Project Report
On
Shuttle Cab Tracker

Submitted for the course: Technical Answers For Real World Problems(TARP)

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ABSTRACT

Internet of Things (IOT) has opened wide dimension in today's world. A lot many application of IOT has come into picture within few years. GPS tracking commonly known as location tracing has been in use from few years. Work and development in this field is highly intensive and new discoveries are made every once in a while. Exploiting this feature of GPS we are trying to build a portable location remote tracing device. The device consists of three different parts: raspberry pi based location tracer, a cloud platform for storage of data and an app for users with easy interface. Our tracking device consists of a mini computer namely raspberry pi which is fitted with a GPS module. The GPS module will collect the location latitude and longitude and send it to cloud database via the internet. An app which will be so designed to fetch the data from the database and displace it to the users in an interactive and easy manner. Our targeted application areas are basically walking stick for elderly people, device for cattle and also for school going children. This device will help increase the safety and security.

INTRODUCTION

There has been a recent boom in wireless technology and use of internet in recent time. The devices have become a vital part of our life recording every moment of our life, therefore every event can be back traced to where and when the event occurred, these data can be stored in cloud. Mostly, the mobile applications are integrated with the device using various devices to locate the position.
In our project, we are going to use IOT based Raspberry pi for the purpose of location tracking, the tracking device that is integrated with the GPS module for getting the location in real time. In the database base monitoring and updating mechanism, the GSM/GPRS module is used which transmit the updated vehicle database to the server and user access the database using web page in Smartphone. That shows the real time vehicle location in the Smartphone.
Spending less time waiting for a bus improves comfortable and effective time management of the student as well. Currently there are few tracking devices that mostly uses GSM module to send the data. There are also models in which the location latitude and longitude are sent as a plain text message. It does provide the location, however for users it becomes difficult to detect in the map as only latitudes and longitudes are provided. Smart phone is the most popular device, and almost every smart phone equips the GPS module.

Previous works have been done on using general devices to coordinate with GPS, Wi-Fi and Cell-Id to provide hybrid positioning.
We are using a mini computer namely raspberry pi. Raspberry pi a miniature, sophisticated device whose function is similar to a computer. It has its own operating system which allows number of possible applications of the device. In a vehicle tracking system the same device raspberry pi can also be integrated with numerous sensors which will give additional information. For example a temperature sensor can be attached to the raspberry pi which can send the internal temperature of the bus and can be automated in order to turn AC on and off. Also, Raspberry pi is very precise and very dependable due to its versatility.

RELATED WORKS

1. DESIGN AND IMPLEMENTATION OF AN ACCURATE REAL TIME GPS TRACKING SYSTEM

Hind Abdalsalam Abdallah Dafallah et al [1]

This paper presents an accurate and reliable real time tracking system using GPS (global positioning system) and GSM (global system for mobile communication) services, which was designed and implemented successfully in university of Khartoum labs. The system permits localization of a portable tracked unit and transmitting the position to the tracking center.

In the conclusion, they were able to design and implement GPS tracking system. The system successfully received GPS signals, processed and transmitted the data to the tracking center. In the tracking center the coordinates have been displayed properly on Google maps, which refresh automatically every 10 seconds to get the new location.

2. A SMART LOW-CONSUMPTION IOT FRAMEWORK FOR LOCATION TRACKING AND ITS REAL APPLICATION

Hao Tang et al [1]

In this paper, they describe the design and implementation of a system providing real time position and tracking service. This system consists of three parts which is GPS Module, GSM/GPRS module and TCP/IP stack, capable of generating location data, establishing TCP connection and receiving SMS. A mobile App is also built for visualization of data.

To sum up, they not only implemented this idea but also found way of implementing the same idea with different approach. It is true that internet does not function in all the parts of the city so in case of no internet the device sends SMS when the receiving device requests for location. They have also looked into security matters where the SMS from authorized number are only replied with location.

3. ADVANCED VEHICLE MONITORING AND TRACKING SYSTEM BASED ON RASPBERRY PI

Prashant A. Shinde et al [1]

An advanced vehicle monitoring and tracking system is designed for monitoring the school vehicle from any location A to location B at real time and provide safety environment to the traveler. The proposed system would make good use of new technology that based on Embedded Linux board namely Raspberry Pi and its advanced feature of storing database at real time. The proposed system works on Global Positioning System (GPS) and Global System for Mobile Communication (GSM) which is used for vehicle tracking and monitoring mechanism. For this purpose SIM908 Module is used which includes all the three things namely GPS GPRS GSM. The GPS gives current location of the vehicle; GPRS sends the tracking information to the server and the GSM is used for sending alert message to vehicle's owner mobile.

In a nut shell, the proposed system plays an important role in real time tracking and monitoring of vehicle and also provides safety and secure solution to the traveler using sensors. Whenever there is

vehicle theft situation or vehicle's accident situation occurs, the proposed system provides the vehicle's current location, speed to the vehicle owner's mobile.

4. INTELLIGENT TRANSPORT SYSTEM USING INTEGRATED GPS OPTIMIZED READER

A.Kamaraj et al [1]

They have proposed a new solution to send quick intimation to their parents about the presence of students through school or college bus at 9.30am. By this we can track the children and save them early if any mischief is happening. For this we are using an RFID reader, GPS tracker and GSM module along with an Arduino mega 2560 and its software. RFID readers can read the RFID tags of the students. GSM system is used to send their presence to their parents through SMS.

To sum up, this paper authors were successful to implement above system. The presence of the students were maintained and intimated to the parents. This is implemented by using RFID as a proof of their presence, also the status of the Student information about their presence sends by SMS via Excel to SMS software. By using this if any mischief (i.e. Abducting, bunking or accidents) is happening on the way to school or college can be found early.

5. Real-Time Tracking Management System Using GPS, GPRS and Google Earth

Due to the high cost of fossil-based energy, several methods are proposed to reduce the usage of the energy in logistics and fleet management to be even more. GPS tracking system is a common approach to get vehicle location information in real-time for fleet planning. We proposed a GPS tracking system called Goo-Tracking that is composed of commodity hardware, open source software and an easy-to-manage user interface via a web server with Google Map or via Google Earth software. The system includes a GPS/GPRS module to location acquisition and message transmission, MMC to temporary store location information, and an 8-bit AVR microcontroller. Our system prototype is shown and tested on a trip from Bangkok to Chonburi. It has shown great stability and also robust message transfer protocol that most of locations are accurately acquired and transmitted to the server in real-time.

