

# **A RESEARCH STUDY ON MOBILE TRACKING SYSTEM**

**Project report in partial fulfilment of the requirement for the award of the  
degree of**  
**Bachelor of Technology**  
**In**  
**COMPUTER SCIENCE**

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## CERTIFICATE

This is to certify that the project titled **MOBILE TRACKING SYSTEM** submitted by **Animesh Prasadi(University Roll No. 12019009023015)**, **Subham Bhattacharyya (University Roll No. 12019009001401)**, **Sudipta Narayan Dhar (University Roll No. 12019009022032)**, **Sourav Sarkar (University Roll No. 12019009022024)**, **Swarnava Halder (University Roll No. 12019009022031)** and **MD. Risher Ali (University Roll No. 12019009023069)** students of UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA, in partial fulfilment of requirement for the degree of Bachelor of Computer Science, is a bonafide work carried out by them under the supervision and guidance of **Prof. Arunabha Tarafdar** during 4<sup>th</sup> Semester of academic session of 2021 - 2022. The content of this report has not been submitted to any other university or institute. I am glad to inform that the work is entirely original and its performance is found to be quite satisfactory.

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## **ACKNOWLEDGEMENT**

We would like to take this opportunity to thank everyone whose cooperation and encouragement throughout the ongoing course of this project remains invaluable to us.

We are sincerely grateful to our guide **Prof. Arunabha Tarafdar** of the Department of Computer Science, UEM, Kolkata, for his wisdom, guidance and inspiration that helped us to go through with this project and take it to where it stands now.

We would also like to express our sincere gratitude to Prof. Sukalyan Goswami, HOD, Computer Science, UEM, Kolkata and all other departmental faculties for their ever-present assistant and encouragement.

Last but not the least, we would like to extend our warm regards to our families and peers who have kept supporting us and always had faith in our work.

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## **ABSTRACT**

Parents are very much concerned about their children now a days and are compelled to provide an Android phone to their children. They want to monitor children activities and movements, where they are going and what they are doing. But this process is difficult. To solve this problem a Mobile Tracking System has been designed, using this system parents can track children's location. This paper aims to develop a Python3 program for any operating system (OS) platform that automatically send the current address location of the phone to the program output using the phone number provided in the SIM card inserted in the phone. Location of mobile device is in the form of latitude and longitude which is converted into full address by this application that includes country/state, city, and street number.

## **INTRODUCTION**

Tracking system is not a new concept. GPS is a popular technology for tracking system. Different types of GPS devices are used to track different types of object's location. GPS devices receive signal from satellite. GSM is another technology that is also used for tracking system. GSM Devices receive signal from connected base station. Mobile phone technology has been developed over a very short period of time. Mobile phone includes GPS sensor, so it can receive signal from base station and Satellite. Now GPS tracker is used for track location but it needs to buy extra GPS devices and have to pay periodically for this services. Device location does not display in GSM technology, it display base station location. If someone wants to find location of the device in GSM technology, it needs to pay to the service provider.

Android-based mobile applications named as GPS phone tracker pro, Mobile Location Tracer, and Location Tracker provides location address of the user and famous applications on Google Play but these applications have no advance features but still more than 0.8 million people downloaded these applications. Furthermore applications like Locate My Friends, Family Locator and Family Locator & Messaging has also more than 0.6 million user downloaded history and are used for finding friends and family location but it has a lot of functionality complaints from users, which includes glitches and application crashing. Mobile Caller Location Tracker, All call Location Tracker and SMS Tracker has more than 0.5 million downloads and

locates only user's location whose mobile phones are connected during call and short message service. There are also some famous mobile applications exist which tracks vehicle location like Vehicle Location Tracker, Find MyCar and Tracker these apps has more than 0.5 downloaded history but user complaints about the features of the apps. Some other applications are also designed with limited functionality to track lost devices e.g. Where My Droid , GPS Phone Tracker Pro and Mobile Location Tracker

Here we have developed a program to track mobile phones using their phone numbers. Client can track immediate location of registered mobile. This mobile tracking system will help parents to monitor their children's mobile phone location.

