

<School Bus Monitoring and Management System>

Software Requirements Specification

<Deliverable 1>

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1. Introduction

There are buses made available for Students monitoring distances, but not many parents have complete information about these buses. Complete information namely the number of buses that go to the required destination, bus numbers, bus timings, the routes through which the bus would pass, time taken for the bus to reach, maps that would guide the parents with his/her son/daughter route and most importantly, track the current location of the bus and give the correct time for the bus to reach its bus stop. The proposed system deals with overcoming the problems stated above. The system is an Android application that gives necessary information about all the buses monitoring in Pune. This information overcomes the problems faced in the previously built application “Pune Bus Guide”. The platform chosen for this kind of system is android, reason being Android Operating System has come up on a very large scale and is owned by almost every second person. Also, Android is a user-friendly platform, thereby enabling ease of access for all the users. A number of applications made for the Android Operating System is increasing on a large scale ever since its advent. Android is an open source mobile software environment. Brought up by Google, the operating system has been made Linux based and uses Java programming language. It has a virtual machine that is used to optimize memory usage as well as resources. This application has been developed using IDE (Android Studio 1.6) with ADT (Android Development Tools) and Android SDK (Software Development Kit). There are a number of constraints that need to be satisfied.

1.1 Purpose

The main goal of the proposed work is to improve the School Bus Monitoring and Management System by adding the necessary additional features into the application, like accurate bus timings, correct bus numbers and moreover adding a GPS tracker into it. This study accepts input in the form of selection of the source and destination and selection of the bus travelling the distance to display the entire details about the routes and also track the location of the respective bus and give the map for the same. The last two decades have seen growing interest in the development of Android based platform.

1.2 Scope

Many city bus systems have discovered that GPS tracking system which allows to monitor the location and arrival time of their bus actually increase the number of people using city buses for routine commuting. The application is a user friendly one that anyone can access for free of cost. The basic idea for this project was to guide the bus travelers with the routes, all the possible stops that come on their way to the destination and moreover, display maps and track their locations and show the estimate remaining time required to reach. The aim is to overcome all the drawbacks faced in all the previous applications and generate fast and accurate results. The proposed system has been divided into two modules as follows. Module 1 gives information about all the routes from the source to the destination and give maps for the same. Module 2 give information about all the buses along with the bus numbers that go through the selected stops, track the location of the selected bus and send this information to the passenger giving him/her the estimate time required for the bus to reach.

1.3 Definitions, Acronyms, and Abbreviations

- Admin: a person who control the whole system.
- Parent: fathers and mothers of the students.
- Bus driver: a people who works for a bus company, They drive the bus to take the students from there house to school and from the school to the house.

