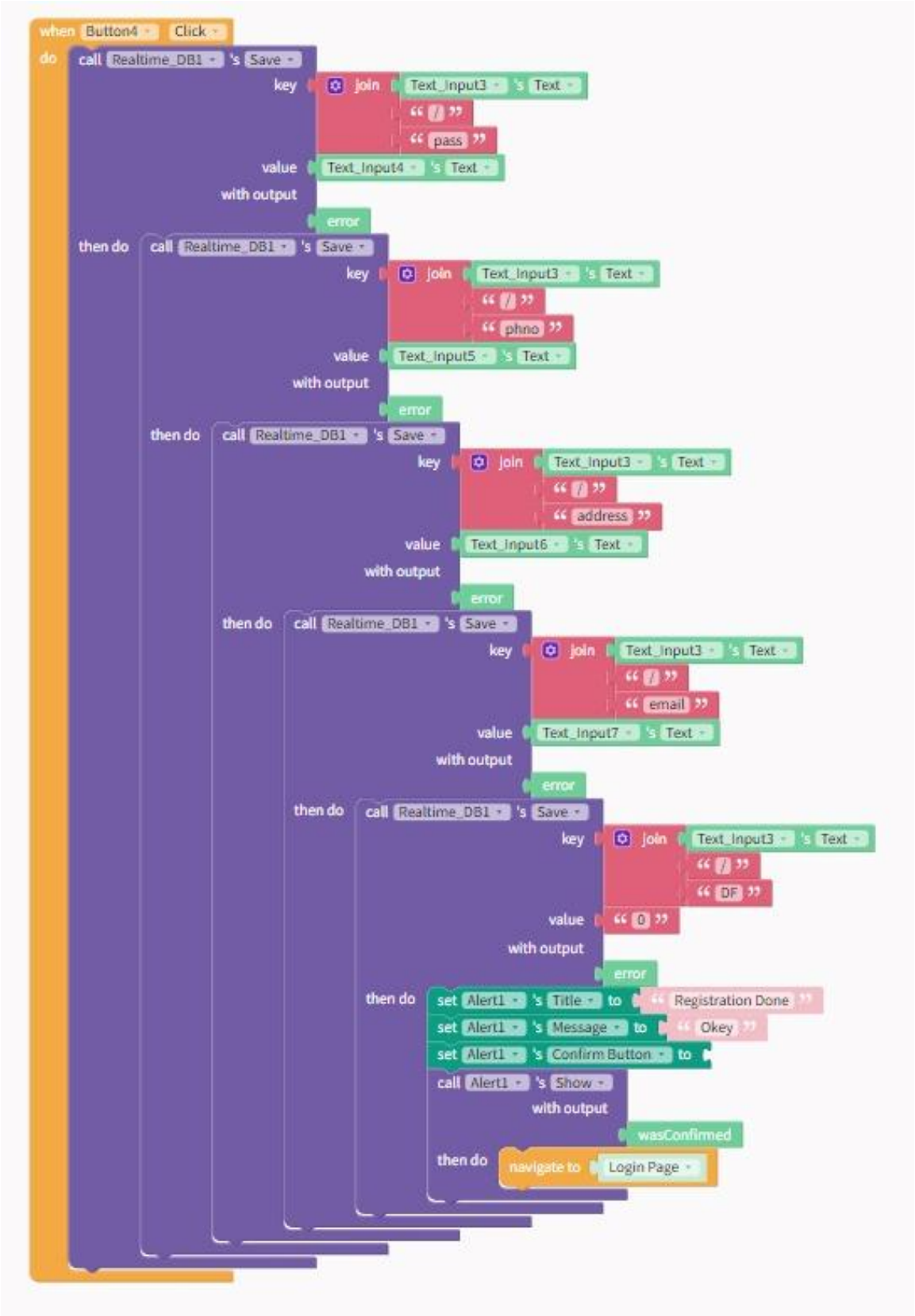


Figure 4.8: Thunkable Code Block for User Registration

CHAPTER 5
RESULT AND ANALYSIS