6. GPS Assisted Standard Positioning Service for Navigation and Tracking: Review & Implementation

The potential ability of Global Positioning System (GPS) to assist navigating and tracking application facilitates in determining precise object positioning on earth. In order to efficiently execute tracking operation, GPS is dependent on various parameters viz. reliability of RF communication link, satellite geometry, GPS antenna placement, parameters to decode NMEA (National Marine Electronics Association) format that the GPS receiver obtains etc. All the information gathered is then analyzed to accurately track the object in real-time. This paper deals with the comprehensive study of GPS space segment and Control segment. Initially, the specification of GPS service known as Standard Positioning Service (SPS) ranging signal characteristics is introduced. Further, a detailed overview of GPS navigation message format, satellite tracking and selection process, frequency planning, C/A code generation and timing is studied and illustrated. Also, the user end implementations of location measurement processing algorithms are discussed. Hence, all the location information is used along with survey maps and object control actuators to support navigation. Furthermore, paper briefly describes the implementation of the real time position tracking system.

7. A real time GSM/GPS based tracking system based on GSM mobile phone

A GPS based tracking system is proposed which keeps track of the location of a vehicle and its speed based on a mobile phone text messaging system. The system is able to provide real-time text alerts for speed and location. Particularly, the present location can be locked and the system will alert the owner if the vehicle is moved from the present locked location. In addition, the speed can be locked and an alert texted if this speed is exceeded.

8. Real Time Vehicle Tracking System Based on ARM7 GPS and GSM Technology

This Paper presents GPS based tracking system has many application in today's world. For example Vehicle tracking, children tracking, any equipment tracking, fleet management etc. An efficient vehicle tracking system is implemented for monitoring the movement of any equipped vehicle from any location at any time. With the help of Global Positioning System (GPS), Global System for Mobile communication (GSM) modem and microcontroller are embedded with the aim of enabling users to locate their vehicles with ease and in a convenient manner. This system provides the facility to the user to track their vehicle remotely through the mobile network. This paper present the development of vehicle tracking systems hardware prototype and GUI application for displaying the actual position of vehicle.

9. Method for improving positioning accuracy by using double low-precision GPS

Minghui Zhao ; Jianhua Wang ; Shanjia Zhang ; Cheng Zhang

2018 International Symposium in Sensing and Instrumentation in IoT Era (ISSI)

In order to improve the measurement accuracy of GPS, this paper proposes two methods to improve the accuracy of dual low-precision GPS positioning. First, two GPS cards of the same model are placed on the two hulls of the catamaran, and the position information of the hull is measured by the dual GPS card; Then, method 1 performs Kalman filtering processing on the position information measured by the dual GPS, and analyzes the filtering effect, and averages the two sets of data after the double GPS filtering, and the average value is the position information of the center of the hull; Method 2 obtains the mean value of the position information measured by the dual GPS, performs Kalman filtering on the mean value, and uses the filtered value as the position information of the hull center; Finally, the effectiveness of the two methods was verified by experiments. Experiments show that the two methods proposed in this paper have obvious effects on improving the accuracy of low-precision GPS positioning.

10. A practical dynamic positioning and tracking on the vehicular ad-hoc network

Tang-Hsien Chang ; Der-Horng Lee ; Chun-Yin Lin ; Siyu Hao ; Shang-Chun Lin

2018 IEEE 4th World Forum on Internet of Things (WF-IoT)

This research aims to build a dynamic positioning and tracking method under Ad-Hoc network, to enhance the precision with GPS or compensate the signal while missing GPS situation. The research applies multiple RSSI signals with a novel mathematical algorithm and α-β-γ filter to develop a systematic frame, to locate and track the moving node in reliable range. The results show that, the positioning model for the users has excellent ability for positioning and excellent predictive ability for tracking. This has practical value for potential applications of intelligent transportation systems (ITS), connected vehicles (CV), internet of things (IOT) and automated driving cars.

11. IoT based smart school bus monitoring and notification system

Judy Thyparampil Raj ; Jairam Sankar

2017 IEEE Region 10 Humanitarian Technology Conference (R10-HTC)

It is important for every school to have a trustworthy and secure transportation service to ensure the safety of the students. It helps the school administration to effectively manage their bus fleet and potentially reduce mishaps. This is where vehicle monitoring takes effect. The proposed system provides real time information about various parameters of the vehicle like the location, the route, the speed, the list of passengers, the adherence of drivers to schedule and much more. The system further allows the parents to be notified when their ward alights or boards the bus. In this system, we make use of RFID and GPS technologies and connect them to a remote server over WiFi using an ESP8266 microcontroller. An Ublox 6M GPS module is used to find the current geographic coordinates of the vehicle's location as well as the speed it is going at. An MFRC522 RFID reader identifies each student as they board or alight the vehicle by reading the id from their RFID tags. The system uses the ESP8266 to upload the information from the peripherals to a database in the web server. The information can be accessed by the parents through a mobile application and this helps them track their wards effectively. The school administration can also access the application to ensure student safety and contact a driver or a parent. The application also allows the administration to be informed of emergencies or complaints.

12. Design and implementation of vehicle tracking system using GPS/GSM/GPRS technology and smartphone application

SeokJu Lee ; Girma Tewolde ; Jaerock Kwon

2014 IEEE World Forum on Internet of Things (WF-IoT)

An efficient vehicle tracking system is designed and implemented for tracking the movement of any equipped vehicle from any location at any time. The proposed system made good use of a popular technology that combines a Smartphone application with a micro-controller. This will be easy to make and inexpensive compared to others. The designed in-vehicle device works using Global Positioning System (GPS) and Global system for mobile communication / General Packet Radio Service (GSM/GPRS) technology that is one of the most common ways for vehicle tracking. The device is embedded inside a vehicle whose position is to be determined and tracked in real-time. A micro-controller is used to control the GPS and GSM/GPRS modules.

The vehicle tracking system uses the GPS module to get geographic coordinates at regular time intervals. The GSM/GPRS module is used to transmit and update the vehicle location to a database. A Smartphone application is also developed for continuously monitoring the vehicle location. The Google Maps API is used to display the vehicle on the map in the Smartphone application. Thus, users will be able to continuously monitor a moving vehicle on demand using the Smartphone application and determine the estimated distance and time for the vehicle to arrive at a given destination. In order to show the feasibility and effectiveness of the system, this paper presents experimental results of the vehicle tracking system and some experiences on practical implementations.

