ANALYSIS OF VEHICLE TRACKING SERVICE IN BANGLADESH

BY

ZANNATUL FERDOUS SONIA

ID: 102-15-1058

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

Supervised By

Anisur Rahman

Assistant Professor

Department of COMPUTER SCIENCE AND ENGINEERING

Daffodil International University

DAFFODIL INTERNATIONAL UNIVERSITY

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APPROVAL

This internship titled **"Analysis of Vehicle Tracking System in Bangladesh"** submitted by Zannatul Ferdous Sonia to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on October 21, 2012.

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Faculty of Science & Information Technology
Daffodil International University

Dr Muhammad Shorif Uddin   **External Examiner**
Professor
Department of Computer Science and Engineering
Jahangirnagar University

DECLARATION

I hereby declare that, this internship report has been done by me under the supervision of **Anisur Rahman, Assistant Professor of Department of CSE** of Daffodil International University. I also declare that neither this report nor any part of this report has been submitted elsewhere for award of any degree or diploma.

Supervised by:

_____

Anisur Rahman
Assistant Professor
Department of Computer Science and Engineering
Faculty of science & Information Technology
Daffodil International University

Submitted by:

_____

Zannatul Ferdous Sonia
ID: 102-15-1058
Department of CSE, CIS & CS
Daffodil International University

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I would like to thank my entire course mate in Daffodil International University, who took part in this discuss while completing the course work.

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

ABSTRACT

Vehicle tracking software can locate the correct position of the car. Using this system we can protect our valuable cars from theft. At once it is used only for vehicles, now the good news is that it is using for vessels also. Now those tracking system is available in our Bangladesh. It is so much important to the vehicle's owner. It can also reduce the fuel consumption, accidents. It helps to the insurance liabilities and Legal issues. It actively monitors the time per stop or start for a vehicle. It surely works as a competitive advantage of a company.

Considering Vehicle Tracking Service's potentiality as a competitive advantage for a business and my scope to learn about real time technology worthiness, I've chosen Vehicle Tracking Service as my Internship topic. So, firstly I found out the suitable Vehicle Tracking Service Company to do my internship, where I can learn about the vehicle tracking service and which help me to decide my further work. Finally, I decided to do my internship in Monico Technologies Limited, a leading Vehicle Tracking Service in Bangladesh.

Monico Technologies Limited is one of the renowned and popular vehicles tracking service provider in Bangladesh. I worked here for three months to complete my internship. I worked in the operation department. I forwarded complains of the customers to the concerned person or departments. There, I learned many things about Vehicle Tracking Service, which would be very much helpful to my carrier life. I tried to explain all over the work I learned within my internship period about the Vehicle Tracking Service. I discussed here the installation process of the device in a vehicle or vessel. I also discussed here client interface with this service. This is the overall work of mine at my internship period. I think I will work further more with this subject and this work will help me a lot.

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CHAPTER ONE

INTRODUCTION

1.1 Executive summary

I have done my internship at Monico Technologies Limited; the IT division of the Monico Ltd. Monico Technologies Limited is a vehicle tracking Service Company in our country. This report is the outcome of my three months internship period at Monico Technologies Limited. I have worked at the operation department of Monico Technologies Limited. During this period I was assigned with various types of duties mainly related with the tracking services. I have prepared this report on the topic which was assigned by my academic supervisor. In this report I have tried to present the information & facts about Monico Technologies Limited & mainly about the vehicle tracking system at Monico Technologies Limited according to the guidelines & details provided to me.

1.2 Objectives of the study

Before starting this report I've set my objectives which have guided me until I finish my report. It always kept me focused to be on right track. These are:

1.2.1 Primary Objectives

1. To present a background and introduction of Monico Technologies Limited.

2. To discuss about the roles & functions of the operation section of Monico Technologies Limited.

3. To provide information of my responsibilities while working as an internee.

4. To share my learning experiences & knowledge which I gathered during my internship period.

1.2.2 Secondary Objectives

1. To have knowledge on vehicle tracking system.

2. To improve report writing ability.

3. To fulfill the requirement of the internship program.

1.3 Methodology

For the purpose of the study, data and information have been collected from both primary and secondary sources. The relevant information collected from primary sources is collected in informal way. Most of the information has been provided by my organizational supervisor. My work experience at Monico Technologies Limited helped me a lot. Besides this, regular conversations with many Monico Technologies Limited employees and suggestions been taken orally from the personnel of Monico Technologies Limited Ltd. I have also collected information orally from the personnel of the other companies to draw a comparison between the tracking systems of these two companies. I have also collected some information from different websites.

1.4 Limitations

1. The company does not have sufficient information regarding their departmental activities in their website.

2. Collecting of data was not smooth because it was not possible to go all required internal information of the company as these are treated as confidential company information.

3. The term paper was prepared within a very short time considering the topics related to it. That's why; it was not possible to demonstrate all aspects of the report.

1.5 Scope of the study

The scope of the study is limited within Monico Technologies Limited & its operation department. It is specifically dealing with the basic work functions & tracking service of the People's vehicle and Organization of Monico Technologies Limited. Here I discuss with the topics related to the company profile, tracking related activities of Monico Technologies Limited. This report also contains a detail description of my learning & experiences which I gathered through my work.

1.6 Origin of the Report

I have completed this report under Monico Technologies Limited (Monico IT division) on Analysis of Vehicle Tracking Service in Bangladesh within three months duration.

1.7 Organization of the Report

I have organized this report within eight chapters and it is given below:

CHAPTER TWO

COMPANY OVERVIEW

2.1 Monico Technologies Limited:

MONICO TECHNOLOGIES LIMITED is the leading company in our country. I have done my internship at Monico Technologies Limited at the operation department. This report is the outcome of my three months internship period at Monico Technologies Limited. I have worked at the operation department of Monico Technologies Limited. During this period I was assigned with various types of duties mainly related with the operation services. I have prepared this report on the topic which was assigned by my academic supervisor. In this report I have tried to present the information & facts about Monico Technologies Limited & mainly about the Vehicle Tracking Service according to the guidelines & details provided to me.

Monico Technologies Limited is a vehicle tracking service in Bangladesh. It is a symbol of trust, accuracy, reliability and perfection. They provide location based services using state of the art technology and we take our work seriously. They have digitized the map of Bangladesh with abundant landmarks and locations which would be right before your eyes. Their vision is to become the best at what we are a sophisticated location based service provider in Bangladesh and gain global recognition therein. Their team of experts is working hard to make that happen, and to ensure that everyone get the absolute best service with a constant smile of confidence in your face. Their pride is their customers who provide them with their trust, their pride is their employee whose multifaceted skills made their services possible, and above all, their pride is being Bangladeshi.

They also provide various IT services; develop office automation, customized web solution. They provide products and services to individuals, small/medium enterprises, and corporate solutions.

Monico Technologies Limited established in 2009. It is situated Dhanmondi near Bangladesh medical college. Now it has all most 2000 client all over the Bangladesh. Monico Technologies Limited is one of the largest vehicles tracking service in Bangladesh.

2.2 Services:

Function of Monico Technologies Limited Vehicle Tracking service:

1. Position track
2. Geo fence:
3. Over speeds Alert.
4. Low power Alert.
5. Voice detection and communicate with driver.
6. Door lock/ shut down
7. Engine lock. Etc.

Any Individual user Can installed this device in their Vehicles like--

1. Private Car
2. Micro Bus
3. Motor cycle
4. Bus
5. Truck
6. Taxi, etc

2.3. Goals

"Actually the goal of the Monico Technologies Limited is that in future within short time to cover all vehicles of Bangladesh even in vessels also."