5.1 USER INTERFACE

5.1.1 User Interface Screenshots

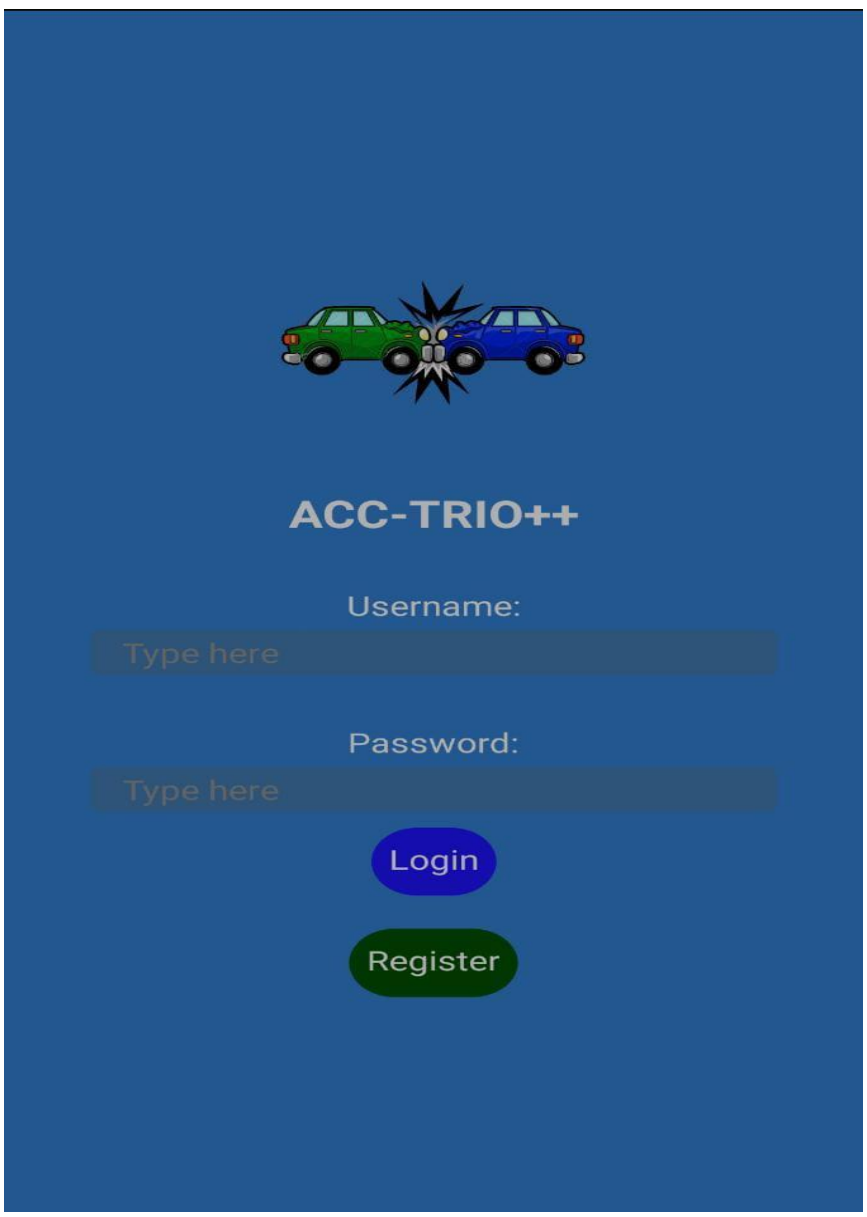


Figure 5.1: Login Page