13. GPS Based Low Cost Intelligent Vehicle Tracking System (IVTS)

Jain; Kamal; Goel; Rahul.
(2012) IACSIT Press, Singapore

Intelligent Vehicle tracking systems (IVTS) are used for the purpose of tracking and navigation of vehicles. The paper describes the implementation of Global positioning systems (GPS) in IVTS systems. Further a critical GPS based low cost IVTS architecture has been described. The first part of the paper describes the need and the basic architecture of a general GPS based IVTS system.
The three IVTS units (i.e. In-Vehicle unit, Communication link and Base station) are described individually. Further the paper describes how and why cost plays a major role in popularizing an IVTS system. The modification that should be carried out in the individual units to obtain a low cost GPS based IVTS system which suits the present dynamic urban environment are explained.

14. Real Time Tracking System

Keshav Agrawal; Shradha Devarkar; Sakshi Salokhe
March 2017 (IJARCET)

There can be several reasons for which we may feel the need to keep track of employees or subordinates based on their daily location. Hence GPS can be used to track the employees. Every GPS tracking system is a common approach to get employee location information in real-time. We have proposed a GPS tracking system called The Real Time Tracking System that is composed of commodity hardware i.e. GPS enabled Android Mobile as a GPS Device and an easy to-manage user interface via a web server with Google Map software. The system includes a GPS/GPRS module for location acquisition and message transmission, and third party Web Server to temporary store location. This proposed system is not tested yet but it will show the correct position of the employee to the admin on the basis of the location information sent by the GPS Device through GPRS.

15. Vehicle Tracking, Monitoring and Alerting System: A Review

Sumit S. Dukare; Dattatray A. Patil; Kantilal P. Rane
June 2015 International Journal of Computer Applications

The goal of this paper is to review the past work of vehicle tracking, monitoring and alerting system, to categorize various methodologies and identify new trends. Vehicle tracking, monitoring and alerting system is challenging problem. There are various challenges encounter in vehicle tracking, monitoring and alerting due to deficiency in proper real time vehicle location and problem of alerting system. GPS (Global Positioning System) is most widely used technology for vehicle tracking and keep regular monitoring of vehicle. The objective of tracking system is to manage and control the transport using GPS transreceiver to know the current location of vehicle. In number of system, RFID (Radio Frequency Identification) is chosen as one of technology implemented for bus monitoring system. GSM (Global System for Mobile Communication) is most widely used for alerting system. Alerting system is essential for providing the location and information about vehicle to passenger, owner or user.

16. Real Time Web Based Bus Tracking System

Manini Kumbhar; Meghana Survase; Pratibha Mastud
February 2016 (IRJET)

Due to rapid increase in population, there is a need for efficient public transportation system. There is an increased burden on public transportation like bus just because of population. Therefore remote user needs a smart system which provides real time information of bus. So we proposed a new system which solves the drawback of current public transportation system. So this system handle all the data like current location of bus , management of buses and it schedule. The real time tracking of bus can be done by this proposed system and this information is then given to remote user who want to know the real time bus information. Some technologies like GPS (Global Positioning System), Google maps and GPRS (General Packet Radio Service) are used for development purposes. This system provides web based application, which gives real time location of bus on Google Maps to remote user.

17. Tracking System using GPS and GSM: Practical Approach

Sameer Darekar, Atul Chikane, Rutujit Diwate, Amol Deshmukh, Prof. Archana Shinde
International Journal of Scientific & Engineering Research Volume 3, Issue 5, May-2012 1 ISSN 2229-5518

The ability to track, trace and control anything by anyone from anywhere on the planet has been mankind's unfulfilled desire. The usefulness of GSM and GPS has made them popular in their own context; integrating these technologies can prove to be a flamboyant solution for many unsolved problems. The idea of this paper is to integrate these two technologies into one system and provide an effective application for vehicle tracking as well as personal tracking. To implement a multi tracking system use of the following two technologies can be made, firstly GSM(Global System for Mobile) which is a set of standards to describe technologies for Second Generation (2G) and GPS(Global Positioning System) which is a satellite-based navigation system consisting several satellites revolving around the earth. The system will provide solution for tracking and tracing of multiple movable objects at a same time, so the name Multi-Tracking System. We can see the current location of the object and other add-on features, for vehicles there will be live tracing and tracking via GPS, controlling its subsystem parts via GSM network using SMS or GPRS. The whole system will be implemented in Microsoft .Net Technology, for system components C#.net will be used and for web based parts ASP.net will be used.

18. Vehicle Tracking System Using GPS

Disha Institute of Management & Technology, Raipur, Chhattisgarh, India
International Journal of Science and Research (IJSR), India Online ISSN: 2319-7064

The paper describe a practical model for routing and tracking of mobile vehicles in a large area outdoor environment based on the Global positioning system (GPS) and Global system for mobile communication (GSM). The supporting device GPS continuously move with the car and will calculate the co-ordinates of each position and when required by the owner it can be communicated with the help of GSM modem which is installed in both Transmitter and receiver section. GSM modem is controlled by a 32 bit ARM7 LPC2148. The device will collect position to supervised center by the SMS (Short Message Service) or GPRS (General Package radio service) and which can be located in the Google Earth and so the current position of the car can be known.

19. GPS BASED VEHICLE TRACKING AND MONITORING SYSTEM- A SOLUTION FOR PUBLIC TRANPORTATION

Akshatha S.A Computer Science Department Mangalore Institute of Technology and Engineering,Mangalore, India

A vehicle tracking system is an electronic device designed with the computer software enables the owner or a third party to track the vehicle location. A location defined using GPS technology is almost accurate to obtain the real vehicle location. Vehicle monitoring system can be implemented using GPS technology; therefore it effectively reduces the vehicle management cost. This paper provides a solution for tracking and monitoring the public transportation vehicles. In this method GPS technology is used to obtain the location of the vehicle using the space based navigation system. Raspberry Pi processing board is used which processes the received values and gives the final output. This method explains a way to monitor the public transportation vehicle from the location A to location B. Raspberry Pi processor compares the passenger specified values with the current location values therefore if the result is not the same then passenger is informed about the same.