CHAPTER THREE

VEHICLE TRACKING SERVICE

3.1 Preliminary

Vehicle tracking service actually is a device that fits into the vehicle and captures the GPS location information apart from other vehicle information at regular intervals to a central server. It can also provide fuel amount, engine temperature, altitude, reverse geocoding, door open/close, tire pressure, cut off fuel, turn off ignition, turn on headlight, turn on taillight, battery status, GSM area code/cell code decoded, number of GPS satellites in view, glass open/close, fuel amount, emergency button status, cumulative idling, computed odometer, engine RPM, throttle position, and a lot more. Vehicle tracking relies both on the Global Positioning satellites (GPS) and a cellular system. A tracking module in the vehicle continuously picks up the GPS coordinates that indicate the real-time location of the vehicle. Using a cellular data service such as GPRS, the coordinates are immediately transmitted to the tracking company's computers. Customers log in to the tracking company Web site to see their vehicles on road maps, similar to in-dash and handheld GPS-based navigation systems.
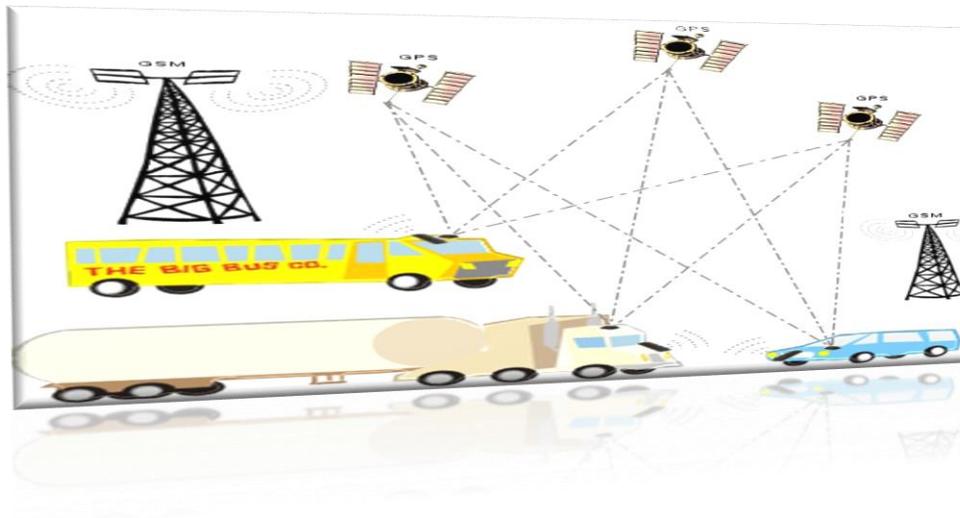

Figure 3.1: Vehicle Tracking Service

In the above figure we see a vehicle tracking service tracking the vehicles with the help of GSM and GPS.

3.2 Types of VTS

Several types of vehicle tracking devices exist. Typically they are classified as "passive" and "active". "Passive" devices store GPS location, speed, heading and sometimes a trigger event such as key on/off, door open/closed. Once the vehicle returns to a predetermined point, the device is removed and the data downloaded to a computer for evaluation. Passive systems include auto download type that transfer data via wireless download. "Active" devices also collect the same information but usually transmit the data in real-time via cellular or satellite networks to a computer or data center for evaluation.

Many modern vehicle tracking devices combine both active and passive tracking abilities: when a cellular network is available and a tracking device is connected it transmits data to a server; when a network is not available the device stores data in internal memory and will transmit stored data to the server later when the network becomes available again.

3.3 Usefulness of Vehicle Tracking Service

1. If you are the user of a GPS vehicle tracking system you will be able to sit at your PC or laptop computer, login to the system and monitor the movement, direction and speed of any vehicle that has a GPS tracking unit installed for your system.

2. One should also be able to look back at historical data of where the vehicle has been; when it was there and how long it stayed there.

3. On more expensive systems the amount of historical data you can store is considerable and you will also get analysis tools to monitor trends and calculate vehicle running costs.

4. Anyone will be able to do this at any time because the GPS unit in the vehicle will operate correctly in all weather conditions.

5. Because they use GPS, these tracking systems are extremely accurate and will be able to show you vehicle positions on a digital street map that is correct to within 15 meters.

6. For the user GPS tracking is very powerful yet simple and easy to use. If you can use a computer you will have no problem enjoying all the functionality that it has to offer.

7. The latest development of these systems now allows one to view the vehicle location data on a map on your cell phone, which is updated automatically every couple of minutes.

8. For the fleet manager or anyone running company cars, vehicle tracking systems are invaluable as they can provide up to date and historical data on routes taken for all their drivers whenever they are driving. If they are doing overnight or late deliveries you can check the system first thing next morning to check that everything went to plan.

9. With the lower priced consumer GPS tracking products you may find that in order to used the data it records you will have to take the unit out of the vehicle and connect it to your PC or laptop via a USB port. The data can then be uploaded and viewed on mapping systems such as Google Earth.

10. However there are also tracking systems for the consumer which operates similarly to the systems used by fleet managers, but these will obviously cost more and there is normally a monthly subscription.

3.4 Vehicle Tracking Service in Bangladesh

Vehicle tracking is one of the fastest growing satellite navigation applications today. Tracking systems employ a combination of GPS, cellular, and other electronic technologies to enable a vehicle to communicate its location and condition to an outside source. Vehicle-tracking systems are often called by other names such as automatic vehicle location-monitoring systems or position-reporting systems.

Today, many fleet vehicles, public transportation systems, delivery trucks and courier services use vehicle tracking system to monitor their locations at all times, including speeding so you can monitoring your driver performance. Vehicle tracking systems also can monitor the location of a vehicle if it has been stolen or lost.

There are many companies that offer GPS vehicle tracking system service. The GPS vehicle system is reasonably priced with a low flat monthly fee, no term contract, and simple to install. Others companies, which are giving this service are- Ntrack, Grameen and Banglalink.

Monico Technologies Limited is one and most favorite one vehicle tracking service of the country. So I will discuss about Monico Technologies Limited Vehicle Tracking Service in this report. Hope, it will help your all to understand the Vehicle Tracking Service.

CHAPTER FOUR
ABOUT SERVICES

4.1 Introduction

We usually know where we are. But that may not always be the case; spatial information up our head may not be translated properly when we are telling ourselves or others directions of places unvisited before, solely based on addresses. Maps are the first thing that comes into our head when we think of going on to a long drive, or exploring the unknown. But still we have to rely on pinpointing the source and destination and drawing the route ON the map, which adds a "little" overhead for us. How about letting it all be done by a computer? Knowing where we are, or where we are going- all are position oriented, making a computer do the daunting tasks of route selection, situation analysis, location point-out are part of location based services. A location based service is a service where the positional and spatial information is processed to serve their parties involved. It can be accessible through mobile, computer network, or any device that utilizes the location based technologies. It is an information and entertainment service that has numerous applications starting simple position detector to advanced weather forecasting.

LBS Applications

Some examples of location-based services are:

1. Requesting the nearest business or service, such as an ATM or restaurant.
2. Turn by turn navigation to any address.
3. Locating people on a map displayed on the mobile phone.
4. Receiving alerts, such as notification of a sale on gas or warning of a traffic jam
5. Location-based mobile advertising.
6. Asset recovery with GPS to find, for example, stolen assets   in containers.

For the carrier, location-based services provide added value by enabling services such as: Resource tracking with dynamic distribution: Taxis, service people, rental equipment, doctors, fleet scheduling. Resource tracking objects without privacy controls, using passive sensors or RF tags, such as packages and train boxcars.

1. Finding someone or something. Person by skill (doctor), business directory, navigation, weather, traffic, room schedules, stolen phone, emergency calls.
2. Proximity-based notification (pushes or pulls). Targeted advertising, buddy list, common profile matching (dating), and automatic airport check-in.

3. Proximity-based actuations (push or pull). Payment based upon proximity (EZ pass, toll watch).

4.2 What is vehicle tracking service & why it is important

VTS monitor the location of a truck, car or any moving vehicle using the GPS system. Widely deployed to keep track of truck fleets, vehicle tracking ensures that the vehicles are being used properly and that they acne be recovered in the event they are stolen.

10 Reasons to use a VEHICLE TRACKING SERVICE-

1. Introduce an AVL tracking system to your employees as part of a bonus and cost savings program. Employees and staff need to quickly accept the idea of using vehicle tracking technology to keep up with the times and increase the financial position of the company; rather than "big brother watching over them". Employees value their jobs in a tighter economy, more than they do the idea of being supervised. At the end of the day, vehicle tracking technology is essentially just another management tool to help you better run you business.

2. An AVL vehicle tracking system can be actively used to resolve customer disputes related to arrival time, service duration and service location. Employees will appreciate this level of detailed support.

3. By knowing the exact location of a vehicle, pinpointed on a map, remote staffs that are lost can be better helped. This helps the employee stay on schedule and not have to speed or work over time to recover lost time.

4. Reducing the average speed of your vehicles. As an example, if you get your vehicles to slow down and stay within the speed limits, this relates directly into fuel consumption, maintenance and accidents that could save up to 20% on your monthly fuel bill. The additional benefit of reducing speed is that your drivers may well keep their licenses for a while longer! And you can reduce your insurance liability. You may find that servicing and maintenance costs will reduce, however this will only be evident over time. It might take a year for you to really see the difference on your bottom-line, but it has to come if you are driving fewer miles and at the legal speed limits.