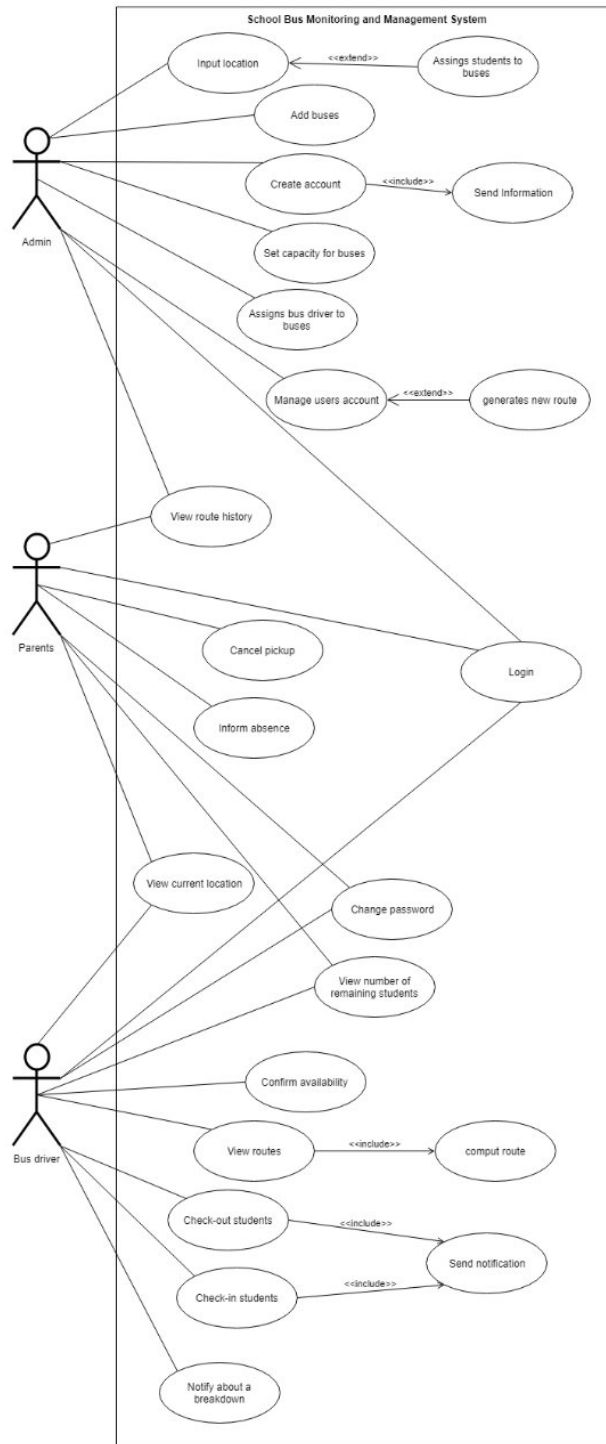
1.4 References

- [SCHOOL BUS ROUTING MANAGEMENT SYSTEM](#), May 22, 2016. University of DELHI.
- [Bus Tracking Application Project Report](#), June 27, 2016.

3.1 Functional Requirements

- 3.1.1 The admin shall be able to create an account for bus driver and parent.**
- 3.1.2 The admin shall be able to add buses.**
- 3.1.3 The user shall be able to login.**
- 3.1.4 The bus driver shall be able to check-in students.**
- 3.1.5 The bus driver shall be able to check-out students.**
- 3.1.6 The bus driver shall be able to view routes to the student's home location.**
- 3.1.7 The parent shall be able to view current location of the bus.**
- 3.1.8 The bus driver shall be able to view current location of the bus.**
- 3.1.9 The admin shall be able to input location for student's home.**
- 3.1.10 The bus driver and parents shall be able to change password.**
- 3.1.11 The admin shall be able to set capacity for each bus.**
- 3.1.12 The admin shall be able to assigns bus driver to buses manually.**
- 3.1.13 The admin shall be able to manage users account.**
- 3.1.14 The parent and admin shall be able to view route history.**
- 3.1.15 The bus driver shall be able to view number of remaining students.**
- 3.1.16 The parent shall be able to inform the system of the student's absence.**
- 3.1.17 The system shall be able to creates records for two trips.**
- 3.1.18 The parent shall be able to request cancelling the pickup.**
- 3.1.19 The bus driver shall be able to confirm his availability for trip.**
- 3.1.20 The bus driver shall be able to notify about a breakdown.**
- 3.1.21 The admin shall be able to assigns bus drivers to buses manually.**

3.2 Use Case Diagram



3.3 Use Case Description

3.3.1 Notify about a breakdown

3.3.1.1 name of the use case:

- Notify about a breakdown

3.3.1.2 Description:

- This use case allows the bus driver to notify the parent and admin about a breakdown if the system has some problem or the bus has damage.

3.3.1.2 Precondition

- a bus may break down or other issues may arise preventing the bus from transporting students. In that cases, the bus driver should use the mobile application to notify the parents and the admin of the breakdown.
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3.3.1.3 Basic Flow

- This case begins to start when an issue arises preventing the bus from transporting students:
 1. The system requests that the case which the function he/she would like to perform (either **notify the parent or admin**, view route, update a location, or check-in/check-out student).
 2. Once the bus driver notifies for a breakdown, the system must send two messages one to notifies the admin and the other for the student's parent.

3.3.1.4 Alternative Flow

- After that, the system response to bus driver that the messages have been sent. Also, the parent and admin received the messages. The system should save that message after sending it in the history messages. The messages should have sent only to the parent who their sons/daughters stuck in the breakdown.

3.3.2 Change password.

3.3.2.1 Name of Use case:

- Change password.

3.3.2.2 Description

- This use case allows the user to change their password whenever they want to change it after meeting the standard of changing any password.

3.3.2.2 Precondition

- The user who wants to change the password must have an active account and should be logged in to change the password.

3.3.2.3 Basic Flow

- The user should enter their old password to verify his account, and then the system ask the user to enter the new password, after the user enters the new password, the system will check if the entered password meets the requirement of the standard passwords, after that the system will ask the user to enter the password again for security purposes, and the system will check the of the two passwords match or not.
- After that the system will send an email notifying the user about him changing the password.

3.3.2.4 Alternative Flow

- If the user has entered a wrong password at the beginning, the system shall not display the changing password page.
- If the user did not follow the standard requirements of changing a password, the system shall make him enter the new password again.
- If the user has entered to different passwords, the system shall notify him that he entered two different passwords.

3.3.3 View route history

3.3.3.1 Name of Use case

- View route history

3.3.3.2 Description

- This use case allows the admin and parents to view the route history for the bus.

3.3.3.3 Precondition

- The admin or parents must be logged into the system before asking for the route history.

