E-Road Management System

Software Requirements Specification Document

Sri Lanka Institute of Information Technology
Special Honors Degree of Bachelor of Science in Information Technology
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E-Mobile Tracker

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Submitted by:

R.Darshitha   - DIT/08/C1/0195

Submitted to:

……………………………..

Ms. Anjana Tissera
(Supervisor)

……………………………..

Mr.Hansa Perera
(Co-Supervisor)

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NO	DIT NO	GROUP MEMBERS	SIGNATURE
01	DIT08C1-0215	Premje P	
02	DIT08C1-0235	Thivaharan V	
03	DIT08M3-1604	Tharangini Y	
04	DIT08C1-0195	Darshitha R	

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Table of Contents

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1. Introduction

This document is created in order to provide the software requirements and a research review on the project we selected for the E-Mobile Tracker (EMT) which is sub system of E-Road

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Management System (ERMS). E-Road Management System (ERMS) is the project we intend to develop for the fourth year project for Comprehensive Design/ Analysis Project subject.

1.1   Purpose

The purpose of this document is to give an outline of the functionality and the Technology requirements of E-Mobile Tracker in the E-Road Management System (ERMS). It will try to provide a clear picture from the end user perspective on how the end product will function according to given scenarios. This document will also try exploit on the technological background and provide on how the developing technology will be applied to the solution that is been proposed.

This document contains two parts. Part I is the Software Requirement Specification (SRS) of the EMT and the whole system ERMS. Part II is the Research Review Document (RRD) that describes the research component of the project.

Within this document we are suppose to give all the requirements and preferred solution.

First two sections of this document will discuss about the primary requirements and the overview of the system. In the overview section it will explain about the use case diagrams, interfaces, special requirements so on. These first two sections basically focus on the end users of the system.

Third section onward it has mainly concerned about the system developers. And it will consist of system requirements, specification using UML diagrams etc.

As the end result, this document will lead the developers to come up with a successful final product.

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Majorly, this document will give its reader an idea about how the research was and is being actually Carried out, what design will be used and how the implementation of the E-Mobile Tracker(EMT) and the whole system which is E-Road Management.

1.2 Scope

Final features and all requirements will be covered by this document. This document provides proper description of the proposed system in order to understand the system well. Simply it gives the reader an insight to what the actual purpose of this research as and why we chose to do it. This is a guideline document which facilitates good development process as well as better final product as its purpose is to guide developers in selecting a design that will be able to accommodate the full-scale application. It will also describe the existing solutions available that brings about similar solutions to the problem.
It will clearly explain about software limitations, technological challengers which system should overcome.

The RRD part will cover the research portion of the project and how we will accomplish the challenge using various technologies. Also this document will emphasize the new arguments which we cover throughout this project.

Requirements are categorized in to functional requirements and non-functional requirements.

- **Functional requirement is** associated with specific functions. It defines a function of a software system or its component. A typical functional requirement will contain a

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unique name and number, a brief summary, and a rationale. This information is used to help the reader understand why the requirement is needed, and to track the requirement through the development of the system.

The Functional Requirements Definition document is created during the Planning Phase of the project. Its intended audience is the project manager, project team, project sponsor, client/user, and any stakeholder whose input/approval into the requirements definitions process is needed.

The plan for implementing *functional* requirements is detailed in the system *design*.

- **Non-functional requirement** is a requirement that specifies criteria that can be used to judge the operation of a system, rather than specific behaviors.
  Non functional requirements are the constraints, on various attributes of these functions or task which have to pay more attention.
  Non-functional requirements are often called **qualities** of a system. Other terms for non-functional requirements are "constraints", "quality attributes", "quality goals", "quality of service requirements" and "non-behavioral requirements.
  The plan for implementing *non-functional* requirements is detailed in the system *architecture*.

As the time become the fourth dimension of the world the mobile communication became the easiest accessible way to meet these challenges in a tactful way. It is very important to develop that kind of mobile phone based traffic controlling system for motorist, because Clients should be permitted to access the system anytime, anywhere and at any instance through web based mobile or mobile and The Administrator of the full control system should be able to keep update

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the system through sending sms to the system or by accessing to the system through the internet or update through internet accessible cell phones or GSM mobile phones.

The E-Road Management System is divided into four different modules.
They are:-

> ➤ E-Mobile Tracker (EMT)
> ➤ E-Path Identifier (EPI)
> ➤ E-Destination Management System (EDMS)
> ➤ E-Statistical Analyzer (ESA)

1.3 Definitions, Acronyms, and Abbreviations

Term	Definition
SRS	Software Requirements Specification
RRD	Research Review Document
Web Server	A computer program that is responsible for accepting HTTP requests from *clients* (user agents such as web browsers), and serving them HTTP responses along with optional data contents, which

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	usually are Web pages such as HTML documents and linked objects (images, etc.). A computer that runs a computer program as described above. Examples: IIS, Apache. [6]
ERMS	E-Road Management System
EMT	E-Mobile Tracker
EPI	E-Path Identifier
EDMS	E-Destination Management System
ESA	E-Statistical Analyzer
MySQL	MySQL is a relational database management system (RDBMS), which has More than 11 million installations. The program runs as a server providing, Multi-user access to a number of databases.

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Database	Information relating to the registered users logins, statistical details and transport service details, client details, and reservation place details.
Client	A person or the organization who requests to developed system.
SMS	Short Message Service
3G	Third generation of mobile phone standards and technology, superseding 2G.
GPRS	General Packet Radio Service.
GUI	Graphical User Interface.
API	Application Programming Interface.
CELL ID	The Mobile Base Station Identification that a particular mobile device receives the signal waves.

1.4 Overview

The E-Road Management System is a web based information system in which users can Get to know the alternative paths and description of a place via Google map, can book and pay through

the mobile phone to transport services .The ERMS unit broadcasts the update traffic patterns in real time, thereby enabling the Clients to dynamically calculate the desired optimal travel paths.

Not only a group of users, but anyone can enjoy the benefits of the website. The E-Road Management System (E-RMS), implemented to have to have both specific and general objectives. This is mainly focus on the reducing the traffic, to meet all requirements our system provide some services to our Client. The new system is going to change the way the Traffic control, transport services, as the will be input directly into the computer in this function.

ERMS provide the following non quantifiable benefits:

- Better relation with Clients.
- More accurate motorway history and information.
- Improved management information.
- Faster processing of staffs and services details.
- This solution will provide e-mail and internet facilities to all staffs of the ERMS.

The proposed system aims at:

- Minimizing the waiting time by basing the time allocation on real time vehicular load on the roads.

- Optimization of traffic flow by synchronization between neighboring traffic   signals.
- Tracking motion of every vehicle within the city limits
- Ensuring faster passage for emergency vehicles like ambulances, fire engines et al.
- Catering to plan corrective action during traffic jams and unexpected situations.