5. Verification of the accuracy of time sheets can be a key area for improvement. The introduction of an AVL system gives you the facility to compare a typical start-stop reposts to the time sheets. Determine what the average margin of error is and then compare that to the time sheets before you installed the vehicle tracking system. The benefit can equate to savings of thousands of pounds, per employee, per year.

6. Verify existing and promote new sales calls from your sales team. If each sales person can generate one additional sale call in every call in every three days that mean an extra 84 sales calls, per employee, per year. How much in extra sales, new business and profits will this mean to your business every year? Add to this the savings from not paying for mileage or fuel for unproductive or personal driving on company times and your business is even further ahead.

7. Actively monitor the time per stop or call. A good service manager will know exactly how long a quality service call or delivery will take. By watching the reported time they can determine whether the employee is spending too much, "unproductive time", or too little "valuable" time with customers and clients. This results in fewer customer cancellations, allowances, returned goods and an increase in sales. Efficiency is the key here.

8. Use the fact that you are utilizing the latest vehicle tracking technology as a competitive advantage. Telling customers that you will be there between 8am-5pm is becoming less acceptable in the marketplace. Customers want more precise and better-informed call times. When all else is equal between customers, use of vehicle tracking technology will be a distinct sales advantage.

9. Contact your insurance provider and request a discount when you can show them your vehicles are now driving slower, driving fewer miles and you are reducing the risk of accidents. If the insurance company will not give you a reduction, shop around. There are insurance companies that will offer a discount, once you can show an improvement.

10. Use the reporting a system can help to eliminate moonlighting, driving after hours and unwanted stops during the workday. This will save your money on wages, fuel maintenance, limit your liability and provide for better customer service.

Your driving policy must be a written policy to reduce you liability in case of legal action.

4.3 How it works

Track your track vehicle tracking solutions combine sophisticated GPS tracking technology with flexible, advanced mapping and reporting software. A Vehicle Location Manager is installed on your vehicle which collects and transmits tracking data via a cellular or satellite network, whichever works best for your operations. The device then delivers the data to the Track Your hosted application, NetTrack, which you can access through the Web at any time. Your will receive real-time vehicle tracking updates, including location, direction, speed, idle time, start/stop and more, allowing you to manage a tighter schedule and more efficient fleet.

1. Track Your Truck's unit updates the vehicle internal position every second and transmits a new GPS message every 2 minutes.
2. Track Your Truck's Sky Runner unit transmits the GPS message via an MSAT satellite, which covers North America, to the Track Your Truck 24/7 Network Operation Center.
3. Track Your Truck's SkyHawkII unit transmits the GPS message via Globalstar's LEO Satellite network to the Track Your Truck NOC.

Track Your Truck vehicle tracking features include real-time mapping with automatic refresh, live tracking from your mobile phone, and detailed truck activity reports.

Vehicle tracking relies both on the Global Positioning satellites (GPS) and a cellular system. A tracking module in the vehicle continuously picks up the GPS coordinates that indicate the real-time location of the vehicle. Using a cellular data service such as GPRS, the coordinates are immediately transmitted to the tracking company's computers. Customers log in to the tracking company's web site to see their vehicles on road maps, similar to in-dash and handheld GPS-based navigation systems.
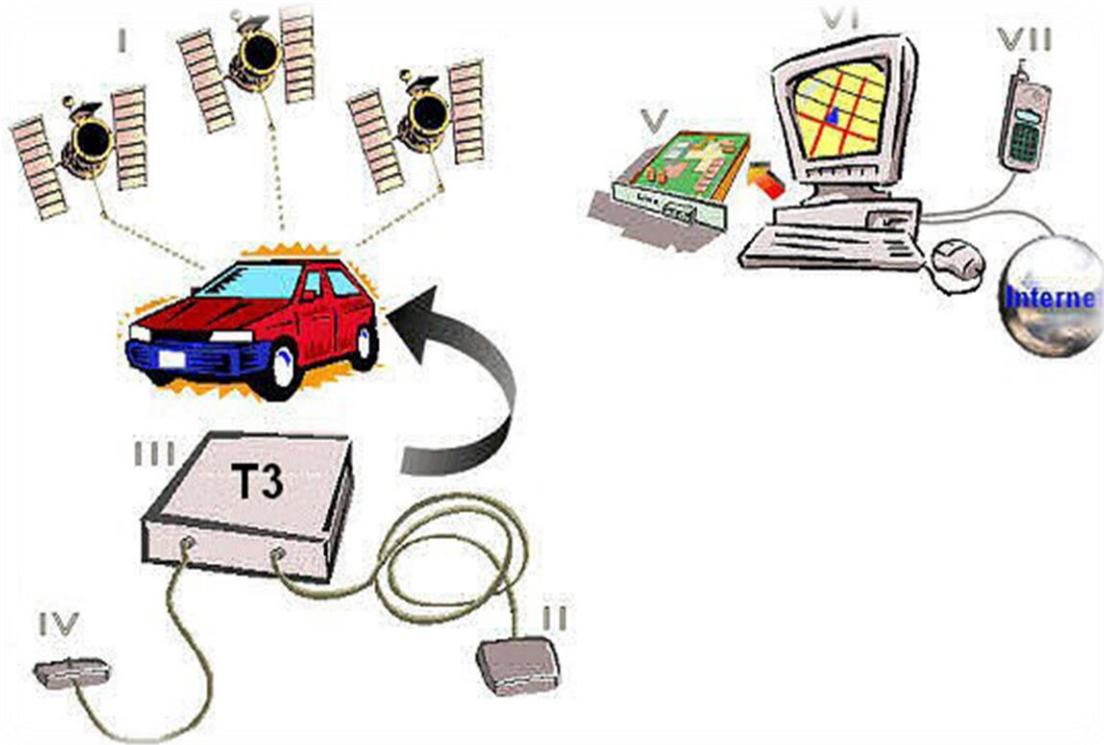
Figure 4.1: How VTS work

In the above figure, we can see how vehicle tracking services work. Here a tracking module in the vehicle continuously picks up the GPS coordinates that indicate the real-time location of the vehicle. Using a cellular data service such as GPRS, the coordinates are immediately transmitted to the tracking company's computers. Customers log in to the tracking company's web site to see their vehicles on road maps, similar to in-dash and handheld GPS-based navigation systems.

Passive Tracking Service:

Passive tracking devices which provide a cost-effective approach to vehicle tracking allow users to monitor assets without having to pay a monthly fee. Since passive devices do not transmit data and only receive GPS coordinates, second-by-second tracking features are common. When the user wants to review the recorded data they simply remove the GPS tracking system from the vehicle and manually download the data via USB port.

4.4 Technologies

GPS

The Global Positioning System (GPS) is a space-based global navigation satellite system (GNSS) that provides location and time information in all weather, anywhere on or near the earth, where there is an unobstructed line of sight to four or more GPS satellites. It is maintained by the United Sates government and is freely accessible by anyone with a GPS receiver.

The GPS project was developed in 1973 to overcome the limitations of previous navigation systems, integrating ideas from several predecessors, including a number of classified engineering design studies from the 1960s. GPS was created and realized by the U.S. Department of Defense (USDOD) and was originally run with 24 satellites. It became fully operational in 1994.

In addition to GPS, other systems are in use or under development. The Russian Global Navigation System (GLONASS) was in use by only the Russian military, until it was made fully available to civilians in 2007. There are also the planned Chinese Compass navigation system and the European Union's Galileo positioning system.

The design of GPS is based partly on similar ground-based radio-navigation system, such as LORAN and the Decca Navigation developed in the early 1940s, and used during World War II. In 1956, Friedwardt Winterberg proposed a test of general relativity (for time slowing in a strong gravitational field) using accurate atomic clocks placed in orbit inside artificial satellites. To achieve accuracy requirements, GPS uses principles of general relativity to correct the satellites' atomic clocks. Additional inspiration for GPS came when the Soviet Union launched the first man-made satellite, Spuntnik in 1957. Two American physicists, William Guier and George Weiffenbach, at Jjohns Hopkin's Applied Physics Laboratory (APL), decided on their own to monitor Sputnik's radio transmission. They soon realized that, because of the Doppler effect, they could pinpoint where the satellite was along its orbit from the Doppler shift. The Director of the APL gave them access to their brand new UNIVAC II to do the heavy calculations required. When they released the orbit of Sputnik to the media the Russians were dumbfounded to learn how powerful American computers had become, as they were not able to calculate the orbit themselves, due to the APL asked Guier and Weiffenbach to look at the inverse

problem where your know the location of the satellite and you want to find your own location. This led them and APL to develop the Transit system.