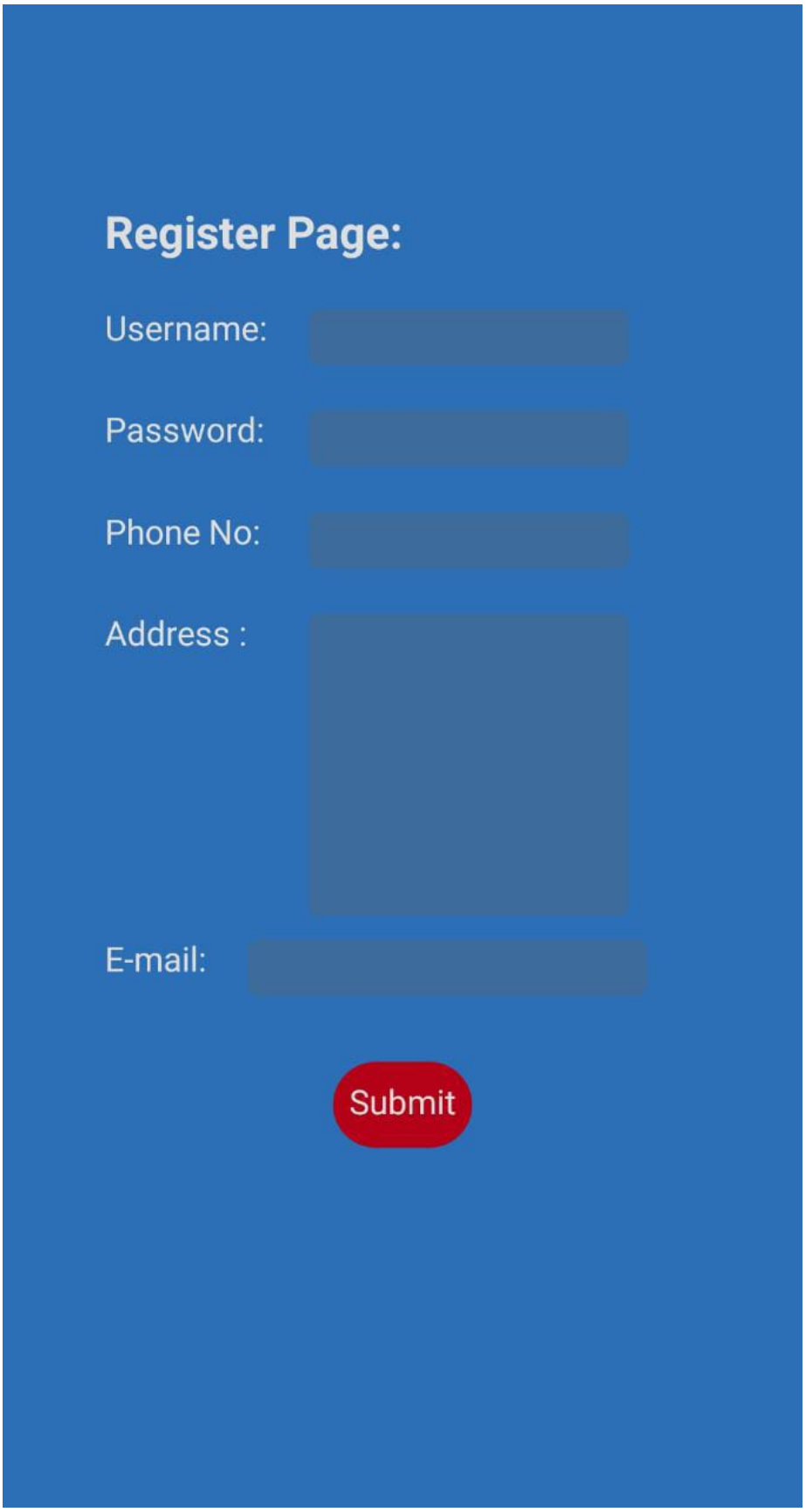


Figure 5.2: Registration Page for New Users

Figure 5.3: Home Page (When no accident has occurred)