Architecture Diagram

- 15 -

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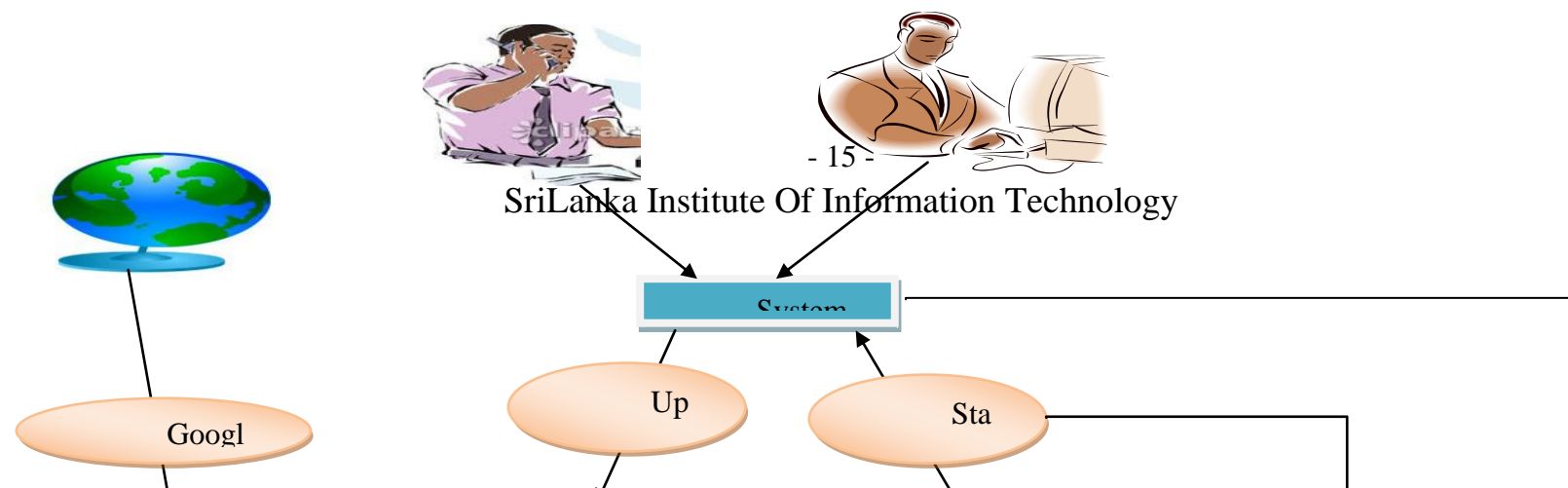
2. Overall Descriptions

E-Road Management System (ERMS) provides the information regarding road traffic, road block, accidents, preplanned road blocks, guiding the easiest path or alternative path via the

mobile tracking system and path identifier system. Already offered **ERMS** is also considered when designing the system as it already facilitates some of the administration process.

Thus the proposed system is going to be used in the environment as an integrated system, using the facilities provided by other existing systems as well. It acts through mainly GSM and position determining map by provide the information via the mobile phone for the clients.

The mobile nature and today's mobile administration requires immediate information access and total flexibility towards the users for a successful infrastructural accomplishment for this fast growing world.
This technology comes through as the optimal portable solution for the information access, management and improved communication, while providing the strongest security measures in the market today.

 With regards of the above mentioned theme a data base system and a proper scheme for real time path and vehicle guidance will be proposed and produced. The proposed System includes a unit equipped position determining system adapted to determine their present position with the processed information regarding precise location of the roads and land marks which can be retrieved via the mobile phones continuously.

Clients should be permitted to access the system anytime, anywhere and at any instance through web based mobile or mobile. The Administrator of the full control system should be able to keep update the system through sending sms to the system or by accessing to the system through the internet or update through internet accessible cell phones or GSM mobile phones .

Automate their day-to-day functions by a web based system, and a mobile based web, helps the relevant person to update the system by just send a short message service or login to their account through our website via the mobile phone, and they can easily keep the details of their location, exit points, paths to the destination point, and availability of transportation services through our proposed system. To make their existing website more user friendly, we decided to use Google map with the position determining system, moreover updating via a short message service continuously.

Anyone should be able to share resources and exchange ideas through the internet. The inspiration for this research is to solve the problems of the client regarding the location where he/she on, paths towards the destination point, inform the Client about the pre-planned road blocks, accidents, place descriptions and provide better transport services to the Client.

With regards to the above problems, our team comes across with the solution called **E-Road Management System.** The ERMS unit broadcasts the update traffic patterns in real time, thereby enabling the Clients to dynamically calculate the desired optimal travel paths.

The purpose for this research is to solve the traffic, road blocks, accident's, inform the Client about the pre-planned road blocks from the government, statistical graph generations, place descriptions and provide better transport services to the Client.
A system and method for real time vehicle guidance by Central Traffic Control Unit are presented.
We will be giving special facility to GPRS 3G Mobile users. That they can browse the Google Map and they can get weather information of that area.
Today cellular phones have become a part of our life style. And mobile applications can now be developed to deliver any types of data to from any user, any place in the world.
Introducing Web Base E-Mobile Tracker for Mobile Users to the mobile platform is a development of important application to the today world requirement.

Today life style is so busy. So, people don't have time to waste. Because of this, they may need some valuable information to make success their day today life. And they don't have much time to waste on that. This may cause to improve the peoples self confidence, and ability to achieve their day to day goals.

The main reason for that was the lack of correct information spread through the people as soon as possible. So that, we must use the media which is mostly close to people. Now we have identified that most close media to people is the mobile phone technology. We can provide more reliable and efficiency service to users with less cost.

2.1 Product perspective

This is a new concept to have a multipurpose website which contains details that are not exactly related. It is also challenging to develop. It is a really useful website.

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Sri Lanka does not have an automated system to monitor or to control the traffic. Policemen in the cities and/or the traffic light systems control the traffic.
According to this system it is difficult for us to know where the traffic is blocked in advance. Therefore, we have no way of getting out of it or to avoid it until we reach the destination.

In the mornings and in the afternoons (peak hours) some electronic media both radio and television announces the roads that are blocked at the time.
These announcements make the people a little amount of help avoiding busy roads and selecting alternative routes without much delay. The problem here is that announcements are made only at a particular time.
Association of Automobiles has taken steps to make their members aware of damaged roads. This approach is restricted to their members and also to certain areas. There is no any mobile application developed to provide transport services and booking through the mobile phones or something similar to it.

But In our system we can book for transport services, can pay, get to know the path, can avoid the traffic jam by giving non traffic paths through the mobile phones. And also we can access these and other additional facilities through the Google map also.

As well as our system has simulation part. It is very help to control or manage the future traffic jam proplems, accident, and other inconvenience things.

2.1.1 System interfaces

For our mobile application development we use Microsoft Visual Studio.NET 2005 and Eclipse under Android SDK as programming environment. For mobile application coding (logical programming) we selected Visual Studio c Sharp. Because of its very powerful, availability of rich component libraries, user friendliness, robustness etc.

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For web server application, web services (Web Site) and WAP Mobile Solution, also we are using Visual Studio ASP.NET of Visual Studio.NET 2005 and Eclipse 3.0.2 programming environment. So that case also it deals with the internal Microsoft.NET SDK version 2.0 and Java SDK 1.5 in the system level.

2.1.2 User interfaces

Our system contains three software components. There are Mobile application, Web and Information service and web site.

Mobile application:
Mobile application we will develop mainly targeting our mobile phone users. Which our registered mobile users can login to system and they can get browse Google map, getting path relevant to their required locations or their living location. This Mobile application interfaces are describe in chapter 3.

Web and Information Services:
According to our system we will provide sending message service in the confirmation of services situation, which will necessary information for our system users. It will about transport services and mobile payment. We will provide important information to our users. And also we will give browse a Google map and provide path report relevant to their location or their living location as a web service.

Website:
Through the website general public users also can get path rather than our registered users. They also can browse Google map. And they also can registered to our system typing there mobile phone number, their name, their address etc. filling the system provided registered form.

2.1.3 Hardware interfaces

Two Intel Pentium 4 systems with at least 512MB memory and 80 GB (7200rpm) Hard disk. 3G and GPRS phone which can install software facilitated phone.
Memory Constraints

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2.1.4 Software interfaces

The system will use some proven and popular technologies like Microsoft .NET, Visual Studio 2010 and SQL 2010 and some for mobile application.
Through the internet connect our mobile users who are registered our system and install our mobile application in their phone we use the GPRS and 3G technologies.

2.1.5 Communication interfaces

System communicates system via network. This system is fully networked and has a main Server. System can communicate through its subsystems with its network IP addresses. To communicate within the network the system used some other equipment such as Routers, Modems and GSM equipments. To get the efficient communication throughout the system use such equipment through network.
The system will require a GPRS enabled 3G supporting mobile devices and a Network Adaptor connected to a LAN or directly connected to the internet.