20. An Efficient Web-Based Tracking System through Reduction of Redundant Connections

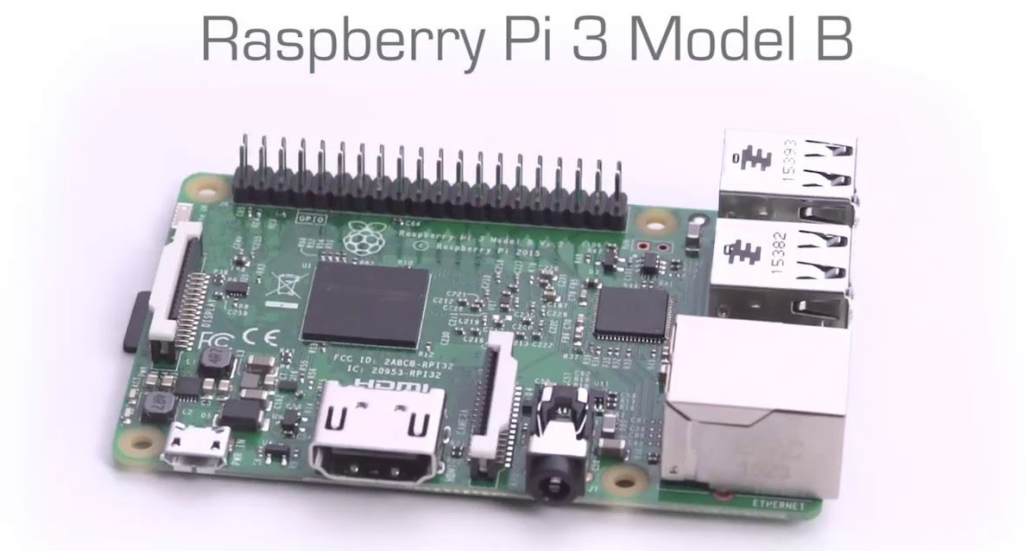
Department of Electrical Engineering, National Chiao Tung University, Hsinchu, Taiwan, R.O.C.

With the convergence of the Internet and the Global Positioning System (GPS), a common approach called GPS tracking system has been developed nowadays. A GPS tracking system is a system that uses GPS to determine the precise location of a vehicle, person, or other assets and the information can also be shared with remote clients through the Internet. For the device used in the outdoor, it usually connects to the Internet through mobile network like GPRS or 3G. However, the weaknesses of mobile network are low bandwidth and high charging strategies compared to Ethernet or even Wi-Fi. In this paper, an efficient web-based tracking system through reduction of redundant connections is proposed. By integrating several technologies nowadays we design a new connection scheme to improve the efficiency for the location-aware application. The proposed architecture is focus on two problems. One is the redundant connection, causing the waste of bandwidth and fees during the period when connecting to the mobile network. The other is the data asynchronization during the period of transmission. This paper not only provides a new connection scheme to solve above issues, but also has verified this architecture on an embedded platform with a prototype implementation for a web-based tracking system.

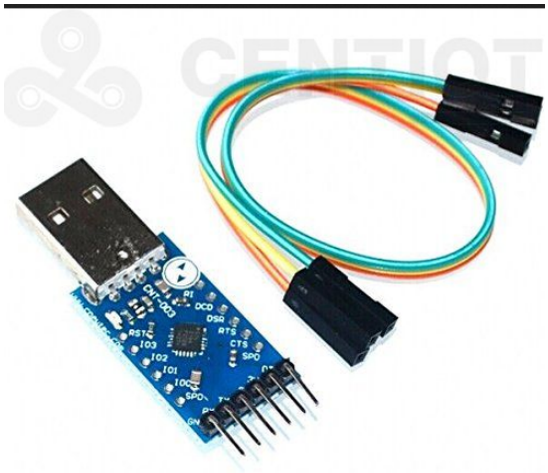
PROPOSED METHOD

In this project we have used three main hardware components which are different from all the research papers mentioned before. Those are:

1. Raspberry Pi: The Raspberry pi is a single computer board with credit card size, that can be used for many tasks that your computer does, like games, word processing, spreadsheets and also to play HD video. It was established by the Raspberry pi foundation from the UK. It has been ready for public consumption since 2012 with the idea of making a low-cost educational microcomputer for students and children. The main purpose of designing the raspberry pi board is, to encourage learning, experimentation and innovation for school level students. The raspberry pi board is a portable and low cost. Maximum of the raspberry pi computers is used in mobile phones. In the 2st century, the growth of mobile computing technologies is very high, a huge segment of this being driven by the mobile industries. The 98% of the mobile phones were using ARM technology.



2. USB to UART converter: This is an USB2.0 to TTL UART Converter module which is based on CP2102 Bridge by SiLabs. This module can be used with Laptop's which don't have standard serial port. This module creates a virtual COM port using USB on your computer which can support various standard Baud Rates for serial communication. You just need to install the driver using a setup file which automatically installs correct driver files for Windows XP/Vista/ 7. After driver installation, plug the module into any USB port of your PC. Finally a new COM port is made available to the PC. The feature which makes it more convenient is the TTL level data i/o. So you don't need to make a RS232 to TTL converter using chips like MAX232. The Rx and Tx pin can be connected directly to the MCUs pins (assuming 5v i/o).