## **RECENT TECHNOLOGY USED**

### **NETWORD BASED**

The location of a mobile phone can be determined using the service provider's network infrastructure. The advantage of network-based techniques, from a service provider's point of view, is that they can be implemented non-intrusively without affecting handsets. Network-based techniques were developed many years prior to the widespread availability of GPS on handsets. The technology of locating is based on measuring power levels and antenna patterns and uses the concept that a powered mobile phone always communicates wirelessly with one of the closest base stations, so knowledge of the location of the base station implies the cell phone is nearby.

The accuracy of network-based techniques varies, with cell identification as the least accurate, due to differential signals transposing between towers, otherwise known as "bouncing signals". Triangulation is moderately accurate, and the newer "advanced forward link trilateration" timing methods are the most accurate. The accuracy of network-based techniques depends on the concentration of cell base stations, with urban environments achieving the highest accuracy because of the high density of cell towers. Their accuracy also depends on the implementation of the most current timing methods.

One of the key challenges of network-based techniques is the requirement to work closely with the service provider, as it entails the installation of hardware and software within the operator's infrastructure. Frequently the compulsion associated with a legislative framework, such as Enhanced 9-1-1, is required before a service provider will deploy a solution.

## **HANDSET BASED**

The location of a mobile phone can be determined using client software installed on the handset. This technique determines the location of the handset by putting its location by cell identification, signal strengths of the home and neighboring cells, which is continuously sent to the carrier. In addition, if the handset is also equipped with GPS then significantly more precise location information can be then sent from the handset to the carrier.

Another approach is to use a fingerprinting-based technique, where the "signature" of the home and neighboring cells signal strengths at different points in the area of interest is recorded by war-driving and matched in real-time to determine the handset location. This is usually performed independent from the carrier.

## **SIM-BASED**

Using the subscriber identity module (SIM) in GSM and Universal Mobile Telecommunications System (UMTS) handsets, it is possible to obtain raw radio measurements from the handset. Available measurements include the serving Cell ID, round-trip time, and signal strength. The type of information obtained via the SIM can differ from that which is available from the handset. For example, it may not be possible to obtain any raw measurements from the handset directly, yet still obtain measurements via the SIM.

## **WIFI**

Crowdsourced Wi-Fi data can also be used to identify a handset's location. The poor performance of the GPS-based methods in indoor environment and the increasing popularity of Wi-Fi have encouraged companies to design new and feasible methods to carry out Wi-Fi-based indoor positioning. Most smartphones combine Global Navigation Satellite Systems (GNSS), such as GPS and GLONASS, with Wi-Fi positioning systems.

## **MOBILE TRACKING SYSTEM : PYTHON PROGRAM**

Here we have created a python program for mobile tracking system using phone number. We have created 2 files, main.py and test.py. "main.py" is where the program used for running the tracking system are done and in "test.py" we input the number in the program.

### **CODE:- (main.py)**

```
import phonenumbers

import folium

from test import number

from phonenumbers import geocoder
Key = "dca14f2b9b7a4605967cbaaef2d2d99e"
samNumber = phonenumbers.parse(number)
yourLocation = geocoder.description_for_number(samNumber, "en")
print(yourLocation)

from phonenumbers import carrier
service_nmber = phonenumbers.parse(number, "RO")
print(carrier.name_for_number(service_nmber, "en"))

from opencage.geocoder import OpenCageGeocode
geocoder = OpenCageGeocode(Key)

query = str(yourLocation)

results = geocoder.geocode(query)

lat = results[0]['geometry']['lat']
lng = results[0]['geometry']['lng']
print(lat,lng)

myMap = folium.Map(location=[lat, lng], zoom_start = 9)
folium.Marker([lat, lng], popup = yourLocation).add_to((myMap))

myMap.save("myLocation.html")
```