2.1.6 Memory constraints

The mobile client application is expected to use no more than 6 MB of RAM And will have an installation size less than 2 MB in addition to a user defined Amount of external buffer storage, not less than 10 MB, either in the Phone Memory or Memory Card.

The server application will require a minimum memory capacity of 2 GB and an external storage space of approximately 10 MB excluding the pre-requisites .The server application would require approximately 1 GB of external storage for proper functioning.
Mobile application running machine:
At least 256 MB of memory. Recommend 512 MB of memory

Web Server running machine:
At least 512 MB of memory. Recommended 1GB of memory.

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2.1.7 Operations

- **Online Registration:**
  Register the user to access the ERMS system fully.

- **Providing best path to the Motorist with the help of Google Map:**
  After Motorist's indicating where they want to go it may show the entire best path avoiding traffic and road blocks.
  Using a mobile phone also Clients can get to know or identifies best path.

- **Reserve the tickets for transport services through the Mobile Phones:**
  Client needs the system will provide alternative paths as well, such as trains and flight services. After having a look whether our Client like to reserve tickets they can reserve tickets through our system.

- **Mobile Payment:**
  Then they can get the services and pay through the phone or by cash.

- **Path Given through Mobile Phones:**
  If the client doesn't know the place then he/she can know the place that where he is now, and he can know about travel services by interacts with the system.

- **Auto Generate SMS And Mails:**
  If any accident happens, after the authorize person update the system. The system automatically looks for nearby Hospitals, Police Stations and send emergency alerts (using auto generated SMS & mails). And direct them to the point. All this happen in a short amount of time.

- **Providing Preplanned Road Block Calendars:**
  A calendar is provided in our system, using that calendar Clients can get to know about the pre-planned road blocks and the alternative paths.

- **Online Reservations:**
  Hotels, Hospitals, Railways, Airports, etc. are provided from an authorized web page (profile) there they can update their services and can provide services to our Client such as online reservation. After Client Search the place in Google Map and click on it Clients can view this page or profile.

- **Auto Generate Statistical Graph:**
  Auto generated statistical graphs between population, accidents, vehicles and more.

- **Simulator:**
  Simulator, this is use to get to know how it will look like if any change happens in population, vehicles, etc. When the Client input some values in any of those the following outcome will arrives by studying the past stored data in the system.

- **Provide bus routes:**
  Buses, bus routes and distance also shown in the Google Map when Client searching for a place.

- **Pointing and giving description important places:**
  Client can search a place (e.g. Kandy) and in on enter, the system will provide with pointing the place in Google Map and pointing all important locations in that place just like Hotels, Schools, Hospitals, Airport, Railway Station, Police Station.

2.1.8 Site adaptation requirements

When run the mobile application, mobile phone should require GPRS connection and support mobile software installation facility. But we recommend 3G mobile phone to browse our website through the internet. System is only use English language.

2.2 Product functions

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Thus the proposed system is going to be used in the environment as an integrated system, using the facilities provided by other existing systems as well. It acts through mainly GSM and position determining map by provide the information via the mobile phone for the clients.

Automate their day-to-day functions by a web based system, and a mobile based web, helps the relevant person to update the system by just send a short message service or login to their account through our website via the mobile phone, and they can easily keep the details of their location, exit points, paths to the destination point, and availability of transportation services through our proposed system. To make their existing website more user friendly, we decided to use Google map with the position determining system, moreover updating via a short message service continuously.

The typical users of the system are Travelers and clients and it has to be maintained continuously by the Administrator of ERMS database & Administrative staffs of ERMS.

Some of them are indicate accidents, road blocks, traffic in Google map and a calendar it carries the pre-planned road blocks by the Government in addition to this the system will provide an alternative path to the Client by using the Google map by graphically. Ultimately the client can get the precise location and easiest way for his destination in an effective manner within a short time and more accurate way.

Thus it should need a global system by getting the information of all locations in a defined area for the client and conveyed via GSM providers at the same time for the user. Thus the revelation of our project is to provide our client with an accurate and efficient way to solve the existing problem domain.

The main function of the EMT module is:

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Using a mobile phone also Clients can get to know or identifies best path. Client needs the system will provide alternative paths as well. If the mobile user wants to know the path then he/she has to give from where to where wants the path.

 If the client doesn't know the place then he/she can know the place that where he is now, and he can know about travel services by interacts with the system such as trains and flight services. After having a look whether our Client like to reserve tickets they can reserve tickets through our system.
Then they can get the services and pay through the phone or by cash.

In this competitive world the mobile communication became the easiest accessible way to meet these challenges in a tactful way. The mobile nature and today's mobile administration requires immediate information access and total flexibility towards the users for a successful infrastructural accomplishment for this fast growing world.

So, it will reach the all user's hand easily.

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Architecture Diagram for EMT Module

The main function of EPI module is:

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When an accident is indicated to the system so after the system look for the nearby Hospitals and Police stations send them emergency alerts (SMS and mails). All this are done in a short time period. So this will make huge impact in the future motorway. And by just login to the system user can get to know about the pre-planned road blocks. This is done with the help of Google map and it carries alternative path as well.

ERMS admin

Police

Update   Point the location

User Request

User

ERMS Data Base

Response

Send alerts with help of Google map to Motorist

Google Map
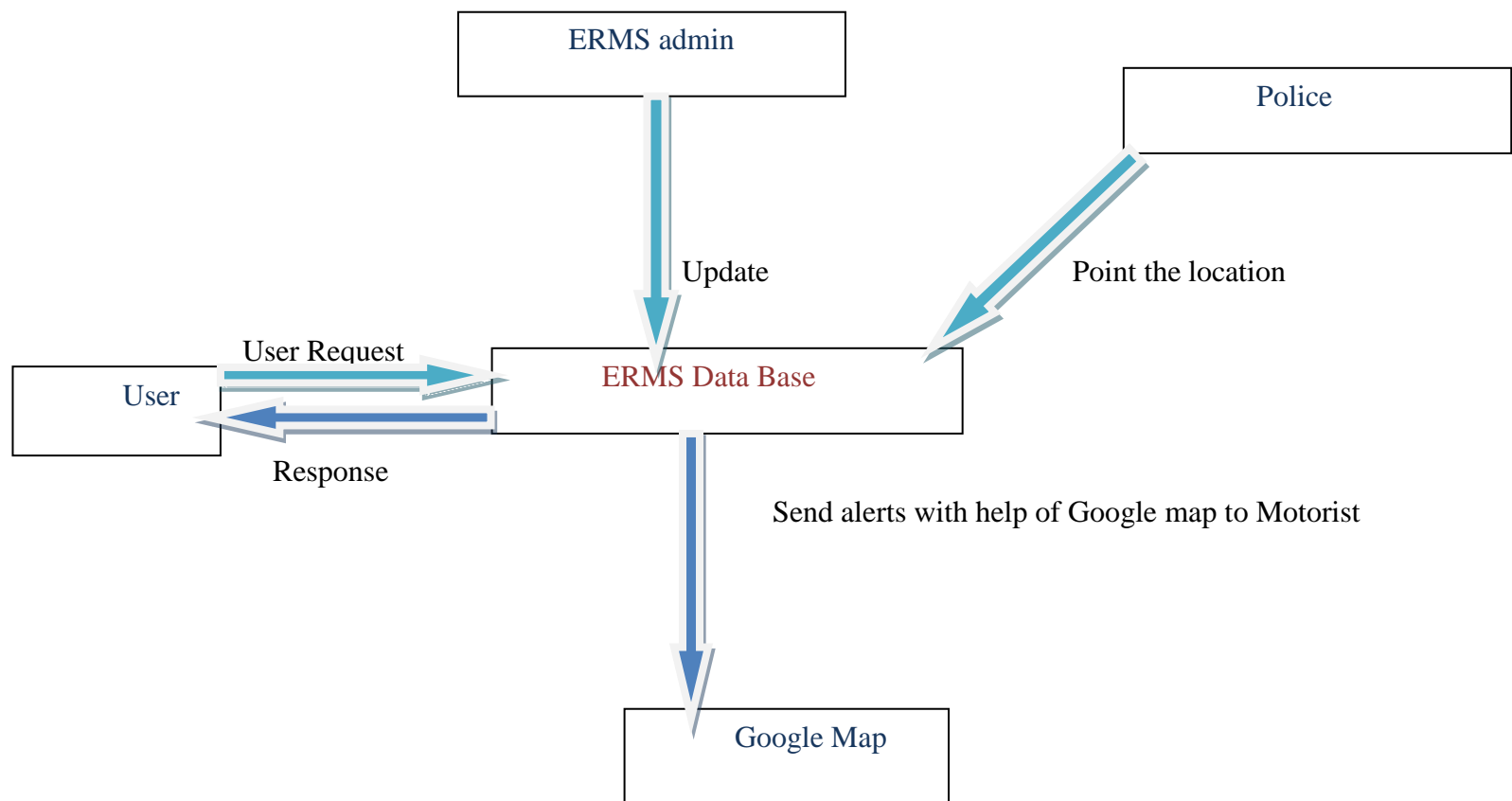
The main function of ESA module is:

Generating graphs using statistic data. Graphs are often an excellent way to display your results. In our system 'graph generation' is one of the most important parts for managing the traffic in Sri Lanka. It will helps to easily read data on a graph rather than paragraphs as the data are visually appear in the graph. It handles large data in a small area.

Road Development authority

Simulator

ERMS server

Enter Data

Outcome

Generate Graphs

Police department

User
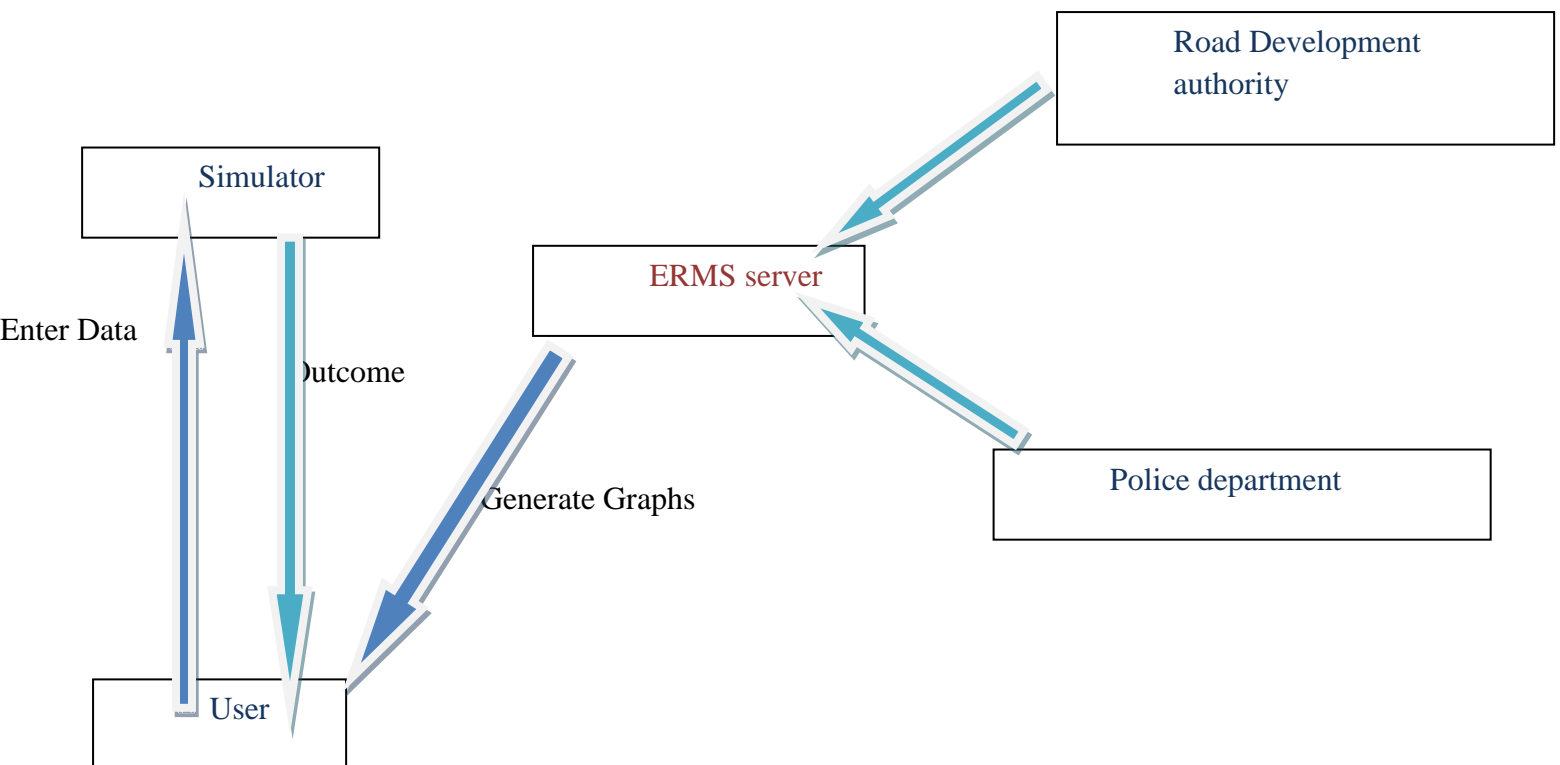
The main function of EDMS module is:

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 Provide the description of a place as text and voice and online reservation, and give the path and distance through the Google map.