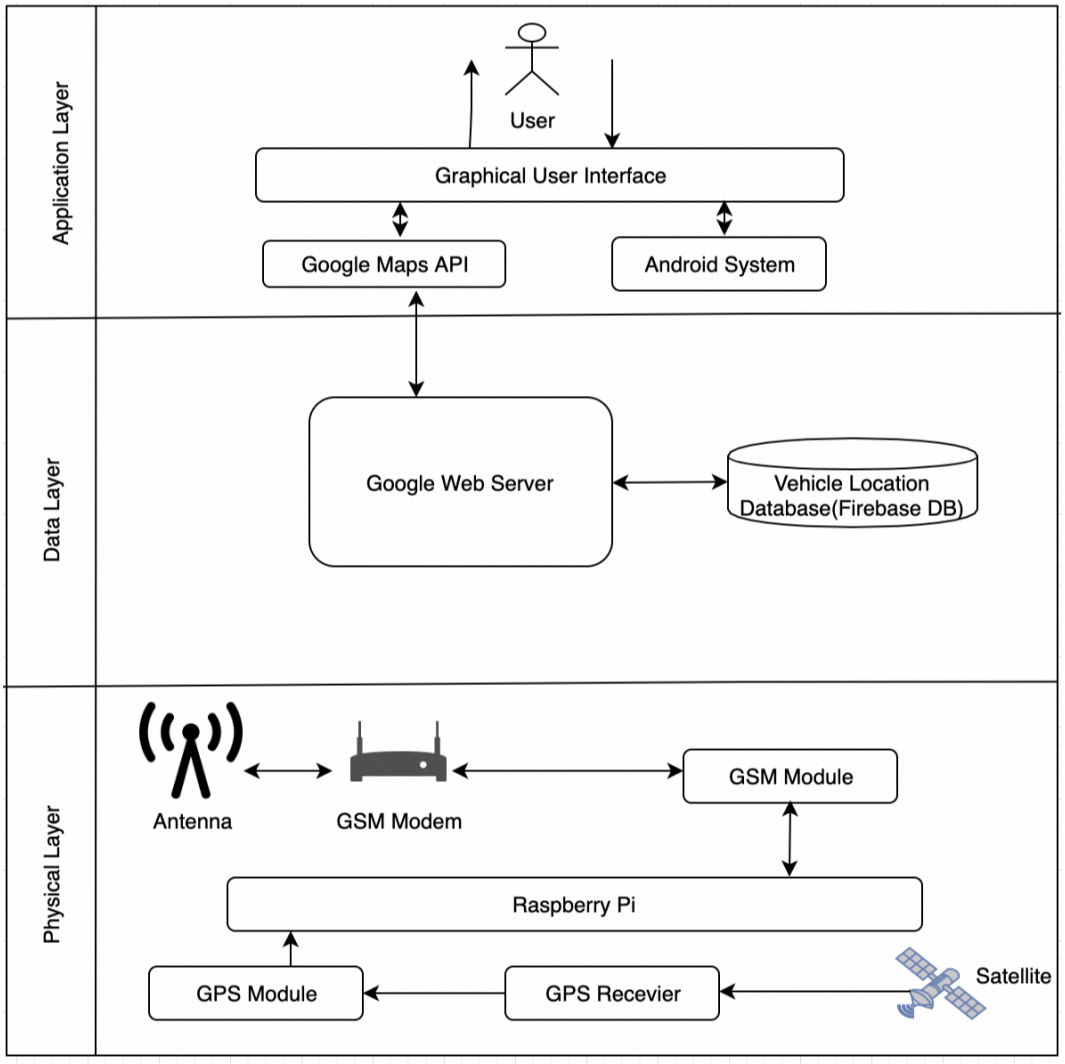


3. GPS Module: A GPS navigation device, GPS receiver, or simply GPS is a device that is capable of receiving information from GPS satellites and then to calculate the device's geographical position. Using suitable software, the device may display the position on a map, and it may offer directions. A GPS device can retrieve from the GPS system location and time information in all weather conditions, anywhere on or near the Earth. A GPS reception requires an unobstructed line of sight to four or more GPS satellites,[2] and is subject to poor satellite signal conditions. In exceptionally poor signal conditions, for example in urban areas, satellite signals may exhibit multipath propagation where signals bounce off structures, or are weakened by meteorological conditions.

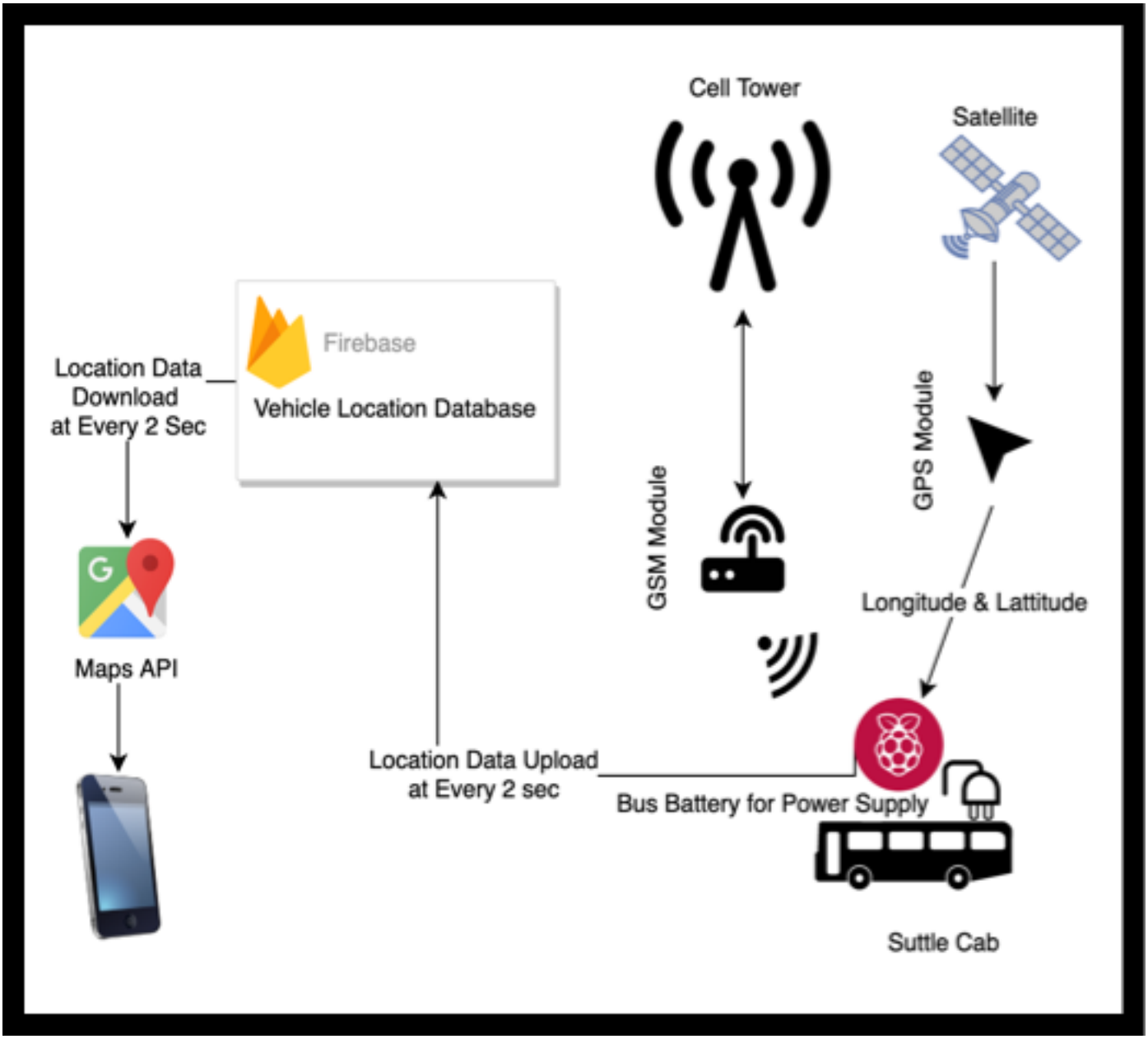
For the data storage we are using firebase database. In that we are using real time database so that it gets updated every three seconds.

For the front end we have made an Android App that shows the real time location of the device. It fetches data from firebase database every 3 seconds.