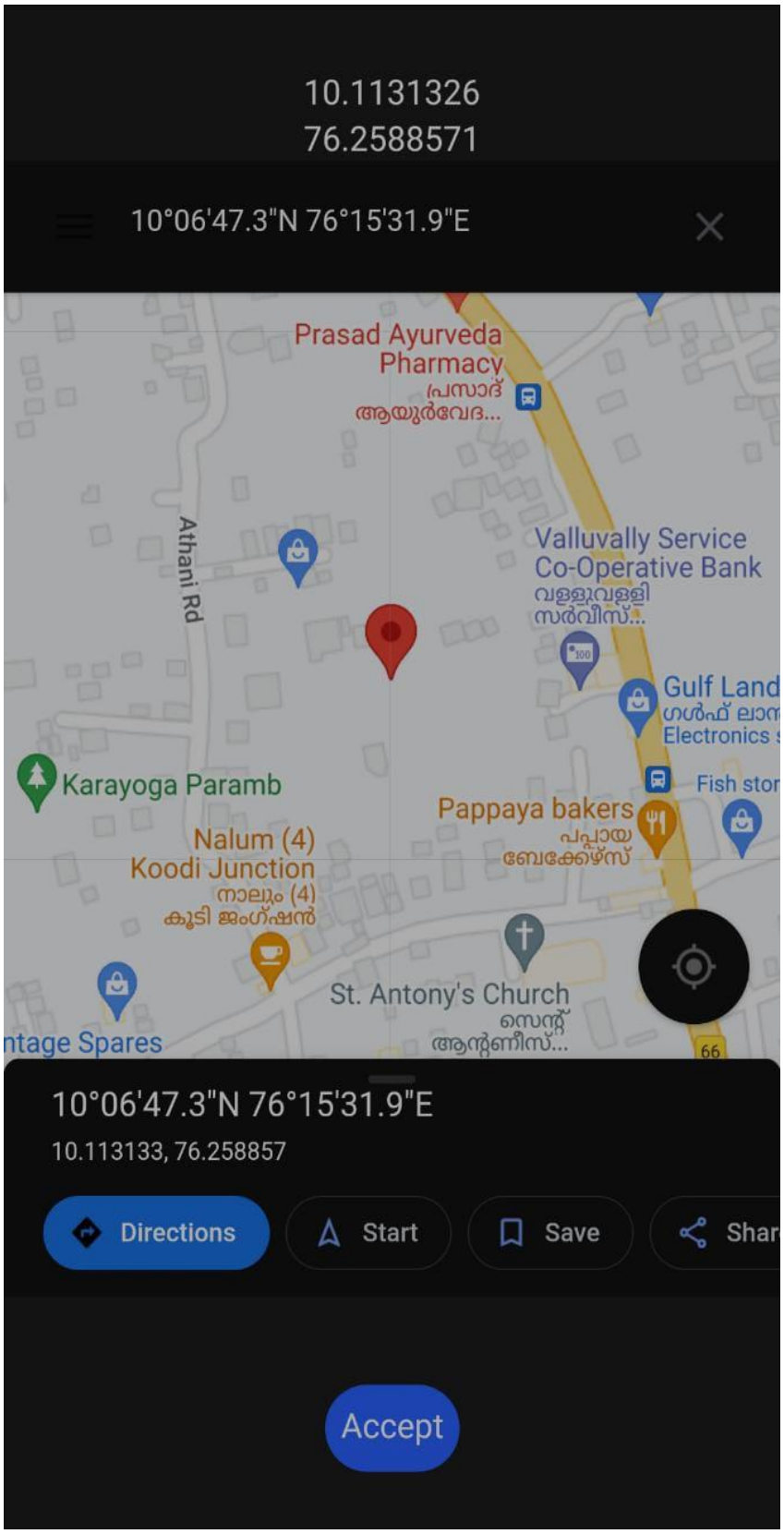


Figure 5.4: Home Page (When accident has occurred)