The first satellite navigation system, Transit (satellite), used by the United States Navy, was first successfully tested in 1960. It used a constellation of five satellites and could provide a navigational fix approximately once per hour. In 1967, the U.S. Navy developed the Timation satellite the proved the ability to place accurate clocks in space, a technology required by GPS. In the 1970s, the ground-based Omega Navigation System, based on phase comparison of signal transmission from pairs of station, became the first worldwide radio navigation system. Limitations of these systems drove the need for a more universal navigation solution with greater accuracy.

While there were wide needs for accurate navigation in military and civilian sectors, almost none of those were seen as justification for the billions of dollars it would cost in research, development, deployment, and operation for a constellation of navigation satellites. During the cold war arms race, the nuclear threat to the existence of the congress. This deterrent effect is why GPS was funded. The nuclear triad consisted of the United States Navy's submarine-launched ballistic missiles (SLBMs) along with United States Air Force (USAF) strategic bombers and intercontinental ballistic missiles (ICBMs). Considered vital to the nuclear deterrence posture, accurate determination of the SLBM launch position was a force multiplier.

Precise navigation would enable United States submarines to get an accurate fix of their positions prior to launching their SLBMs. The USAF with two-thirds of the nuclear triad also had requirements for a more accurate and reliable navigation system. The Navy and Air Force were developing their own technologies in parallel to solve what was essentially the same problem. To increase the survivability of ICBMs, there was a proposal to use mobile launch platforms (such as Russian SS-24 and SS-25) and so the need to fix the launch position had similarity to the SLBM situation.

In 1960, the air Force proposed a radio-navigation system called MOSAIC (Mobile System for Accurate ICBM control) that was essentially a 3-D LORAN. A follow-on study called Project 57 was worked in 1963 and it was "in this study that the GPS concept was born." That same year the concept was pursued as Project 621B, which had "many of the attributes that your now see in GPS" and promised increased accuracy for

Air Force bombers as well as ICBMs. Updates from the Navy Transit system were too slow for the high speeds of Air Force operation. The Navy Research Laboratory continued advancements with their Timation (Time Navigation) satellites, first launched in 1967, and with the third one in 1974 carrying the first atomic clock into orbit. With these parallel developments in the 1960s, it was realized that a superior system could be developed by synthesizing the best technologies from 621B, Transit, Timation and SECOR in a multi-service program. During Labor Day weekend in 1973, a meeting of about 12 military officers at the Pentagon discussed the creation of a Defense Navigation Satellite System (DNSS). It was at this meeting that "the real synthesis that became GPS was crated." Later that year, the DNSS program was named Navstar. With the individual satellites being associated with the name Navstar (as with the predecessors Transit and Timation), a more fully encompassing name was used to identify the constellation of Navstar satellites, Navstar-GPS, which was later shortened simply to GPS. After Korean Air Lines Flight 007, carrying 269 people, was shot down in 1983 after straying into the USSR's prohibited airspace in the vicinity of Sakhalin and Moneron Islands, President Ronald Reagan issued a directive making GPS freely available for civilian use, once it was sufficiently developed, as a common good. The first satellite was launched in 1989, and the 24th satellite was launched in 1994.

Initially the highest quality signal was reserved for military use, and the signal available for civilian use was intentionally degraded ("Selective Availability", SA). This changed with President Bill Clinton ordering selective Availability to be turned off at midnight May 1, 2000; improving the precision of civilian GPS from 100 meters (about 300 feet) to 20meters (about 65 feet). The executive order signed in 1996 to turn off selective availability in 2000 was proposed by the US Secretary of Defense, William Perry, because of the widespread growth of differential GPS services to improve civilian accuracy and eliminate the US military advantage. Moreover, the US military was actively developing technologies to deny GPS service to potential adversaries on a regional basis. GPS is owned and operated by the United States Govt. as a national resource. Department of Defense is the steward of GPS. Interagency GPS Executive Board oversaw GPS policy matters from 1996 to 2004. After that the National Space-Based Positioning, Navigation and Timing Executive Committee was established by

presidential directive in 2004 to advise and coordinate federal departments and agencies on matters concerning the GPS and related systems. The executive committee is chaired jointly by the deputy secretaries of defense and transportation. Its membership includes equivalent-level officials from the departments of state, commerce, and homeland security, the Joint Chiefs of Staff and NASA. Components of the executive office of the president participate as observers to the executive committee, and the FCC chairman participates as a liaison. USDOD is required by law to "maintain a Standard Positioning Service (as defined in the federal radio navigation plan and the standard positioning service signal specification) that will be available on a continuous, worldwide basis," and "develop measures to prevent hostile use of GPS and its augmentations without unduly disrupting or degrading civilian uses."

GSM

GSM (Global System for Mobile Communications, originally Group Special Mobile), is a standard set developed by the European Telecommunications Standards Institute (ETST) to describe technologies for second generation analogue cellular networks, the GSM standard originally described a digital, circuit switched network optimized for full duplex voice telephony. The standard was expanded over time to include first circuit switched data transport, then packet data transport via GPRS. Packet data transmission speeds were later increased via EDGE. The GSM standard is succeeded by the third generation (or "3G") UMTS standard developed by the 3GPP. GSM networks will evolve further as they begin to incorporate fourth generation ("4G") LTE Advanced standards. "GSM" is a trademark owned by the GSM Association.

The GSM Association estimates that technologies defined in GSM standard serve 80% of the global mobile market, encompassing more than 1.5 billion people across more than 212 countries and territories , making GSM the most ubiquitous of the many standards for cellular networks.

Early European analogue cellular networks employed an uncoordinated mix of technologies and protocols that varied from country to country, preventing interoperability of subscriber equipment and increasing complexity for equipment manufacturers who had to contend with varying standards from a fragmented market. The

work to develop a European standard for digital cellular voice telephony vegan in 1982 when the European Conference of Postal and Telecommunications Administrations (CEPT) created the Group Special Mobile committee and provided a permanent group of technical support personnel, based in Paris.   In 1987, 15 representatives from 13 European countries signed a memorandum of understanding to develop and deploy a continental standard paid off, eventually resulting in a unified, open standard-base network larger than that in the United States.

France and Germany signed a joint development agreement in 1984 and were joined by Italy and the UK in 1986. In 1986 the European Commission proposed to reserve the 900 MHz spectrum band for GSM. By 1987, basic parameters of the GSM standard had been agreed upon and 15 representatives from 13 European nations signed a memorandum of understanding in Copenhagen, committing to deploy GSM. In 1989, the Group Special Mobile committee was transferred from CEPT to the European Telecommunications Standards Institute.

Phase I of the GSM specifications were published in 1990. The historic world's first GSM call was made by the Finnish Prime Minister Harri Holkeri to Kaarina Suonio(Mayor in city of Tampere) in July 1 1991. The first network was built by Telenokia and Siemens and operated by Radiolinja 1992, the first short messaging service (SMS or "text message") message was sent and Vodafone UK and Telecom Finland signed the first international roaming agreement. Work had begun in 1991 to expand the GSM standard to the 1800 MHz frequency band and the first 1800 MHz network became operational in the UK in 1993. Also in 1993, Telecom Australia became the first network operator to deploy a GSM network outside of Europe and the first practical hand-held GSM mobile phone became available. In 1995, fax, data and SMS messaging services became commercially operational, the first 1900 MHz GSM network in the world became operational in the United States and GSM subscribers worldwide exceeded 10 million. In this same year, the GSM Association was formed. Pre-paid GSM SIM cards were launched in 1996 and worldwide GSM subscribers passed 100 million in 1998.

In 2000, the first commercial GPRS services were launched and the first GPRS compatible handsets became available for sale. In 2001, the first UMTS (W-CDMA)

network was launched and worldwide GSM subscribers exceeded 500 million. In 2002, the first multimedia messaging services (MMS) were introduced and the first GSM network operational in a network in 2003 and the number of worldwide GSM subscribers exceeded 1 billion in 2004.

By 2005, GSM networks accounted for more than 75% of the worldwide cellular network market, serving 1.5 billion subscribers. In 2005, the first HSDPA capable network also became operational. The first HSUPA network was launched in 2007 and worldwide GSM subscribers exceeded two billion 2008.

The GSM Association estimates that technologies defined in the GSM standers serve 80% of the global mobile market, encompassing more than 1.5 billion people across more than 212 countries and territories, making GSM the most ubiquitous of the many standards for cellular networks.