Architecture:



Design



Explanation:

Raspberry Pi is connected with GPS module and GSM Module. For this GPS module is connected through wire and GSM module is connected via WiFi. GSM module provides internet connection for upload of longitude and latitude whereas GPS Module will fetch the Longitude and latitude position from Satellite. This all components are in placed in Shuttle cab and raspberry pi is powered from the bus battery.

After the data for location has been fetched the raspberry pi uploads the location data to Firebase database. This upload happens every 3 secs and after that with the help of Google maps API in the Application the location is fetched on the students cell phone.

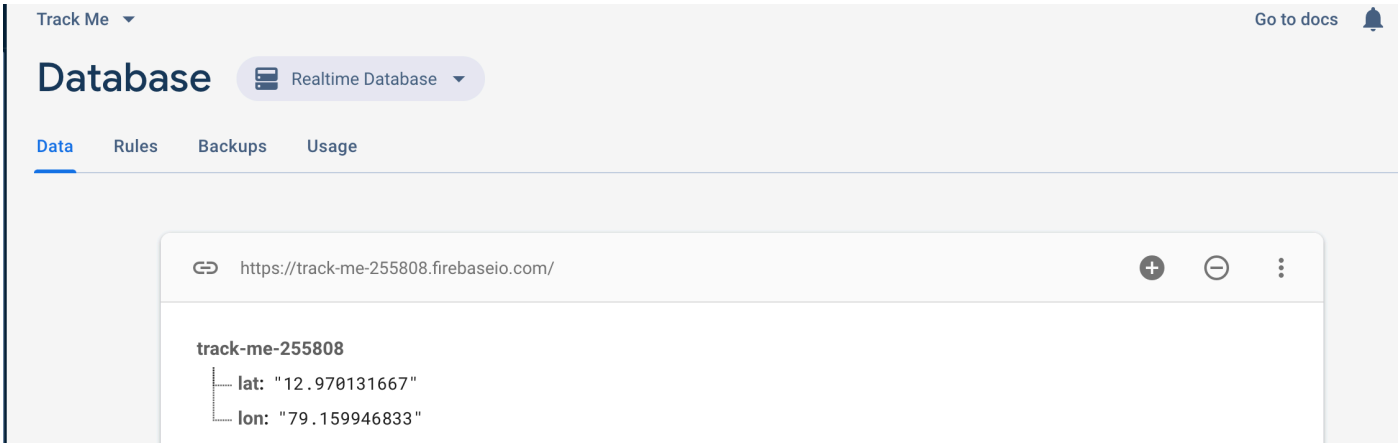
IMPLEMENTATION

Backend

Raspberry Pi was configured and GPS module is connected then it starts to fetch longitude and latitude. After that it is configured to run a python program which will automatically upload those values to firebase database. That file name is dashboard.py

```
import pyrebase
import gps
import time
session =gps.gps("127.0.0.1","2947")
session.stream(gps.WATCH_ENABLE | gps.WATCH_NEWSTYLE)
firebaseConfig = {
"apiKey": "AIzaSyC_-p84JFO-RQFZMZze_WXMoCfqxlM66LQ",
"authDomain": "track-me-255808.firebaseapp.com",
"databaseURL": "https://track-me-255808.firebaseio.com",
"projectId": "track-me-255808",
"storageBucket": "track-me-255808.appspot.com",
"messagingSenderId": "650861681379"
 }


firebase=pyrebase.initialize_app(firebaseConfig)

dados=firebase.database()
while True:
time.sleep(3)
        raw_data =session.next()
        if raw_data['class'] =='TPV':
                if hasattr(raw_data, 'lat') & hasattr(raw_data, 'lon'):
                        latitude = raw_data.lat
                        longitude = raw_data.lon
                        print(latitude)
                        print(longitude)
                        latt=str(latitude)
                        long=str(longitude)
                        dados.child().update({"lat":latt})
                        dados.child().update({"lon":long})
```

Database



Frontend

MainActivity.java

```
package com.example.trackall;

import androidx.appcompat.app.AppCompatActivity;

import android.content.Intent;
import android.os.Bundle;
import android.view.View;

public class MainActivity extends AppCompatActivity {
    public void maps(View view)
    {
        Intent intent = new Intent(MainActivity.this,MapsActivity.class);
        startActivity(intent);
    }
    public void maps1(View view)
    {
        Intent intent = new Intent(MainActivity.this,MapsActivity2.class);
        startActivity(intent);
    }

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
    }
}
```

MapsActivity.java

```
package com.example.trackall;

import androidx.fragment.app.FragmentActivity;

import android.os.Bundle;
import android.util.Log;
import android.os.Handler;

import com.google.android.gms.maps.CameraUpdateFactory;
import com.google.android.gms.maps.GoogleMap;
import com.google.android.gms.maps.OnMapReadyCallback;
import com.google.android.gms.maps.SupportMapFragment;
import com.google.android.gms.maps.model.LatLng;
import com.google.android.gms.maps.model.MarkerOptions;
import com.google.firebase.database.DataSnapshot;
import com.google.firebase.database.DatabaseError;
import com.google.firebase.database.DatabaseReference;
import com.google.firebase.database.FirebaseDatabase;
import com.google.firebase.database.ValueEventListener;
import com.google.firebase.database.annotations.NotNull;


public class MapsActivity extends FragmentActivity implements OnMapReadyCallback {

    private GoogleMap mMap;
    private DatabaseReference mDb;
    private static final String TAG = "MainActivity";
    private double latt;
    private double lonn;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_maps);
        SupportMapFragment mapFragment = (SupportMapFragment) getSupportFragmentManager()
                .findFragmentById(R.id.map);
        mapFragment.getMapAsync(this);
        mDb= FirebaseDatabase.getInstance().getReference();
```

```
        mDb.addValueEventListener(new ValueEventListener() {
            @Override
            public void onDataChange(@NotNull DataSnapshot dataSnapshot) {
                // This method is called once with the initial value and again
                // whenever data at this location is updated.
                fetchValues value = dataSnapshot.getValue(fetchValues.class);
                Log.d(TAG, "Long: " + value.getLon());
                latt= Double.parseDouble(value.getLat());
                lonn=Double.parseDouble(value.getLon());
                LatLng sydney = new LatLng(latt,lonn);
                mMap.addMarker(new MarkerOptions().position(sydney).title("Shuttle Cab"));
                mMap.moveCamera(CameraUpdateFactory.newLatLng(sydney));
                final Handler handler = new Handler();
                handler.postDelayed(new Runnable() {
                    @Override
                    public void run() {
                        mMap.clear();
                    }
                }, 2000);

            }

            @Override
            public void onCancelled(@NotNull DatabaseError error) {
                // Failed to read value
                Log.w(TAG, "Failed to read value.", error.toException());
            }
        });

    }


    /**
     * Manipulates the map once available.
     * This callback is triggered when the map is ready to be used.
     * This is where we can add markers or lines, add listeners or move the camera. In this
case,
     * we just add a marker near Sydney, Australia.
     * If Google Play services is not installed on the device, the user will be prompted to
install
     * it inside the SupportMapFragment. This method will only be triggered once the user has
     * installed Google Play services and returned to the app.
     */
    @Override
    public void onMapReady(GoogleMap googleMap) {
        mMap = googleMap;
    }




}
```