### **CODE:- (test.py)**

```
number = input()
```

### **SYSTEM GENERATED HTML CODE:-**

```
<!DOCTYPE html>
<head>
    <meta http-equiv="content-type" content="text/html; charset=UTF-8" />

    <script>
        L_NO_TOUCH = false;
        L_DISABLE_3D = false;
    </script>

    <style>html, body {width: 100%;height: 100%;margin: 0;padding: 0;}</style>
    <style>#map {position:absolute;top:0;bottom:0;right:0;left:0;}</style>
    <script src="https://cdn.jsdelivr.net/npm/leaflet@1.6.0/dist/leaflet.js"></script>
    <script src="https://code.jquery.com/jquery-1.12.4.min.js"></script>
    <script
src="https://maxcdn.bootstrapcdn.com/bootstrap/3.2.0/js/bootstrap.min.js"></script>
    <script src="https://cdnjs.cloudflare.com/ajax/libs/Leaflet.awesome-
markers/2.0.2/leaflet.awesome-markers.js"></script>
    <link rel="stylesheet" href="https://cdn.jsdelivr.net/npm/leaflet@1.6.0/dist/leaflet.css"/>
    <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.2.0/css/bootstrap.min.css"/>
    <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.2.0/css/bootstrap-theme.min.css"/>
    <link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/font-
awesome/4.6.3/css/font-awesome.min.css"/>
    <link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/Leaflet.awesome-
markers/2.0.2/leaflet.awesome-markers.css"/>
    <link rel="stylesheet" href="https://cdn.jsdelivr.net/gh/python-
visualization/folium/folium/templates/leaflet.awesome.rotate.min.css"/>

    <meta name="viewport" content="width=device-width,
        initial-scale=1.0, maximum-scale=1.0, user-scalable=no" />
    <style>
        #map_bfaa8ff7786442e5b232b3548bcf58ca {
            position: relative;
            width: 100.0%;
            height: 100.0%;
            left: 0.0%;
            top: 0.0%;
        }
    </style>
```

```

</style>

</head>
<body>

    <div class="folium-map" id="map_bfaa8ff7786442e5b232b3548bcf58ca" ></div>

</body>
<script>

var map_bfaa8ff7786442e5b232b3548bcf58ca = L.map(
    "map_bfaa8ff7786442e5b232b3548bcf58ca",
    {
        center: [22.3511148, 78.6677428],
        crs: L.CRS.EPSG3857,
        zoom: 9,
        zoomControl: true,
        preferCanvas: false,
    }
);

var tile_layer_ab2138ddbdec4644a409027f1fec663c = L.tileLayer(
    "https://s.tile.openstreetmap.org/{z}/{x}/{y}.png",
    {"attribution": "Data by \u0026copy; \u003ca href=\"http://openstreetmap.org/\u003eOpenStreetMap\u003c/a\u003e, under \u003ca href=\"http://www.openstreetmap.org/copyright\"\u003eODbL\u003c/a\u003e.", "detectRetina": false, "maxNativeZoom": 18, "maxZoom": 18, "minZoom": 0, "noWrap": false, "opacity": 1, "subdomains": "abc", "tms": false}
).addTo(map_bfaa8ff7786442e5b232b3548bcf58ca);

var marker_28246e99ee374210889f4d60a8a64afb = L.marker(
    [22.3511148, 78.6677428],
    {}
).addTo(map_bfaa8ff7786442e5b232b3548bcf58ca);

var popup_601bbf4da6a7473281265292037869d4 = L.popup({"maxWidth": "100%"});

```

```

        var html_0f609ddf2d2d4a9f83ef6d9faabf9f41 = $(`<div
id="html_0f609ddf2d2d4a9f83ef6d9faabf9f41" style="width: 100.0%; height:
100.0%;">India</div>`)[0];

popup_601bbf4da6a7473281265292037869d4.setContent(html_0f609ddf2d2d4a9f83ef6d9faa
bf9f41);

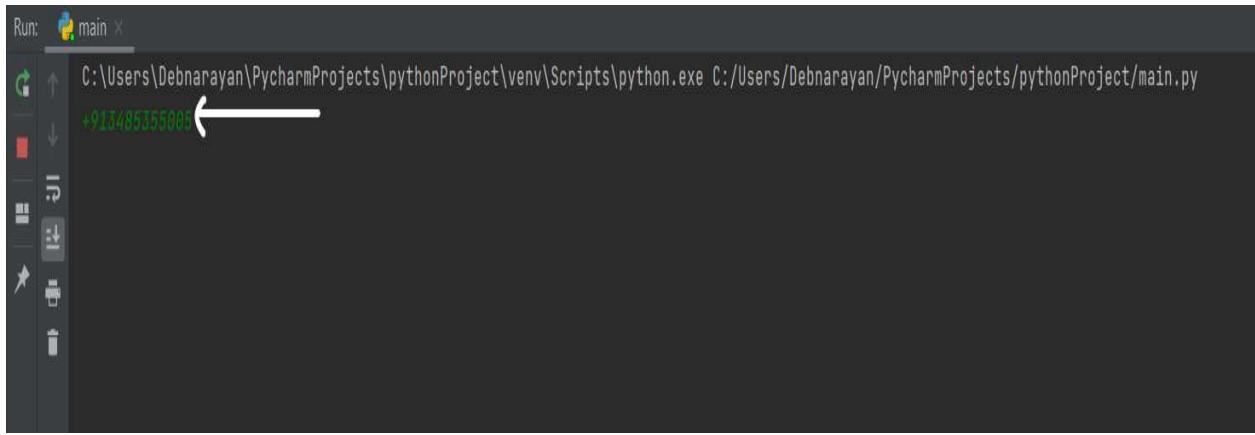
marker_28246e99ee374210889f4d60a8a64afb.bindPopup(popup_601bbf4da6a747328126529
2037869d4)
;

</script>