Location		Distance

User	Destination Information

Response   Request

ERMS server
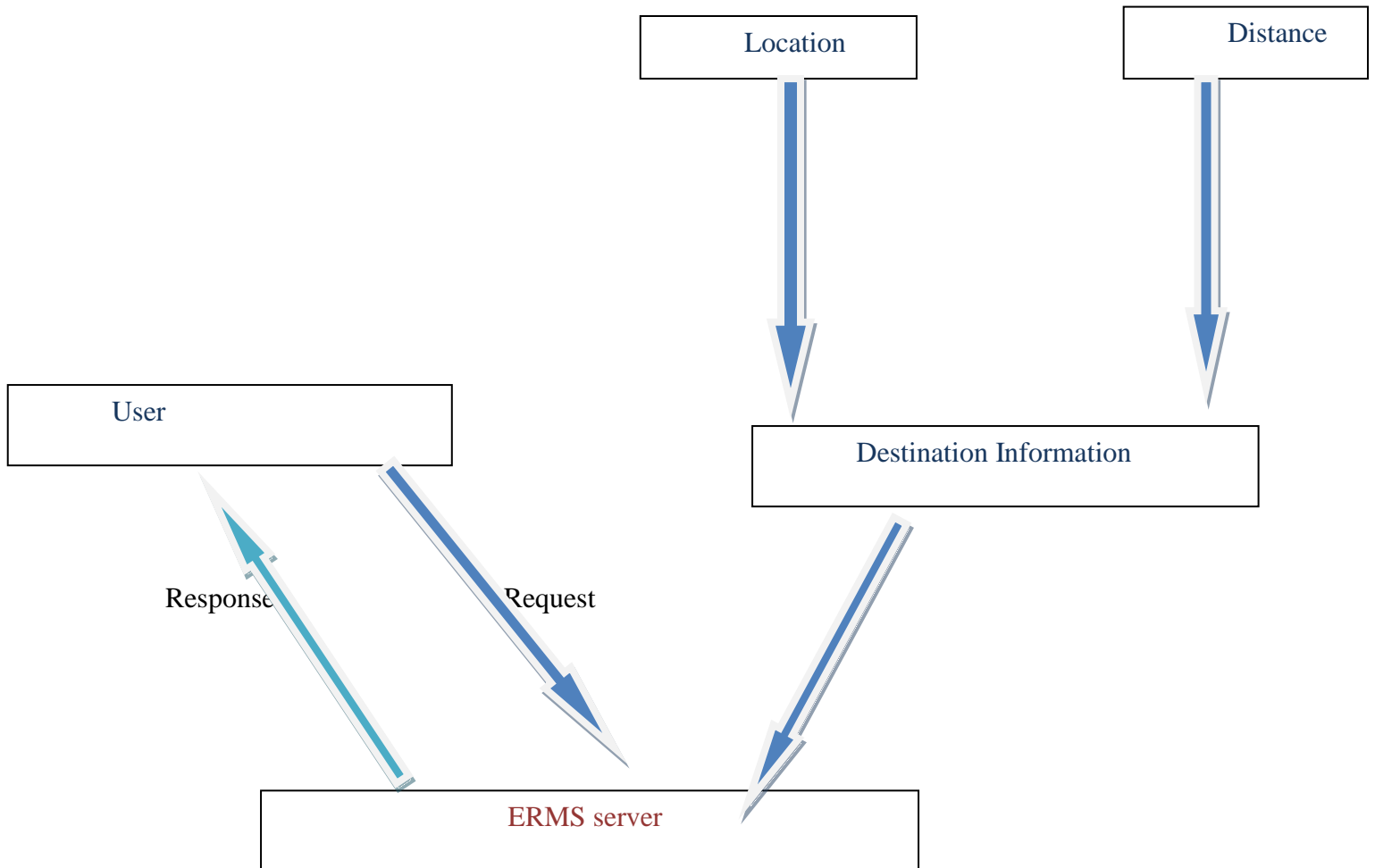
2.2.1 Use Cases

01.

Use Case	Register
Summary	Subscribe to ERMS
Actor	Mobile User
Preconditions	System should have login page
	System is working in order
Description	User will enter the necessary information to required for the subscription to the ERMS
Alternative	N/A
Post condition	Provide user Id for user

02.

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Use Case	Path Request
Summary	Find the path
Actor	Mobile User, System
Precondition	System is working in order
Description	User has to enter from where to where he/she wants to go, to require for the path between these two places.
Alternative	User request path between two places where there is no roads like forests.
Post condition	User preferences (places) are saved at the database and have to update and provide the path through Google map graphically.

03.

Use Case	Mobile Payment
Summary	Pay through Mobile phone
Actor	Mobile user, Transport services, Bank
Precondition	System is working in order
	Mobile user should be registered

	Mobile user have an account
Description	User has to login and enter all values according what the system asked and submit.
Alternative	Banking system is in out of order or doesn't work properly.
Post Condition	The system have to send the confirmation report for user and have to debit particular amount from user's account, and deposit to transport service's account.

04.

Use Case	Mobile Reservation
Summary	Reserved seats in Trains.
Actor	Mobile user, Transport services
Precondition	System is working in order
	Mobile user should be registered
	Transport service is available at the required time.
Description	Mobile user has to enter all the details what they want and send it to the system to reserve.

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Alternative	Request for bus and taxi reservations
Post Condition	Reserved seat and send confirmation message with the reservation details.

05.

| Use Case	Request for transport services
Summary	Got the transport service
Actor	Mobile User, Transport service
Precondition	System is working in order
	The mobile user should be registered
	Transport services are available at that time
Description	The Mobile user has to enter transport service type and other preferred details such as currently he/she is locating and destination point.
Alternative	Request for transport service for a place where there is no roads to travel.
Post Condition	Got the transport service as what

	mobile user wants.

06.

Use Case	Provide Transport service
Summary	Provide the transport service to the mobile user
Actor	Transport services
Precondition	System is working in order
	Transport service should be available
Description	Analyze the mobile user given details and provide the proper transport service and give the transport service detail to the system.
Alternative	Transport service can't provide to that required place such as forest
Post condition	Send the confirmation message with the details of the transport services.

07.

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Use Case	Provide the path
Summary	Provide the path using Google map
Actor	Mobile user, system
Precondition	System is working in order
Description	Analyze the details which are given by user and update the data and provide the path
Alternative	The path doesn't available to provide geographically such as forests
Post Condition	Provide the path which avoids the traffic and road blocks.

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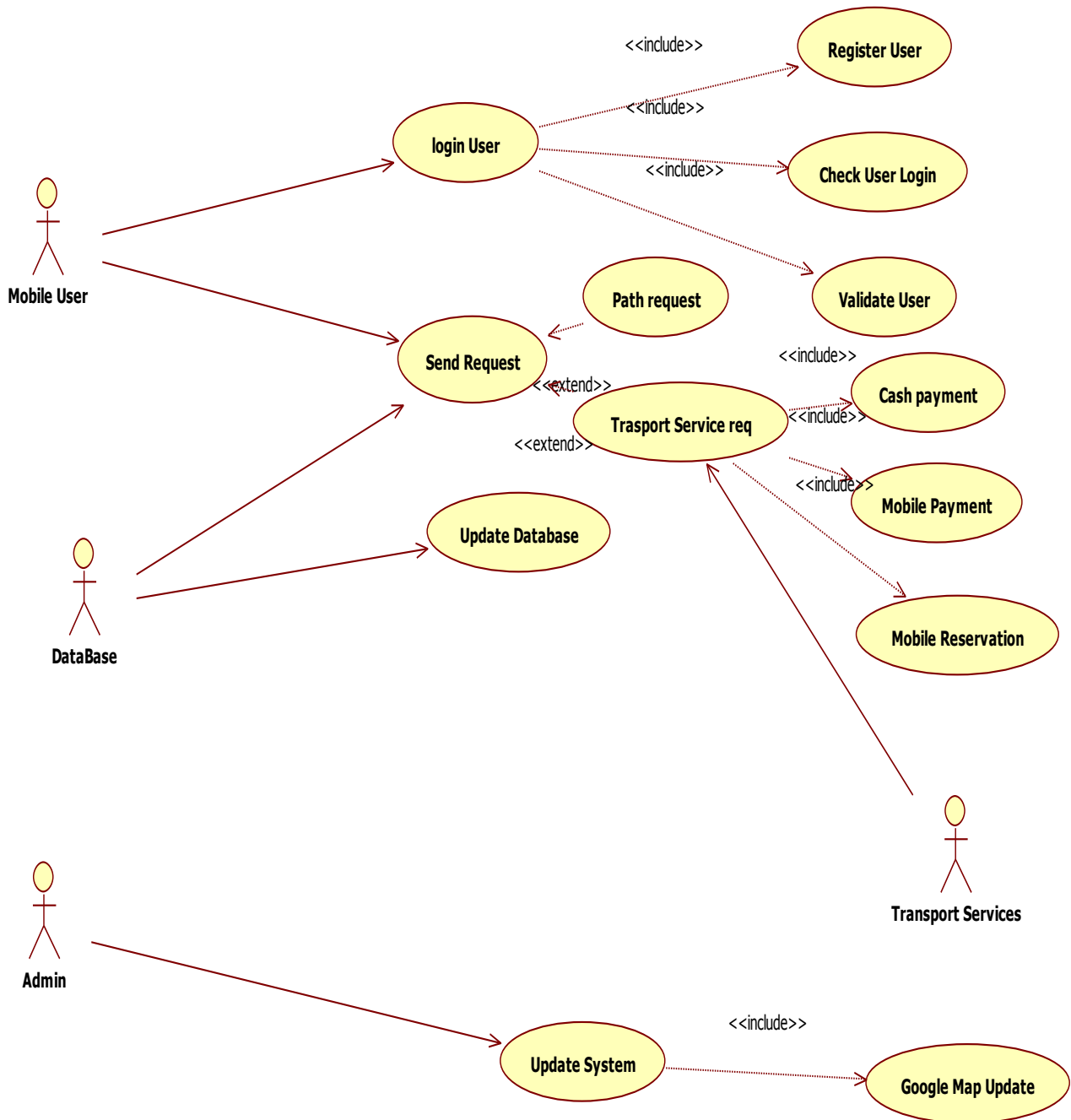
2.3 User characteristics

The system must be simple enough to be used by a novice computer literate, by following the simple steps given in the application.
The desired users of this software should have experience in running an ordinary application in any platform.
The intended users should be accustomed with installing the applications in an operating system.
In our project we have assigned the administrator, Client, ERMS Assistance as users.
Client is one of the users of our system.
ERMS assistance also a user of our system.