4.5 Technical Details

GSM cell site antennas in the Deutsches Museum, Munich, Germany

GSM is a cellular network, which means that mobile phones connect to it by searching for cells in the immediate vicinity. There are five different cell sizes in a GSM network-macro, micro, pico, femto and umbrella cells. The coverage area of each cell varies according to the implementation environment. Macro cells can be regarded as cell where the base station antenna is installed on a mast or a building above average roof top level. Micro cells are cells whose antenna height is under average roof top level; they are typically used in urban areas. Pico cells are small cells whose coverage diameter is a few dozen meters; they are mainly used indoors. Femtocells are cells designed for use in residential or small business environment and connect to the service provider's network via a broadband internet connection. Umbrella cells are used to cover shadowed regions of smaller cells and fill in gaps in coverage between those cells.

Cell horizontal radius varies depending on antenna height, antenna gain and propagation conditions from a couple of hundred meters to several tens of kilometers. The longest distance the GSM specification supports in practical use is 35kilometers (22 mi). there are also several implementations of the concept of an extended cell where the cell radius

could be double or even more, depending on the antenna system, the type of terrain and the timing advance.

Indoor coverage is also supported by GSM and may be achieved by using an indoor pico cell base station, or an indoor repeater with distributed indoor antennas fed through power splitters, to deliver the radio signals from an antenna outdoors to the separate indoor distributed antenna system. These are typically deployed when a lot of call capacity is needed indoors; for example, in shopping centers or airports. However, this is not a prerequisite, since indoor coverage is also provided by in-building penetration of the radio signals from any nearby cell.

The modulation used in GSM is Gaussian minimum-shift keying (GMSK), a kind of continuous-phase frequency shift keying. In GMSK, the signal to be modulated onto the carrier is first smoothened with a Gaussian low-pass filter to being fed to a frequency modulator, which greatly reduces the interference to neighboring channels (adjacent-channel interference).

4.6 Network structure

The network is structured into a number of discrete sections:

1. The Base Station Subsystem (the base stations and their controllers).
2. The Network and Switching Subsystem (the part of the network most similar to a fixed network). This is sometimes also just called the core network.
3. The GPRS Core Network (the optional part which allows packet based internet connection).
4. The Operational Support System (OSS) for maintenance of the network.

Subscriber Identity Module (SIM)

One of the key features of GSM is the Subscriber Identity Module commonly known as SIM. The SIM is a detachable smart card containing the user's subscription information and phone book. This allows the user to retain his or her information after switching handsets. Alternatively, the user can also change operators while retaining the handset simply by changing the SIM. Some operators will block this by allowing the phone to use only a single SIM, or only a SIM issued by them; this practice is known as SIM locking. CDMA

Code division multiple access (CDMA) is a channel access method used by various radio communication technologies. It should not be confused with the mobile phone standards called cdmaOne, CDMA2000 (the 3G evolution of cdmaOne) and WCDMA (the 3G standard used by GSM carriers), which are often referred to as simply CDMA, and use CDMA as an underlying channel access method.

One of the basic concepts in data communication is the idea of allowing several transmitters to send information simultaneously over a single communication channel. This allows several users to share a band of frequencies. This concept is called multiple accesses. CDMA employs spread-spectrum technology and a special coding scheme (where each transmitter is assigned a code) to allow multiple users to be multiplexed over the same physical channel. By contrast, time division multiple access (TDMA) divides access by time, while frequency-division multiple access (FDMA) divides it by frequency. CDMA is a form of spread-spectrum signaling, since the modulated coded signal has a much higher data bandwidth than the data being communicated.

An analogy to the problem of multiple access is a room (channel) in which people wish to talk to each other simultaneously. To avoid confusion, people could take turns speaking (time division). CDMA is analogous to the last example where people speaking the same language can understand each other, but other languages are perceived as noise and rejected. Similarly, in radio CDMA, each group of users is given a shared code. Many codes occupy the same channel but only users associated with a particular code can communicate.

Steps in CDMA Modulation

CDMA is a spread spectrum multiple access technique. A spread spectrum technique spreads the bandwidth of the data uniformly for the same transmitted power. Spreading code is a pseudo-random code that has a narrow ambiguity function, unlike other narrow pulse codes. In CDMA a locally generated code runs at a much higher rate than the data to be transmitted. Data for transmission is combined via bitwise XOR (exclusive OR) with the faster code. The figure shows how spread spectrum signal is generated. The data signal with pulse duration of T_b is XOR'ed with the code signal with pulse duration of T_c. (Note: Bandwidth is proportional to $1 / T$ where T = bit time) Therefore, the bandwidth of the data signal is $1 / T_b$ and the bandwidth of the spread spectrum signal is $1 / T_c$ since T_c

is much smaller than T_b, the bandwidth of the spread spectrum signal is much larger than the bandwidth of the original signal. The ratio T_b / T_c is called spreading factor or processing gain and determines to a certain extent the upper limit of the total number of users supported simultaneously by a base station.

Each user in a CDMA system uses a different code to modulate their signal. Choosing the codes used to modulate the signal is very important in the performance of CDMA systems. The best performance will occur when there is good separation between the signal of a desired user and the signals of other users. The separation of the signals is made by correlating the received signal with the locally generated code of the desired users. The separation of the signals is made by correlating the received signal with the locally generated code of the desired user. If the signal matches the desired user's code then the correlation function will be high and the system can extract that signal. If the desired user's code has nothing in common with the signal the correlation should be as close to zero as possible (thus eliminating the signal); this is referred to as cross correlation. If the code is correlated with the signal at any time offset other than zero the correlation should be as close to zero as possible. This is referred to as auto-correlation and is used to reject multi-path interference.

In general CDMA belongs to two basic categories: synchronous (orthogonal codes) and asynchronous (pseudorandom codes)

CHAPTER FIVE
EXPERIMENTAL SETUP

5.1 Devices used in VTS

To install a VTS we have to use various kinds of devices. In Monico Technologies Limited, when I install a VTS for the experiment I used some devices which are shown and briefed below-

Hardware Description

Host Tracker

Earphone jack.

LCD display screen-Optional   Handset-Optional
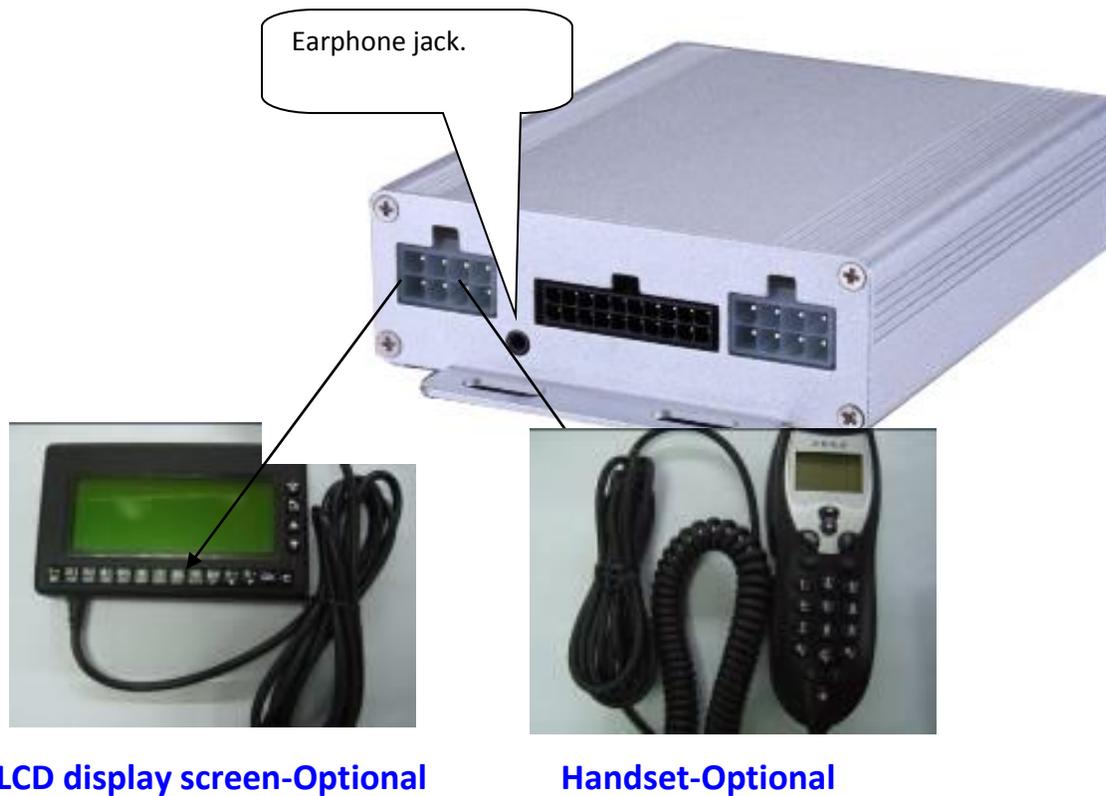
Figure 5.1: Host Tracker with LCD Display and Handset

In the above figure, we can see the main device which we install as VTS. In this device we can see where we plug in the CD display screen-optional, handset-optional and earphone jack.