```

## OUTPUT

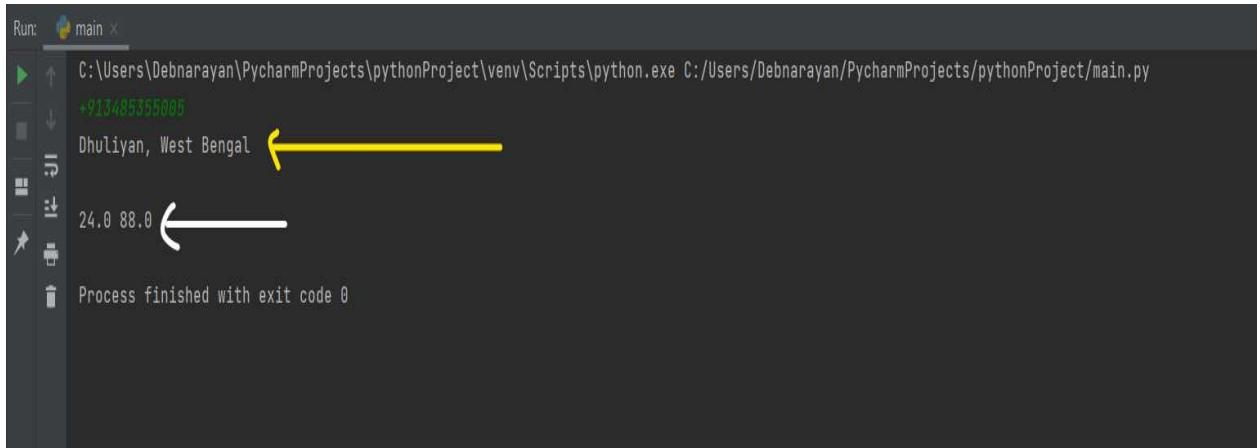
First we will input our phone number(indicated by white arrow), I have used the number "+913485355005"



The screenshot shows the PyCharm Run console window. The command line shows the path to the Python script and the command to run it. In the input field, the phone number '+913485355005' is typed, with a white arrow pointing to it from the left.

Then after pressing "Enter" we will get the following result:-

( The white arrow indicates the latitudinal and longitudinal location of my phone and,  
The yellow arrow indicates the city and state)