MapsActivity2.java

```
package com.example.trackall;

import androidx.fragment.app.FragmentActivity;

import android.os.Bundle;
import android.util.Log;


import com.google.android.gms.maps.CameraUpdateFactory;
import com.google.android.gms.maps.GoogleMap;
import com.google.android.gms.maps.OnMapReadyCallback;
import com.google.android.gms.maps.SupportMapFragment;
import com.google.android.gms.maps.model.LatLng;
import com.google.android.gms.maps.model.MarkerOptions;
import com.google.firebase.database.DataSnapshot;
import com.google.firebase.database.DatabaseError;
import com.google.firebase.database.DatabaseReference;
```

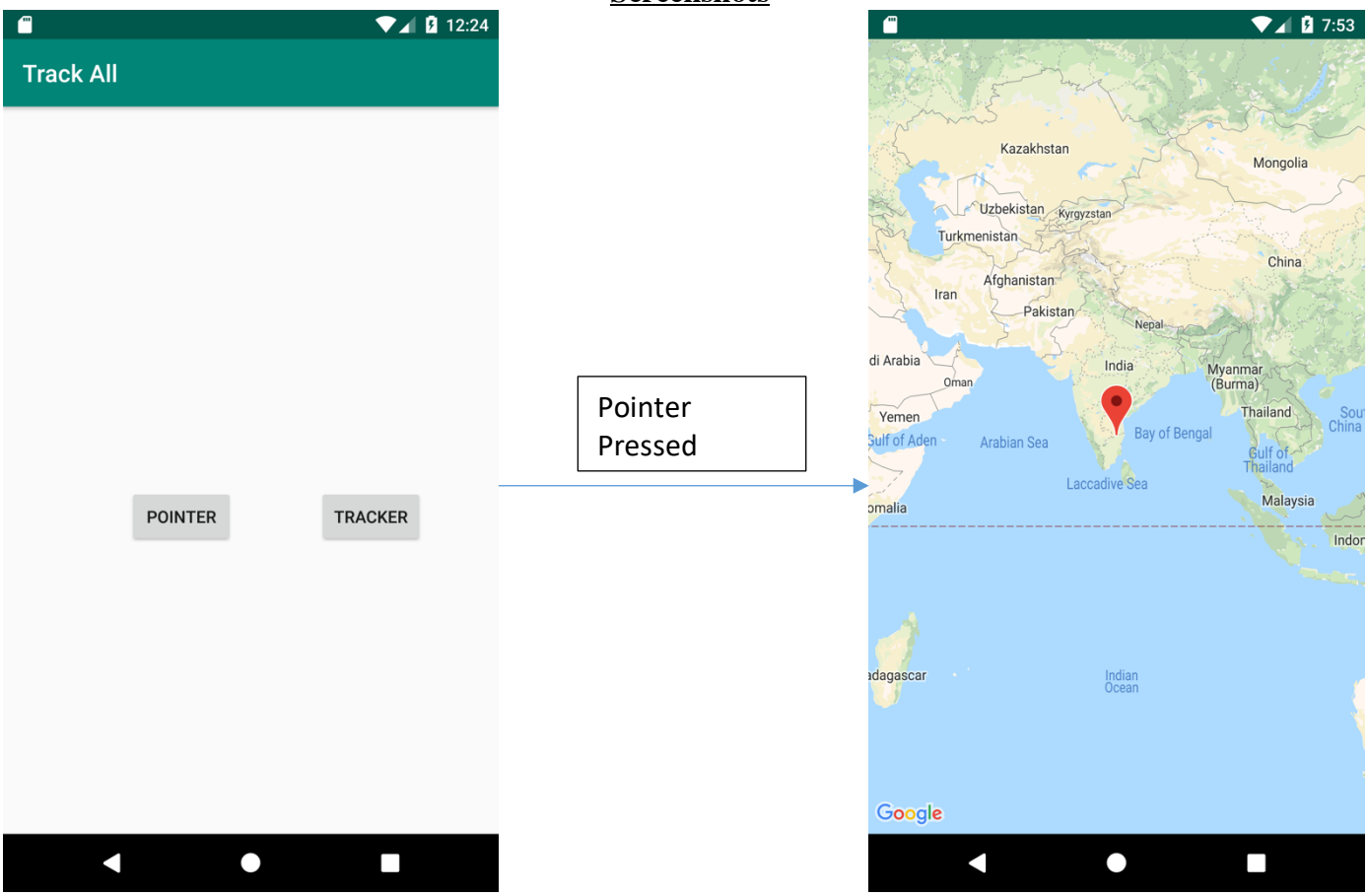
```
import com.google.firebase.database.FirebaseDatabase;
import com.google.firebase.database.ValueEventListener;
import com.google.firebase.database.annotations.NotNull;


public class MapsActivity2 extends FragmentActivity implements OnMapReadyCallback {

    private GoogleMap mMap;
    private DatabaseReference mDb;
    private static final String TAG = "MainActivity";
    private double latt;
    private double lonn;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_maps);
        SupportMapFragment mapFragment = (SupportMapFragment) getSupportFragmentManager()
                .findFragmentById(R.id.map);
        mapFragment.getMapAsync(this);
        mDb= FirebaseDatabase.getInstance().getReference();
        mDb.addValueEventListener(new ValueEventListener() {
            @Override
            public void onDataChange(@NotNull DataSnapshot dataSnapshot) {
                // This method is called once with the initial value and again
                // whenever data at this location is updated.
                fetchValues value = dataSnapshot.getValue(fetchValues.class);
                Log.d(TAG, "Long: " + value.getLon());
                latt= Double.parseDouble(value.getLat());
                lonn=Double.parseDouble(value.getLon());
                LatLng sydney = new LatLng(latt,lonn);
                //mMap.addMarker(new MarkerOptions().position(sydney).title("Shuttle Cab"));
                mMap.addMarker(new MarkerOptions()
                        .position(
                                new LatLng(latt,
                                        lonn))
                        .draggable(true).visible(true));
                mMap.moveCamera(CameraUpdateFactory.newLatLng(sydney));
                //mMap.setMinZoomPreference(10.0f);
                //float zoomLevel = 20.0f; //This goes up to 21
                //mMap.moveCamera(CameraUpdateFactory.newLatLngZoom(sydney, zoomLevel));
                //final Handler handler = new Handler();
                /*handler.postDelayed(new Runnable() {
                    @Override
                    public void run() {
                        mMap.clear();
                    }
                }, 1000);*/

            }

            @Override
            public void onCancelled(@NotNull DatabaseError error) {
                // Failed to read value
                Log.w(TAG, "Failed to read value.", error.toException());
            }
        });

    }


    /**
     * Manipulates the map once available.
     * This callback is triggered when the map is ready to be used.
     * This is where we can add markers or lines, add listeners or move the camera. In this
case,
     * we just add a marker near Sydney, Australia.
     * If Google Play services is not installed on the device, the user will be prompted to
install
     * it inside the SupportMapFragment. This method will only be triggered once the user has
     * installed Google Play services and returned to the app.
     */
    @Override
```

```
    public void onMapReady(GoogleMap googleMap) {
        mMap = googleMap;
    }
}
```