Press this small button with a ball-point pen or something small and sharp. Then the SIM card slot will come out.

GPS   GSM

Put in the SIM card slot.

This indicator can turn red and blue light.

GSM Antenna

Emergency triggering alarm

GPS Antenna

Figure 5.2: Host Tracker with GPS and GSM Antenna

In the above figure, we can see the GSM antenna wire, the GPS antenna wire and the emergency triggering alarm wire, which joined with the device to pick up the signals to track the vehicles. Here also we can see where the SIM should go.

5.2 Start Up

Put the SIM card in place and installed the tracker in the car, the red indicator is on. About 40 seconds, the unit will begin to work and acquire the GSM signals as well as the GPS signals, and the red indicator will keep flashing every 2 seconds when the GSM module is no communication. When the blue indicator is light, the unit has been located.

Main Functions

1. Positioning and Tracking: Through the on-line Positioning platform or the cell phone to locates at times, and get the working status. You can choose the Positioning platform by yourself.

2. Triggering Emergency Alarm: When there is an emergency happened on the vehicle, you can put on the button and the installed unit will send out alarm to the authorized numbers.

3. Remote Controlling oil and circuit: your can control the oil and circuit via the unit by SMS in anywhere and anytime.

4. Remote monitoring: in anywhere and anytime, call the phone number in the unit, when it connects your can monitor the sound around 5 meter.

5. Movement alert: Send SMS to the unit to start the movement alert function. When the vehicle is moving, the unit will send the movement alert to all authorized numbers.

6. Geo-fence: set up a geo-fence for the unit to restrict its movements within a district. The unit will send the message to all authorized numbers when it reaches the district.

7. Over speed alert: Send SMS to the unit to start the movement alert function. When the vehicle is over speed, the unit will send the over speed alert to all authorized numbers.

8. Restart the unit: send SMS to resume the default of unit.

9. Auto track: Your can set up auto track by SMS or on-line positioning platform.

10. Mileage statistics: ACC checking; cutting off power and alarm.

11. Compatible with the original anti-theft alarm: It will send SMS alarm after the original anti-theft alarm warning.

12. Support two way conversation phones; you can talk with other person by this tracker.

13. Support GPS data record. In no network signal, tracker record GPS data. After come from signal, tracker sends record data to server. It can store 2000 data.

14. Support LED advertisement screen. Platform center can send advertisement message to car with this tracker and LED advertisement screen.

15. Support LCD display screen. Platform center can send information to tracker's information LCD.

16. Support camera, it send command to take photos from GPRS platform, and see photos on platform.

5.3 Device Activation / Set Up

GPS Vehicle Tracker Installation

GPS608C tracker should be installed by technical professional of local service center. Without permission, the user can't repair or move the tracker randomly. If users do, any unfortunate damage should be compensated by them.

Installation Steps

(Caution: The following installation should under no power, otherwise will be dangerous.)

Installation diagram of The Tracker
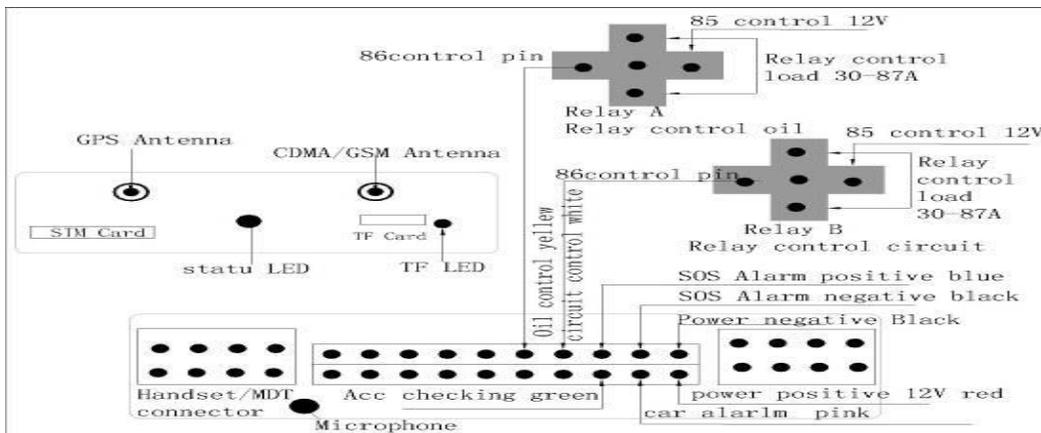
Figure 5.3: Installation diagram of VTS

1. Power supply line: The red wire connects 12V"+";Black wire connects to 12V"-"
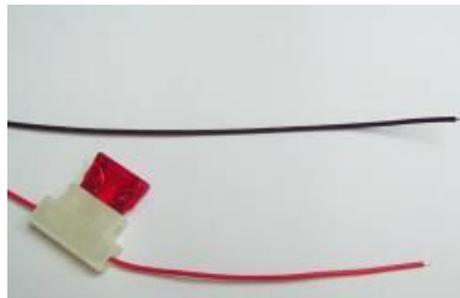
2. Wire for cutting off oil of the tracker

Yellow wire connects the relay pin 86; 85 pin connect to 12 V DC, 87 pin and 30 pin in series power supply circuits. Caution: Wrong connection of yellow wire will damage the tracker.
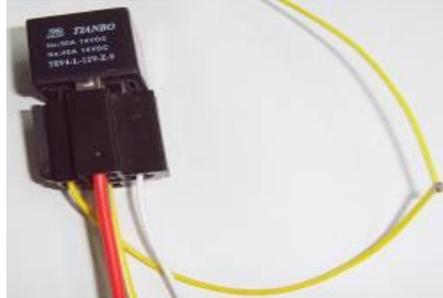
3. Wire for cutting off circuit of the tracker

White wire connects relay pin 86; 85 pin to 12 V DC, 87 pin and 30 pin are in series power supply circuits. Caution: Wrong connection of yellow wire will damage the tracker.

4. Emergency triggering alarm

The blue wire connects the positive of the alarm button, and the black wire connects the negative of the alarm button.

5.4 Application

1. Global positioning
2. Real-time monitoring
3. Vehicle locating
4. Timing tracking
5. Cutting off power and circuit by remote control
6. Vehicle rental / Fleet management etc
7. Specs.

Tracker Model	GPS608
GPS608C: CDMA Band	800MHz
GPS Chip	SiRF III
GPS Sensitivity	-160dBm
GPS Positioning accuracy	3 – 30m
Data transmission	SMS, CDMA data
ways for search Location	Mobile phone or tracking software
Dim.	113 * 91* 31 (mm)
Weight	0.695kg
Work Temp.	-20Cto+70C
Storage Temp.	-40Cto+85C
Running humidity	5-95%RH
Working Voltage	DC 9V－30V
Backup battery	3.7V / 1100mAh li-ion battery
Standby work current	< 50mA

User File

User name		Sex		Age	
Address					
Telephone				Zip	
Purchasing address					
Retail price		Odd Numbers			
Commodity name and specification		Model No.			
Dealer signature		User Signature			

5.5 Guarantee Item

1. 2months upon date of purchase, if there is function problem, we should offer the same item subject to goods and packing maintain perfect.
2. 1year upon date of purchase, we will guarantee to keep the goods in repair. (Not including fittings)
3. Guarantee service is subject to normally using.
4. All of damage by man-made (tear open the housing, tear off the sticker, unusually using), or losing this card, will not guarantee.

CHAPTER SIX

RESOURSES USED IN TRACKING SERVICE

6.1 Maps

In VTS some maps are used to see the tracking vehicle. In these maps one can able to see his/her vehicle's exact location. These maps have many special roles in vehicle tracking services. Monico Technologies Limited uses four maps to watch the vehicle. They are-

1. Goggle Street
2. Goggle Satellite
3. Goggle Hybrid
4. Monico Map

In these above maps, one map is owned by Monico Technologies Limited. The other three maps, which are used by Monico Technologies Limited, are owned by Google.