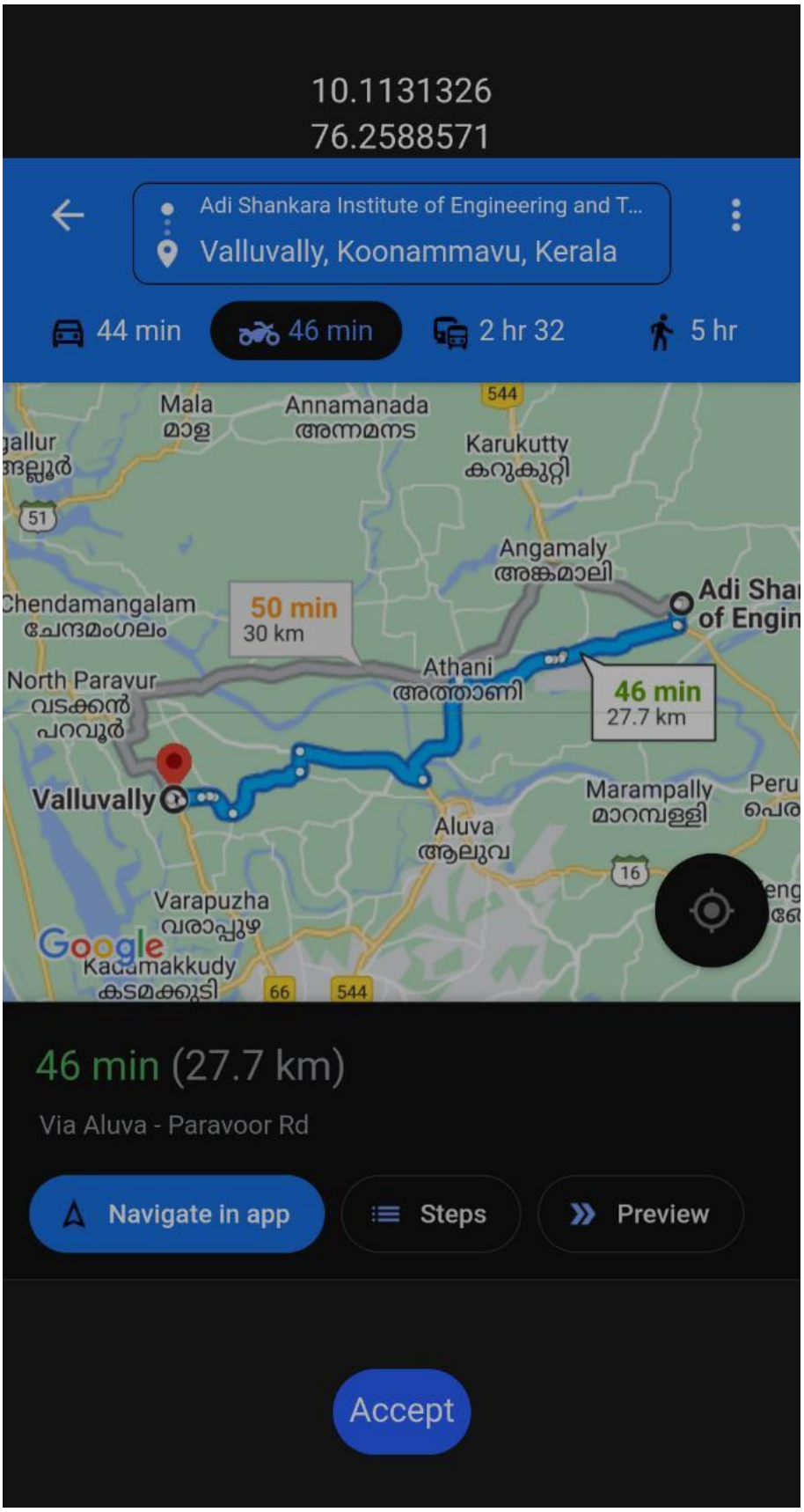


Figure 5.5: Directions to the destination from user's current location

CHAPTER 6
ADVANTAGES

- Real-time information sharing

  Accident detection and location information is shared in real-time making it more efficient

- Reduced risk of false alerts

  The value from the crash sensor is verified, so that it does not produce a false alert on small jerks or shakes.

- Better Accuracy

  Accuracy on accident detection and accident location has been ensured.

- Low cost

  The project is implemented and developed to reach users belonging to various economic levels in the society. Thus, cost has been minimized.

- Crash Data

  Crash levels are stored in a real time database which can be used for implementing future scopes.

CHAPTER 7
DISADVANTAGES

The system comes with certain disadvantages:

- The accuracy and efficiency of the GPS module depends on signal, if it's lost then location won't be accessible.
- The application is prone to crashing at times.
- Huge impact to the hardware from collision may cause damages.

CHAPTER 8
APPLICATIONS

Every application of the Accident Alert System will ensure more safe and secure driving. Vehicle manufacturing companies can include our system in their vehicles. Working alongside the manufacturers will allow our system to be more efficient and effective. Also, the system can be modified to work with specific features of the vehicle.

By adding multiple camera modules to the system, live accident visuals from multiple angles can be obtained. These accident visuals can be recorded and used for insurance claims, legal purposes etc.

Every time the vehicle collides, the crash sensor senses it and passes a value to the database. This real-time crash data can be used as a reference to increase accuracy of upcoming systems in the future. Also, research can be done to introduce new technologies to this field.

CHAPTER 9
SUMMARY

In this project an IoT based Accident Alert System was developed and discussed. The Internet of Things (IoT) describes the network of physical objects that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet. An application was built using Thunkable and the crash data was managed through Firebase Realtime database. A number of existing systems and three systems available in the market - Ajjas Maximiser, Cartrack and SOSmart were studied. The working of the system is shown using different diagrams. The circuit diagram of the hardware device, the Arduino code and working of the realtime database is also discussed. Thunkable is a platform where developers can develop applications without code. The backend of the application is also discussed in the report. The system is efficient enough to provide immediate help to accident victims. The stakeholders of the project include vehicle manufacturers, passengers, hospitals, emergency services etc. The system has great future scope and can be scaled to meet higher needs.