Administrator:
 Admin should be a computer operator or a police officer who has specially trained for our system. That person has the full control of the system. if any system crash occurs it can manually run the system.

Client:
 No need to have much computer literacy. Simply use our mail generation function.

ERMS Assistance:
Admin should be a computer operator and should know how to send a SMS to our special number.

2.4 Constraints

To develop ERMS developers needs visual studio 2010, ASP .NET, word document 2010, and SQL 2008 DBMS. It is must to have a web server like IIS, Apache etc as well as it must be cost effective and competitive to visual studio 2010 and SQL 2010. It is also essential to have the application server to have an internet connection.

C# will be the implementation language for the desired product, but it will also be using library files which contain the implementation of HTK toolkit. Due to the fewer availability of voice recognition software for the other platforms the product will be produced with the intention of deploying in windows operating system. Since the voice recognition supports much Windows Vista or Windows 7 OS versions it is preferable if the user uses Windows Vista OS or higher.

For the users of ERMS must have a connection to the internet and have to use a web browser or should have GSM phones. Mobile phone with the GPRS and 3G facility. (Large Screen).

2.5 Assumptions and dependencies

The system will be developed assuming that the users will have 3G enabled in their mobile phone. Since the application would run fine with just a GPRS Connection, it is recommended to enable 3G wherever possible in order to receive highest possible data rate from the remote server to the mobile client.

There are two kinds of users they are registered users and unregistered users. The system that is to be developed will depend on Microsoft Visual Studio environment and all the software that required running this system appropriately. This system will also depend on Microsoft operating systems (XP or later versions) since the Visual Studio Environment depend on it.

2.6 Apportioning of requirements

An overview of requirement is described in the section 2, while section 3 contains the detailed requirements. Sections 3 will be take into consideration if any Discrepancies arise in the development. The requirements described in section 2 and 3 of the EMT system.

The order in which main tasks are to be developed as follows.
- o Connecting the server to the mobile phone
- o Triggering the mobile phone events

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2.6.1 FUNCTIONAL REQUIREMENTS

F1: User Registration

Input: - Enter User Details
Output: - Provide Unique ID
Process: - Register User Details and Store the Details of users
Description: - Register the user details and provide the user id for user. Which id is used
                        To Login the system.

F2: Select Transport Services

Input: - Select transport service type
Output: - Provide transport service details
Process: - Provide transport service
Description: - If the client needs the transport service then they have to request for
                        Transport service, then the client sends the request to transport service
                    Then the transport service will reply to the system about their availability
                    After that system will response to the user.

F3: Mobile Reservation

Input: - Enter transport service type and request for reservation
Output: - provide the reservation details and confirmation message
Process: - reserve place in train service for the user and enter their details
Description: - After request for reservation, allocate seats for user according their request
                        And other transport details also.

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F4: Mobile Payment

Input: - Enter Amount and password
Output: - Confirmation message
Process: - Check whether valid user or not, and check whether amount is correct or not,
                Send the confirmation message to user.
Description: - Validate the user and amount.
                        The given amount debited from the user's account.

F5: Path Request

Input: - give the current location and destination point
Output: - Display the path through the Google map
Process: - System automatically generate the path using polygons
Description: -If the user request path then system automatically the path by using Google
                        Map.

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# 3. Specific requirements [1] (for "Object Oriented" products)

3.1 External interface requirements

3.1.1 User interfaces

According to the E-Mobile Tracker System for Mobile Users system has to provide these kinds of Interfaces to users.

3.1.1.1 Mobile Application
Login Dialog box and Form Browse Google Map through Their phone daily and form for requesting transport services and path and for mobile payment and mobile reservation also.