6.2 Functions

With the help of some function Monico Technologies Limited is able to view the location of a vehicle. Some of the functions are-

1. Follow Mode
2. View on Map
3. Previous Location
4. Animated Path Clear Map

In follow mode, Monico Technologies Limited's VTS follows the vehicle where it is going. In view on map mode, one can view his/her vehicle in the map from the pc or phone. In the previous location mode, one can see the vehicles previous locations. One can also see the vehicle's animated path in the map with the help of animated path mode.

6.3 Technologies

In Monico Technologies Limited they use three types of technologies to track vehicles. They are using-

1. HTML
2. PHP
3. DJANGO

In the future, they are thinking to use JAVA as a technology. They will work on it as soon as possible.

CHAPTER SEVEN

MY RESPONSIBILITIES, FINDINGS AND RECOMMENDATION

7.1 My Responsibilities-

I joined the Monico Technologies Limited as an intern in the operations department. I learned many things about Vehicle Tracking Service by working in Monico Technologies Limited. My responsibilities in the Monico Technologies Limited was-

1. Talk to the client over phone about various problem
2. Manage the client face-to-face
3. Inform the concerned person about the client's problems
4. Solve various problem about the tracker after set-up

7.2 Findings-

1. How to manage the client
2. How to setup a tracker into a vehicle
3. How to solve various problems in the tracker after set up
4. How works GPS, GSM and CDMA technology
5. Over all idea on satellite activities

I very much enjoyed the internship period in Monico Technologies Limited. I've learned very much important things and works which may be couldn't possible to learn from anywhere else.

7.3 Recommendations-

There are many opportunities to increase the efficiency, productivity and accountability of vehicle tracking service including-

1. Increase productivity
2. Reduce operational costs
3. Improve customer service
4. Enhance security for both driver and vehicle
5. Sending bus/trucks to your destination with confidence
6. Eliminate logbooks and quickly reconcile disputed job tickets

CHAPTER EIGHT

VTS USAGE AND REAL TIME OBSERVATION

## 8.1 Usage and Real Time Observation of VTS
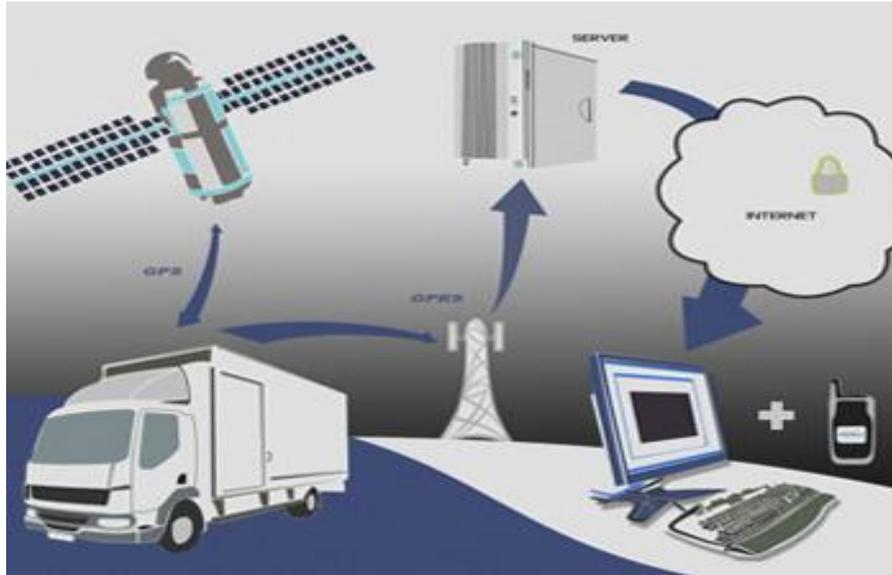
Figure 8.1: Combination of total GPS and GSM technology 01

In the above figure, we can see the combination works of total GPS and GSM technology. We can also see how the signals picked and how one can see the vehicle's path in a computer.

Figure 8.2: Combination of total GPS and GSM technology 02

In the above figure, we can see that how one can able to access the VTS data from a mobile phone.
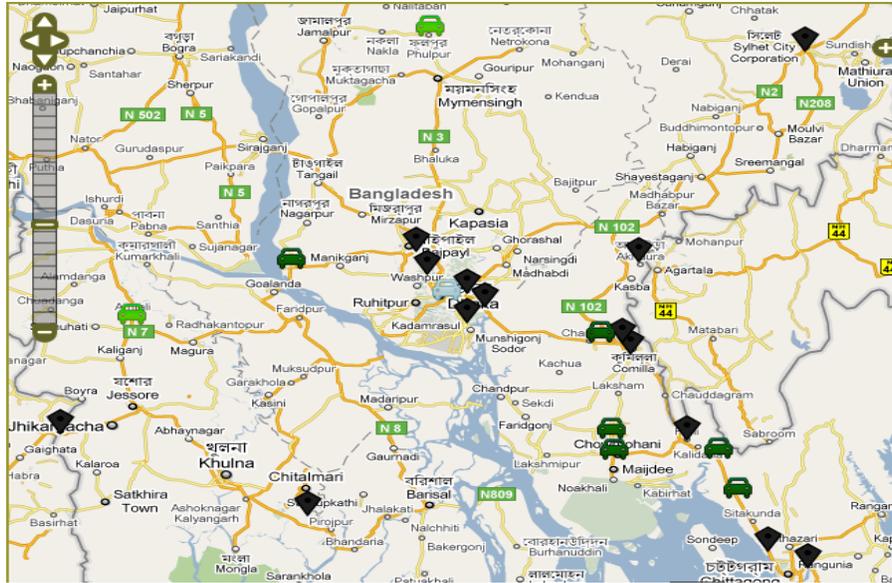
Figure 8.3: View all vehicles in one map

In the above figure we can see all the vehicles in one map under the service of one company.
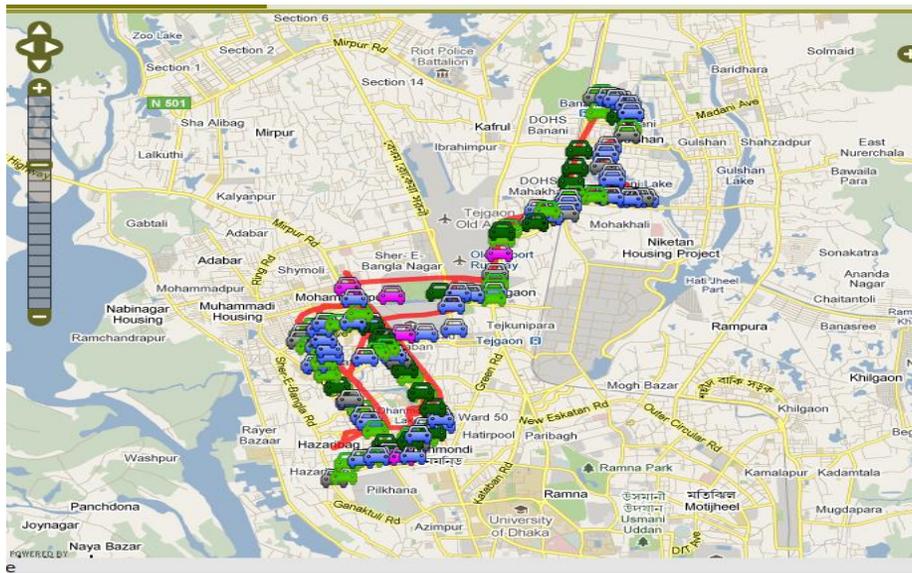
Figure 8.4: Vehicles Previous Route

In the above figure, we can see the previous routes of a vehicle in one map.
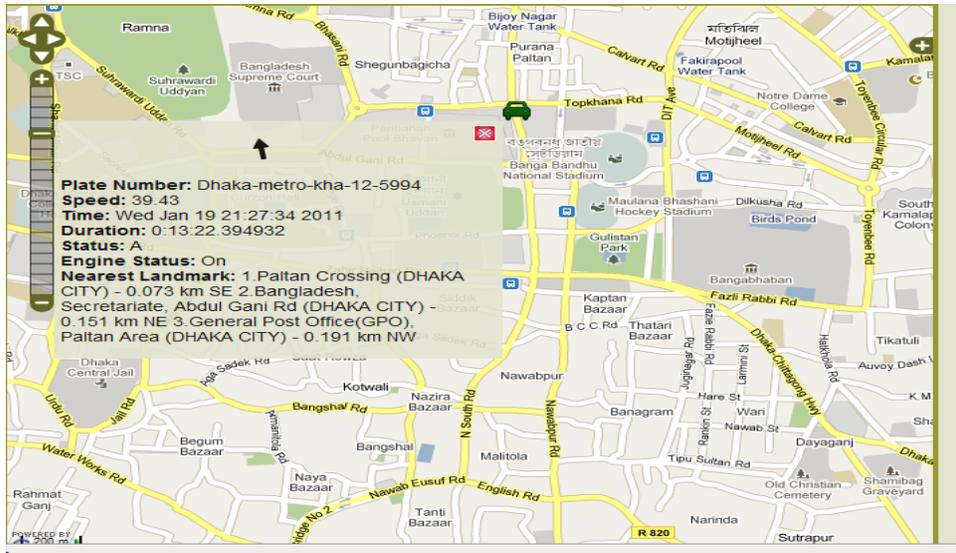
Figure 8.5: Vehicles Last Status