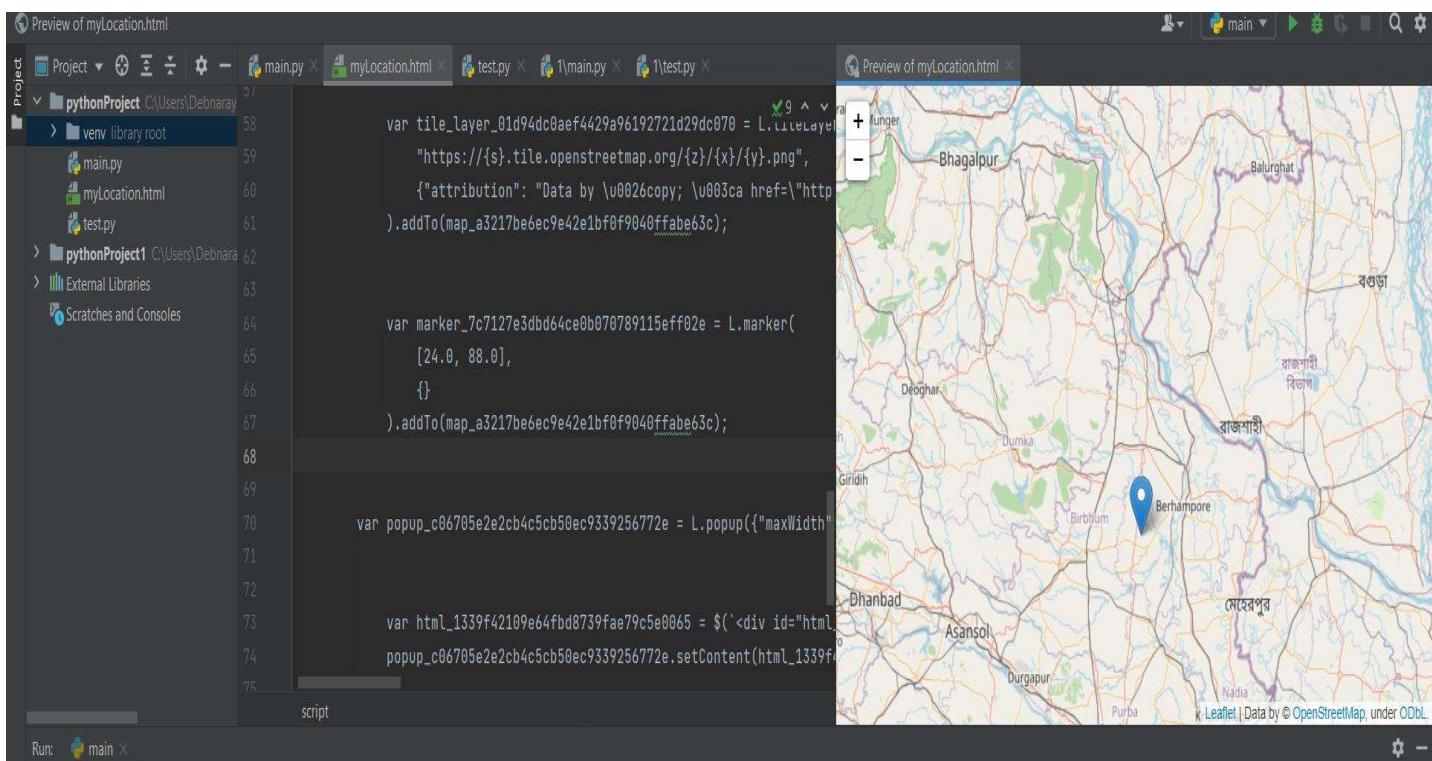


```

Run: main
C:/Users/Debnarayan/PycharmProjects/pythonProject/venv/Scripts/python.exe C:/Users/Debnarayan/PycharmProjects/pythonProject/main.py
+913485355005
Dhuliyan, West Bengal ←
24.0 88.0 ←
Process finished with exit code 0

```

After that the system automatically creates myLocation.html file and shows my GPS location:-



Preview of myLocation.html

```

Project: pythonProject C:\Users\Debnaray
  > venv library root
    main.py
    myLocation.html
    test.py
  > pythonProject1 C:\Users\Debnaray
  > External Libraries
  > Scratches and Consoles
  Run: main

```

```

var tile_layer_01d94dc0aef4429a96192721d29dc070 = L.tileLayer(
  "https://s.tile.openstreetmap.org/{z}/{x}/{y}.png",
  {"attribution": "Data by \u0982\u0986copy; \u0980\u0983ca href='http://openstreetmap.org' target='_blank' rel='noopener' style='text-decoration: none; color: inherit; font-size: small; margin-left: 10px;' data-l10n-id='osm-attribution-link'}).addTo(map_a3217be6ec9e42e1bf0f9040ffab63c);

var marker_7c7127e3dbd64ce0b070789115eff02e = L.marker(
  [24.0, 88.0],
  {}
).addTo(map_a3217be6ec9e42e1bf0f9040ffab63c);

var popup_c06705e2e2cb4c5cb50ec9339256772e = L.popup({
  "maxWidth": 300
}).setContent(html_1339f42109e64fb8739fae79c5e0065);

var html_1339f42109e64fb8739fae79c5e0065 = $(`<div id="html_1339f42109e64fb8739fae79c5e0065"></div>`);
popup_c06705e2e2cb4c5cb50ec9339256772e.setContent(html_1339f42109e64fb8739fae79c5e0065);

```

Preview of myLocation.html

As it shows the phone's location near "Berhamphore" which is near the city the phone is, it can be said it shows the location nearly accurate.