3.3.3.4 Basic Flow

- This use case starts when the admin or parents' wishes to view the route history.
 1. The system recognizes that either the admin sent a request or the parents.
 2. Once the system recognizes who sent the request two sub flow is executed.

3.3.3.4.1 Admin request

1. The system asks the admin which bus route history should be displayed.
2. The system brings the data for that bus for the week.

3.3.3.4.2 Parents request

1. The system check wither there is problem with the bus for the parent's child or not.
2. The system brings the bus route history for that day.

3.3.3.4.3 Alternative Flow

- Wrong bus request
 1. At any time, the admin may choose bus that has not been used for this week or not found, if this happened the system will notify the admin he has chosen the wrong bus.
- No problem with the bus
 1. If the bus of the parent's child does not have any problem in that day the request will be cancelled, and the system will display a message for the parents (there is no problem with bus).

3.3.4 Use Case Create an account

3.3.4.1 Name of Use case:

- Create an account

3.3.4.2 Description:

- This use case allows an administrative can register bus drivers, parents, and buses.
- The administrative can also enter the bus drivers, parents, and buses details into the system.

3.3.4.2 Precondition:

- If the use case was successful, the administrative entered successful information and is returned to the home page then the system will send an SMS to the parent or bus driver which includes a unique username and password. And they can access the software.
- Otherwise, the system state is unchanged.

3.3.4.3 Basic Flow:

1. Use case begins when an administrative visit the web access interface (a web page) software and register the bus drivers, parents and buses.
2. The system requests the administrative to enter the required information such as bus driver name and contact number. And student name. class and section, parents' name, residential address and contact number. And set the capacity for each bus.
3. Once the administrative enters the acquired details, the system will automatically assign students to buses, and the system will send an SMS to the newly registered parent or bus driver which includes a unique username/password.
4. After that, parents and bus driver use the username and password to access the system.

3.3.4.4 Alternative Flow:

- Save and submit
 1. When the administrative choose save and submit, the all information will be saved and the bus drivers, parents or buses. will be registered.
- Invalid Information Entered

1. At any point, the administrative may clicks submit before entering information of the bus drivers, parents or buses in to the system.
 2. The administrative may enters the incorrect or re-enters information, the system displays the error message, if the administrative wants to apply again for the registration then he/she have to perform the use case again. Otherwise, the use case ends.
- Cancel Registration
 1. When the administrative selects the cancel option. The system returns the administrative to the home page and any information entered has been erased.

3.4 Non-Functional Requirements

3.4.1 Performance

- The system should accommodate at least 1000 users.

3.4.2 Reliability

- The location of the bus should be accurate and updated continuously.

3.4.3 Availability

- The system should be available 1.5 hours before the first class and lasts for 2 hours, the second trip created 0.5 hour before the end of the last class and lasts for 2 hours. And requires internet connection.

3.4.4 Security

- The user password should meet minimum standard security.

3.4.5 Maintainability

- The system must be cope with a changed environment and make future maintenance easier.
- The system must provide the capability to back-up the data.

3.4.6 Portability

- The system can be deployed on each purchasing school.

3.5 Design Constraints

- The system should be developed with android Operating system.
- The system should have a web page.
- The bus driver and parents access the system via smartphone.
- The system consists of a central server connecting several smartphones carried out by bus drivers and student's parents.
- Routes are computed such that the total distance that the buses travel is minimized while respecting the capacities of buses using capacitated vehicle routing problem algorithm.

3.6 Ethical and Professional Issues

Application	Reasons for being ethical	Reasons for being unethical
Tracking dementia wandering.	<ul style="list-style-type: none"> • Wandering patients are able to be located before they are harmed. • Provides a sense of security to caregivers 	<ul style="list-style-type: none"> • Technology may not be suited to dementia wanderers as it can be unreliable, unresponsive, impractical and unaffordable
Parents tracking children.	<ul style="list-style-type: none"> • Children can be located if they are lost or abducted. • Can prevent children from speeding or disobeying instructions. 	<ul style="list-style-type: none"> • Invasion of child's privacy. • The child may not have a choice.
Police placing tracking devices on suspected criminals.	<ul style="list-style-type: none"> • GPS evidence may be used to rightly convict a person of a crime. 	<ul style="list-style-type: none"> • May be used without a warrant. • Location data may be modified to create a false alibi or false accusation
Shutting down parts of the GPS.	<ul style="list-style-type: none"> • May thwart terrorist attempts. 	<ul style="list-style-type: none"> • Many parent and students may be inconvenienced.
Security Concerns.	<ul style="list-style-type: none"> • School buses are touted for their safety, accidents and security breaches are inevitable. 	<ul style="list-style-type: none"> • The Location updates cannot be updated as often as every 10 seconds and speed cannot also be monitored in the route.