In the above figure, we can see a vehicles last status from the present time with the speed, time, and plate number, duration of the previous state, engine status and nearest landmark.
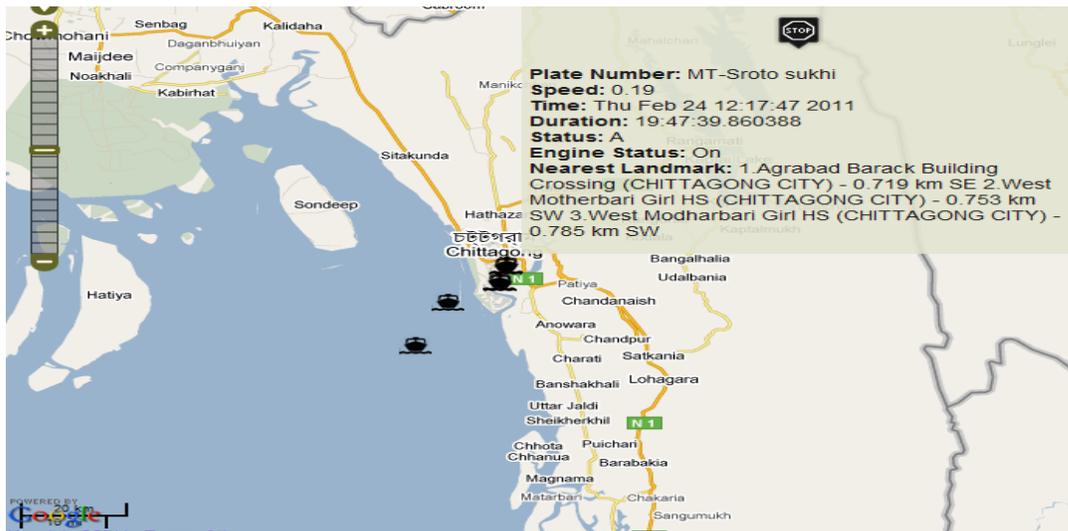

Figure 8.6: Vessel's Previous Status

In the above figure, we can see a vessel's previous status with the speed, time, and plate number, duration of the previous state, engine status and nearest landmark.
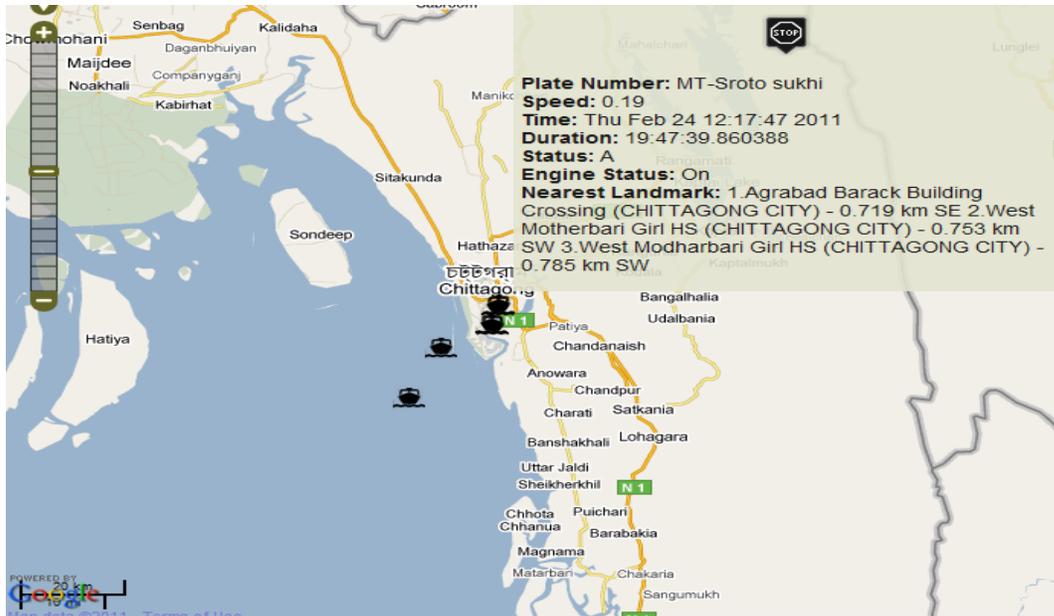
Figure 8.7: Vessel's Last Status

In the above figure, we can see a vehicles last status from the present time with the speed, time, and plate number, duration of the previous state, engine status and nearest landmark.
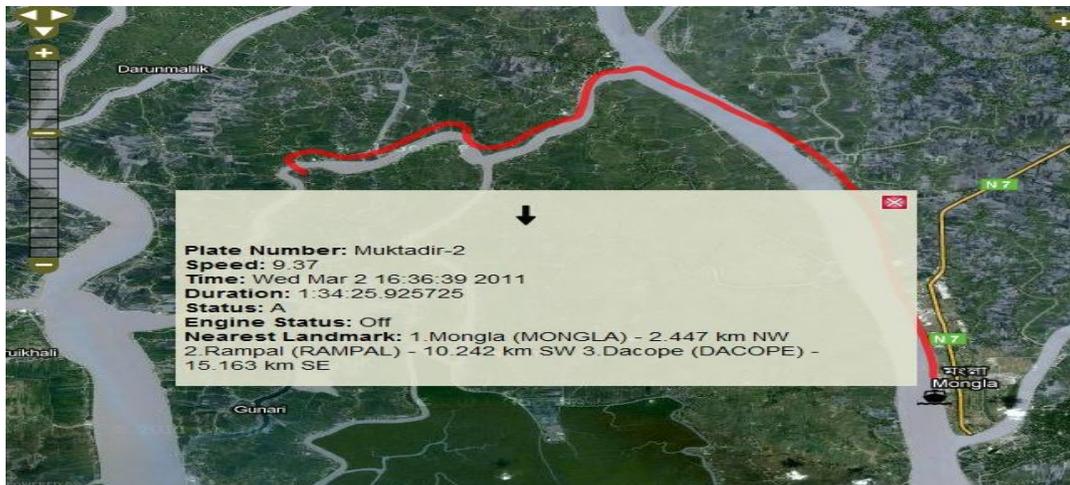

Figure 8.8: Vessel's Previous Route

In the above figure, we can see the previous routes of a vessel in one map.

Figure 8.9: Animated Path for a Vehicle

In the above figure, we can see the animated path for a vehicle.

CHAPTER NINE
CONCLUSION WITH SPECIAL FEATURES

9.1 Conclusion

We can say it for sure from our recent socio political scenarios that vehicle tracking service is so much important for the vehicle owner. Monico Technologies Limited is giving the vehicle tracking service to the vehicle owners in all over Bangladesh. Most of the people of the country do not know about this technology yet. If we become conscious and do advertise about those services then within a very short time all of the people will become aware about this technology and most of the vehicle owner will use this technology in their vehicle which will reduce the theft of vehicle from our country. We have to advertise about the price of this technology. Most of the people think this is a very expensive service, which is so much wrong. It is available in cheap rate. It is a scientifically proven service with easy functions, which almost everyone can handle. Besides other companies Monico Technologies Limited has its own customized map and software.

There are many opportunities to increase the efficiency, productivity and accountability of vehicle tracking service including-

1. Increasing productivity
2. Reducing operational costs
3. Improving customer service
4. Enhancing security for both driver and vehicle

By giving importance of the above factors with the recent condition of VTS in our country, the VTS can be a real benefit for all kind of citizens.

9.2 Future Thoughts

Vehicle Tracking Service has become a useful tool for tracking vehicles from professional and non professional view points. It works as a competitive advantage for the business organization and it works as great tools in maintenance. As I've worked on VTS I realized that it has the potentiality to be used on other sectors like home purpose etc. The experienced I've gathered suggest me to think deeply about its various usages and inspire me to develop plans. In future I'll work on VTS.

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