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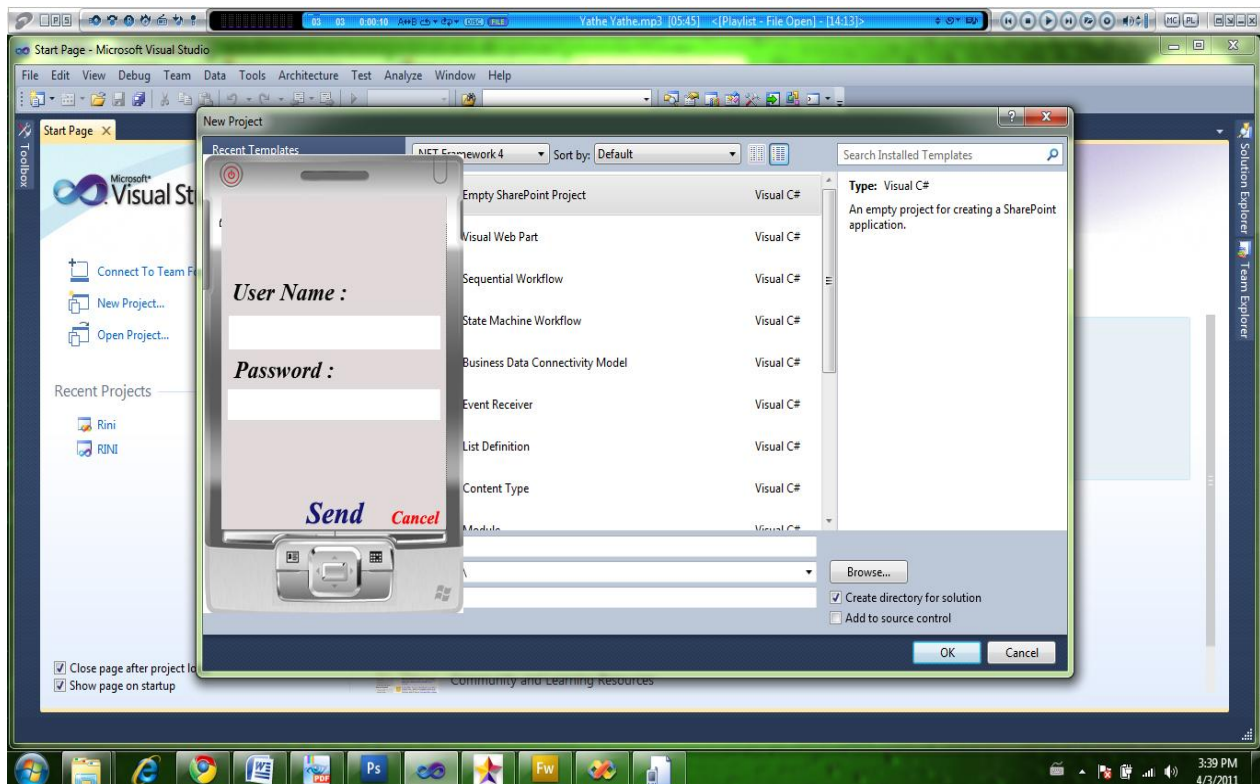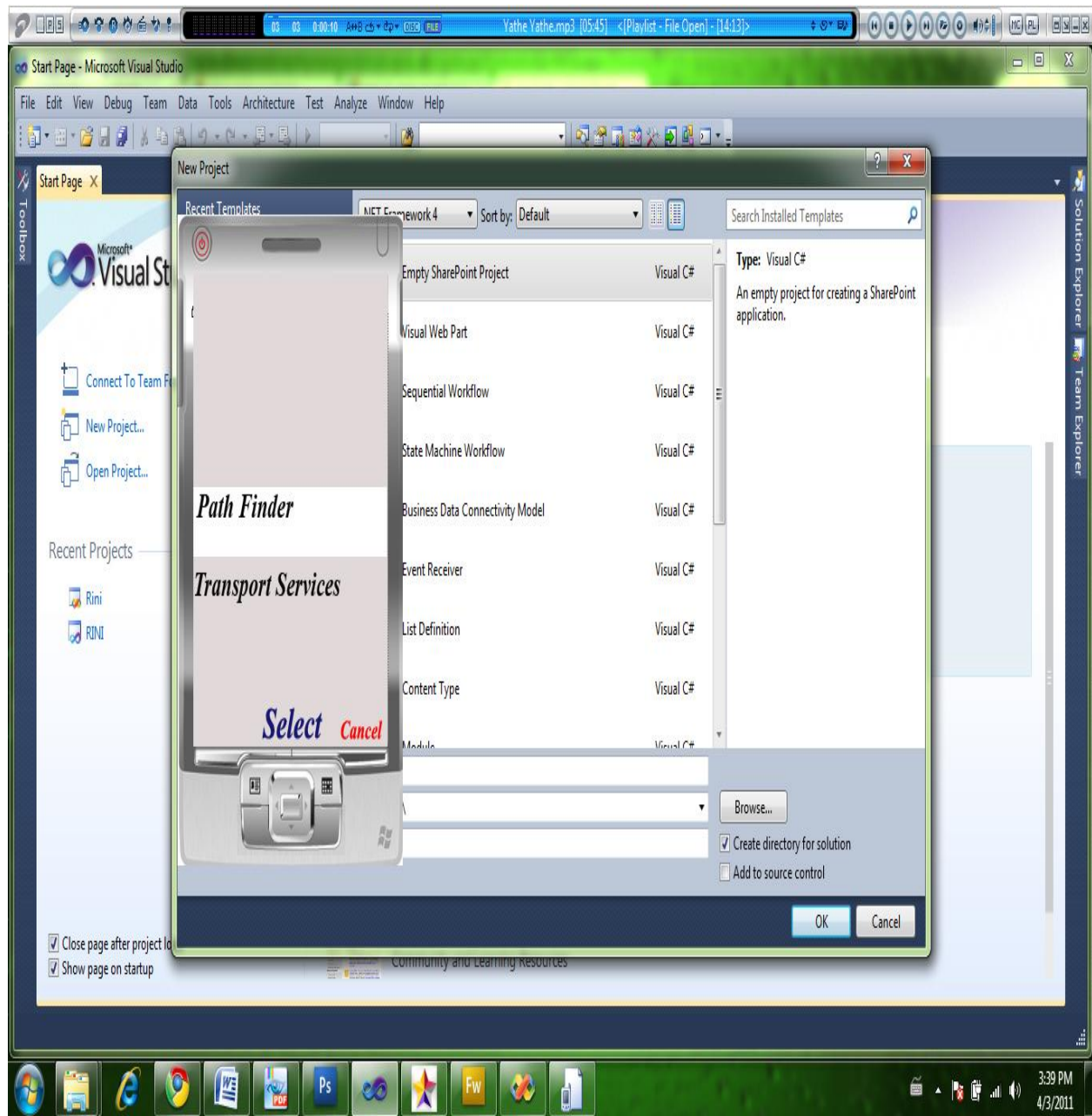
3.1.2 Hardware interfaces
Pentium 4 system with 512MB of memory. With internet access facility. Mobile phones which were have 3G and GPRS facility.

3.1.3 Software interfaces
The system will use some proven and popular technologies like Microsoft .NET

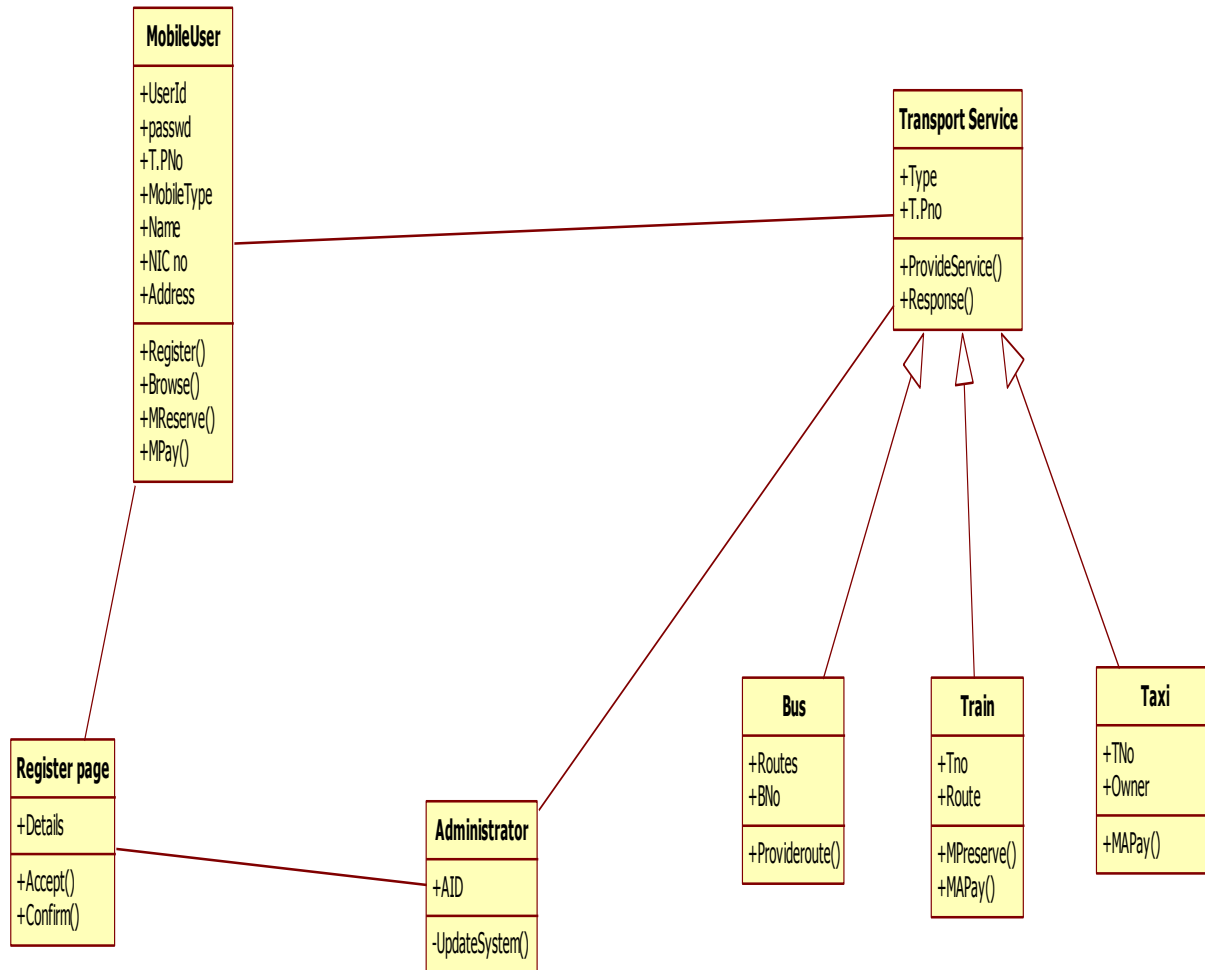**3.1.4 Communication interfaces**
The mobile client would need to occasionally connect to the remote server mo-mentarily, and this requires a GPRS enabled mobile device supporting 3G which is required for finding the location by help of Google map.