## SYSTEM REQUIREMENTS

We have used:-

- 1) OS : Windows 10 64 bit
- 2) APPLICATION : PyCharm PYTHON 3.8
- 3) RAM : 8GB
- 4) PROCESSOR : I3 5<sup>TH</sup> GEN

## **ADVANTAGES AND DISADVANTAGES OF MOBILE TRACKING**

Your smartphone GPS data and cell tower triangulation can help to reveal your current location and enable cell phone tracking system. This brings numerous advantages to the consumers. In emergency situations this tracking system can gather information from your phone provider and your GPS receiver and locate you. If you are injured or met some accident which left you unconscious, the police department, relatives or fire department can use this tracking system to track you and help you out of the situation.

Similarly, you can even locate your friends and spot them among a huge crowd or simply stay connected with them through the app called “Find my Friends”. Child safety is the biggest concern of the parents these days and especially for those parents whose children are rebels. You can use this same tracking system to know the whereabouts of your children and where they have been to and if they have been to a potentially dangerous location. This is possible because some mobile vendors sell smartphones with embedded software which periodically sends phone current location via their cellular network to their central server.

Likewise, the tracking system can help business locate where their employees spend time during business hours and can even track the location of their employees. The taxi and delivery companies can use this feature to keep a check on their driver's location and send warning messages if they cross the speed limits.

However, this feature majorly invades the privacy of the people and their private lives. Mobile phone tracking system on one hand provides various advantages, but the question of privacy is a major concern these days. You can disable the casual location tracking system such as find my friends, however, the information about your location will still be available to mobile vendors and for emergency situations.

## **FUTURE SCOPE**

Global Positioning System (GPS) is much more than just the means of finding a way while commuting. It fulfills a much higher purpose than finding the fastest route. They help you to monitor crucial parameters like speed, trip distance, geo-fencing, real-time tracking among others.

GPS trackers have paved the way for both automobiles like cars, trucks, buses as well as personal safety devices like GPS tracking smartwatches. They are easily trackable via smartphone or laptop keeping you tension-free.

Trackers are small with technological advancement, tend to grow and improve. The future of GPS tracking looks extremely promising and we can expect some interesting advancement in this area. Let's look at what the future holds for GPS monitoring systems.

**Compact Size and Longer Life Span**— Compact GPS devices are smaller than a cell phone but the experts predict that continuous development may shrink the sizes of these devices further.

The size of the tracker depends on the battery, while a thumbnail-sized receiver can be improved, it needs to be big enough to accommodate the battery. As the battery technology unfolds, in the future, we may be able to see GPS trackers getting smaller in size.

These days, the best trackers can go up to 30 days without a recharge but to go longer, extended battery packs may be needed which provide up to 6 months of uninterrupted usage.

**Affordability**— GPS trackers are no longer a luxury reserved for big organizations and government agencies. The low price points have brought it within the reach of small companies and even individuals. GPS vehicle tracking is a must for every business and the raised productivity and efficiency make it a value for money.

They are immensely useful for both the professional and personal front. As per their requirements, different sections of people can be catered through the affordable price range. The devices are getting compact yet powerful. Hence, this is the best time to invest in GPS tracking solutions.

**Extensive Usage**— Past few years have seen a considerable rise in businesses turning to GPS technology, as an effective way to manage their transports, employees, and assets. GPS fleet management systems allow enterprises to access driver's performance, vehicle maintenance to providing other necessary inputs like live vehicle tracking.

As the crime rate increases with each passing day, GPS trackers give a sigh of relief for parents. Trackers ensure the safety of your loved ones- be it children or elderly family members. Parents

rely on these trackers to keep a watch and control their inexperienced young teenagers' reckless driving.

## **CONCLUSION**

This Mobile Tracking System has been designed and developed and works properly. It is very efficient, user can easily use this program. Any people can track any mobile location any time using this program. The program is open-source and anyone can use the program for educational purposes and testing. We have tested for different phones numbers and it shows mostly accurate locations. We think users will be benefited by using this program.

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