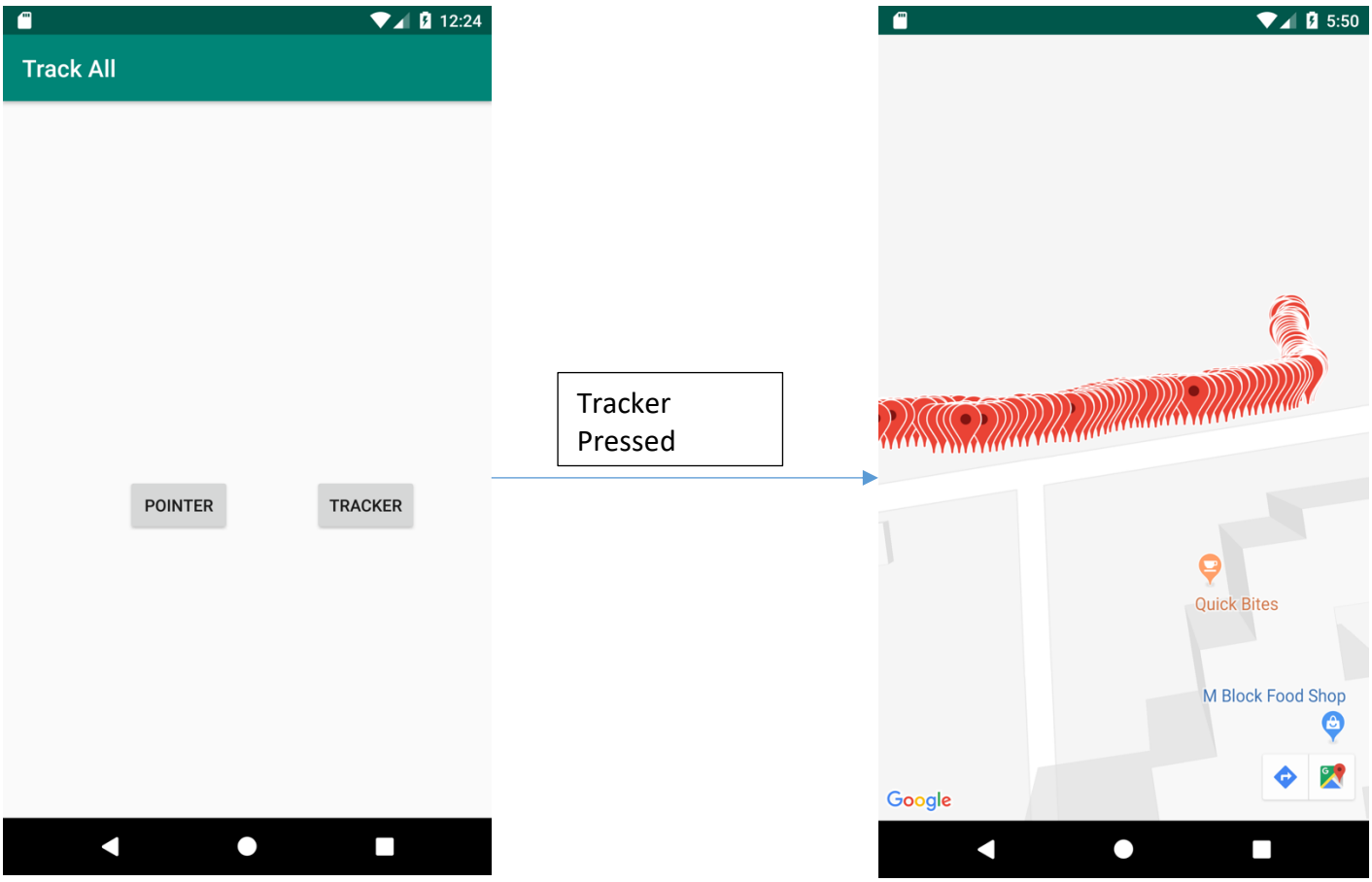
fetchValues.java

```
package com.example.trackall;

public class fetchValues {
    private String lat;
    private String lon;
    public fetchValues()
    {}

    public String getLat() {
        return lat;
    }

    public void setLat(String lat) {
        this.lat = lat;
    }

    public String getLon() {
        return lon;
    }

    public void setLon(String lon) {
        this.lon = lon;
    }
}
```

Screenshots



User can zoom in and see the location in detail and more precise way.



CONCLUSION

The proposed system plays an important role in real time tracking and monitoring of vehicle and also provides safety and secure solution to the traveller using sensors. Whenever there is vehicle theft situation or vehicle's accident situation occurs, the proposed system provides the vehicle's current location, speed to the vehicle owner's mobile. Hence this benefits to track the vehicle as early as possible. In certain situations as per student's safety concern the proposed system given a provision of alert massage on student parent's mobile which also plays an important role.

Several optimization can be applied to our system. First, we assume that GPRS are always available and all location data are transmitted over GPRS. However, this is not always true. When devices are not able to access Internet, location data can be transmitted through SMS. App first requests location via SMS, then device replies with its current position. To prevent from replying data to an unauthorized user, device should only answer incoming SMS from an authorized number. Since GPRS network is not available, authorized number should be stored in device's memory in advance.

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