CHAPTER 10
CONCLUSION

Accidents are one of the most common problems that humanity faces on a daily basis, leading to loss of both life as well as property. The proposed system provides a very viable and effective solution to this problem. The proposed vehicle accident detection system can track an accident at its moment of occurrence and sends an instantaneous alert to registered hospitals, so that emergency services can reach on time. Here we have a model which uses parameters of sensors fitted in the vehicle to determine if an accident has occurred and notifies the concerned people to provide help as soon as possible. This system has many stakeholders such as vehicle manufacturers, passengers, hospitals, emergency services and other user contacts. Thus, the project works towards a social cause and helps create a system which guarantees that no individual is left unattended or helpless in an unforeseen event of an accident, in turn, securing and maintaining the quality of life to the highest standards.

CHAPTER 11
FUTURE ENHANCEMENT

This project has great future potential. The stakeholders of the Accident Alert System application can be extended to work with all hospitals on the map, rather than registered users. In the near future, we can integrate our system with the vehicle's ECU for better gathering of information regarding the condition of the vehicle when the accident takes place. We can also improve the User-Interface of our application and incorporate more features like integrating a camera and with the help of machine learning, we can detect whether the seat belt of the vehicle is fastened, whether the driver is feeling drowsy etc.

The crash data recorded in the realtime database can be used for research purposes, so that more technology can be introduced to reduce road accidents. Accident prevention services can also be added along with accident alert services. The device can be upgraded to perform with the ECU and infotainment system of the vehicle to provide features like automatic braking, lane detection etc. Also alerts regarding low tyre pressure, engine problems can be provided.

CHAPTER 12
PUBLICATIONS

The survey paper titled "Survey on Existing Accident Alert Systems" was published in Volume 8, Issue 3, May-June-2022 of International Journal of Scientific Research & Engineering Trends (IJSRET).

Publication Link:
https://ijsret.com/wp-content/uploads/2022/05/IJSRET_V8_issue3_331.pdf

REFERENCES

[1] Chandran, Sreenithy, Sneha Chandrasekar, and N. Edna Elizabeth. "Konnect: An Internet of Things (IoT) based smart helmet for accident detection and notification." 2016 IEEE Annual India Conference (INDICON). IEEE, 2016.

[2] Dar, B. K., Shah, M. A., Shahid, H., & Naseem, A. (2018, November). Fog computing based automated accident detection and emergency response system using android smartphone. In 2018 14th International Conference on Emerging Technologies (ICET) (pp. 1-6). IEEE.

[3] Kaur, Manjinder, Jyoteesh Malhotra, and Pankaj Deep Kaur. "A VANET-IoT based accident detection and management system for the emergency rescue services in a smart city." In 2020 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO), pp. 964-968. IEEE, 2020.

[4] Khan, Arsalan, Farzana Bibi, Muhammad Dilshad, Salman Ahmed, Zia Ullah, and Haider Ali. "Accident detection and smart rescue system using an Android smartphone with real-time location tracking." International Journal of Advanced Computer Science and Applications 9, no. 6 (2018): 341-355.

[5] Devi, G. Suriya Praba, and JC Miraclin Joyce Pamila. "Accident alert system application using a privacy-preserving blockchain-based incentive mechanism." 2019 5th International Conference on Advanced Computing & Communication Systems (ICACCS). IEEE, 2019.

[6] Ghosh, S., Sunny, S. J., & Roney, R. (2019, March). Accident detection using convolutional neural networks. In 2019 International Conference on Data Science and Communication (IconDSC) (pp. 1-6). IEEE.

[7] Khan, A., Bibi, F., Dilshad, M., Ahmed, S., Ullah, Z. and Ali, H., 2018. Accident detection and smart rescue system using Android smartphone with real-time location tracking. International Journal of Advanced Computer Science and Applications, 9(6), pp.341-355.

[8] Rao, S. Vinod, P. Saketh Kumar, N. Anil Kumar, MD Saleem Yusuf, and B. Krishna. "Smart zone based vehicle speed control using RF and obstacle detection and accident prevention." International Journal of Emerging Technology and Advanced Engineering 4, no. 3 (2014): 13-16.