Also the Web Service running on the remote server always needs to be connected to the internet and thus would need a Network Adaptor either directly connected to the internet or indirectly connected through a LAN. Since a high speed internet connection must be available for the remote server.

3.2 Classes/Objects

In this section a high level class/object diagrams of the EMT system will be discussed. It should be noted that these are only the major classes identified in the system to fulfill the expected functionalities and will be subject to slight modifications in the actual development time.

There are three packages identified in the system as Mobile Users, Transport Services, and Database.

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MobileUser

+UserId
+passwd
+T.PNo
+MobileType
+Name
+NIC no
+Address

+Register()
+Browse()
+MReserve()
+MPay()

Transport Service

+Type
+T.Pno

+ProvideService()
+Response()

Register page

+Details

+Accept()
+Confirm()

Administrator

+AID

-UpdateSystem()

Bus

+Routes
+BNo

+Provideroute()

Train

+Tno
+Route

+MPreserve()
+MAPay()

Taxi

+TNo
+Owner

+MAPay()

Class Diagram of EMT

3.3 Performance requirements

Tracking through mobile network is depends on the mobile connection speed. But as this system target the 3G mobile customers, the accessing of services that are provided   by our system would be in an acceptable speed. Also they select a path or services within an acceptable time that the user would not feel any time lack to get the response.

3.4 Design constraints

We can only develop Windows environment using .net 2005 framework, Mobile Internet Toolkit 1.1, Microsoft Internet Information Server (IIS), SQL 2005 server, Eclipse(3.2,3.3), Eclipse JDT Plug-in, WST, JDK 5 (JAVA),Android SDK (Windows version), Android Development Tools plug-in, Apache Ant.

3.5 Software system attributes

3.5.1 Reliability

The mobile user should be able to access the system without having any objections while browsing. If any other actions such as receiving call while accessing the EMT, those should be handle properly without failing any of the actions. Also the geographical information provided by the system should be correct and valid. It is essential that the user enable 3G access of phone to get a reliable accessing of the system in an acceptable speed. Otherwise EMT will not be able to provide a good service that is up to the quality of service.

With the prevalence of mobile phones, it's no surprise that mobile phone location tracking has become very popular. It's become a useful tool for people to keep an eye on family (especially children) when they are out and about. It is also an inexpensive tool tracking, so that you can be sure that your staff is where you need them to be. And there are clearly uses for surveillance too. This system should be reliable and should not fail more often.

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3.5.2 Availability

The main requirement is in E-Mobile Tracker System is availability. So our clients can easily browse the Google map to get current path information according to the place that they are in. And also our system thoughtfully sends confirmation messages (SMS) to our registered users. We cannot distinguish the exception parts. Those can be occurring certainly in this particular part of the world.
So we considered the availability factor is most important point in our system scope.

3.5.3 Security

We will give special priority to the security in our system. In this system there are many several user levels. Under these user levels, system will grant separate several issues, such as to browse the Google Map and get information about the path and transport services.

3.5.4 Maintainability

We will be extraordinary focused to several possible occurrences. If there is a system failure we recover and restore the system using earlier period details in parallel to those earlier period details. So we can manage the SMS mechanism with the use of log files to track possible breakdowns and unexpected system changes and exception occurrences.

3.6 Other requirements

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4 Supporting information

4.1. A .Appendix

4.1. A.1What is the 3G technology

3G is an ITU specification for the third generation (analog cellular was the first generation, Digital PCS the second)of mobile communications technology. 3G promises increased bandwidth, up to 384 Kbps when a device is stationary or moving at pedestrian speed, 128 Kbps in a car, and 2 Mbps in fixed applications. 3G will work over wireless air interfaces such as GSM, TDMA, and CDMA.The new EDGE air interface has been developed specifically to meet the bandwidth needs of 3G.

4.1. A.2What is GSM

Short for Global System for Mobile Communications, one of the leading digital cellular systems. GSM uses narrowband TDMA, which allows eight simultaneous calls on the same radio frequency. GSM was first introduced in 1991. As of the end of 1997, GSM service was available in more than 100 countries and has become the defector standard in Europe and Asia. GSM is an open, digital cellular technology used for transmitting mobile voice and data services. GSM differs from first generation wireless systems in that it uses digital technology and time division multiple access transmission methods.

GSM is a circuit-switched system that divides each 200 kHz channel into eight 25kHz time-slots. GSM operates in the 900MHz and 1.8GHz bands in Europe and the 1.9GHz and 850MHz bands in the US. The 850MHz band is also used for GSM and 3GSM in Australia, Canada
And many South American countries. GSM supports data transfer speeds of up to 9.6 Kbit/s, allowing the transmission of basic data services such as SMS (Short Message Service). Another major benefit is its international roaming capability, allowing users to access the same services when traveling abroad as at home. This gives consumers seamless and same number connectivity in more than 210 countries. GSM satellite roaming has also extended service access to areas where terrestrial coverage is not available.

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4.1. A.3 what is General Packet Radio Services (GPRS)

The evolution of the mobile networks is progressing from the existing second-generation mobile networks to the third generation of networks that are able to handle high-speed multimedia traffic. General Packet Radio Service (GPRS) is the better evaluation step in GSM wireless network technology. GSM is the global standard and is supported by almost every equipment vendor. GPRS
is an important new enabling mobile data service, which offers a major improvement in spectrum efficiency; capability and functionality compared with today's non-voice mobile services.

Even though PDA supports for GPRS
Connection, it is less cost effective than the mobile phones in modern wireless technologies. The main objectives to be reached by implementing GPRS are the following:
Can transfer data with in higher bandwidth. Give support for busty traffic Use efficiently network and radio resources Provide flexible services at relatively low costs Possibility for connectivity to the Internet Provide fast access time To have and support flexible co-existence with GSM voice Provide simple, clear communication operations with the wireless transmission. Provide common
understanding to reduce the confusion of the usage.

Enhance significantly the quality of the service. Cost efficient. In order to meet these objectives the following technologies are applied. GPRS uses a packet-mode technique to transfer data and signaling in a cost-efficient manner over GSM radio networks and also optimizes the use of radio and network resources. The main advantage of using this GPRS connection is that the customers will not have to wait for the phone to dial, but instead they will get through immediately. For example the messages will be delivered direct to the user's phone, without the need for a full end-to-end connection. When the user switches on their phones, the message will be downloaded automatically. These technologies allow for a greater bandwidth and more capable execution environment, permitting for the development of mobile applications. It is a natural progression for the user to expect these applications to be available to them on their mobile terminals. The introduction of higher bandwidth capability allows for richer applications, and the packet switched nature of GPRS networks allows for more efficient applications such as web browsing, chat, moving images etc. GPRS technique has several key features.

Such as, Speed: Maximum speed that can have with the GPRS is up to 171.2 (kbps). This is three times faster data transmission than existing telecommunication networks.

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This allows transferring data more quickly, immediately across the network. Immediacy: GPRS facilitates instant connections where information can be
sent or received immediately as the need arises, subject to radio coverage. No dial-up modem connection is necessary.
This is why GPRS users are sometimes referred to be as being "always connected". Immediacy is one of the advantages of GPRS (and SMS) when compared to Circuit Switched Data. High immediacy is a very important
feature for time critical applications such as remote credit card authorization where it would be unacceptable to keep the customer waiting for even thirty extra seconds.

New better applications: GPRS supports several new applications that have not previously been available over GSM networks due to the limitations in speed of
Circuit Switched Data (9.6 kbps) and message length of the Short Message
Service (160 characters). Service Access:
There are several needs to access the service from
the GPRS connection.

4.1. B.Appendix

4.2 References

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