SHAHEED ZULFIKAR ALI BHUTTO
INSTITUTE OF SCIENCE AND TECHNOLOGY

Final Year Project Report

TRACKIFY

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Project Supervisor:

Sir Adeel Karim

Date: 20th June, 2022

Submitted in partial fulfillment of the requirements for the degree of

Bachelor of Science in Computer Science in the

Faculty of Computing and Engineering Sciences

Shaheed Zulfiqar Ali Bhutto Institute of Science and Technology (SZABIST)
Karachi Campus

SHAHEED ZULFIKAR ALI BHUTTO
INSTITUTE OF SCIENCE AND TECHNOLOGY

Declaration of Authorship

We, Sheikh Muhammad Asad (1812170) and Syed Rafay Hasan (1812174), hereby declare that the work contained in this paper and the project "TRACKIFY" are original to us. The work has been completed in its entirety while the candidate for a bachelor's degree at the Shaheed Zulfiqar Ali Bhutto Institute of Science and Technology (SZABIST), Karachi, has been identified in this report as having previously submitted work on the subject to either this university or another organization. This report includes any information that was obtained from outside sources or that belonged to other individuals or institutions. Every time we used a piece of work, we acknowledged it. We have given due credit to all sources of assistance used in this article.

Signed:

Syed Rafay Hasan (1812174)
Sheikh Muhammad Asad (1612215)

Date:
20th June, 2022

Project Description

Nowadays guardians are especially worried about their children, which has led to an expanded concern amongst parents today regarding the safety of their children on the way to school and back. They need to screen their children's movements and know about their whereabouts.

Nevertheless, this connection is inconvenient. To deal with this issue a Tracking System has been planned. With the use of this system, guardians can follow their children's location and be able to track school buses. It will also help school administration to track all the school buses and hence providing a sense of comfort for the authorities and parents.

Trackify is a simple solution which will tackle all the rising security concerns, which includes a device and a web based program.

The most part gives guardians and school authorities the capacity to track precisely the area of their school service vehicle.

In this project our main motive is to target schooling industry for the safety and security of students who travel by schools bus every day.

This will make life easier for both the parents and school authorities as they will able to track their each child.

As with the increase number in school population the bus tracking system plays a very important role as there is need to make school transportation system efficient and secure

Furthermore transport administration companies can undoubtedly enlist new students and parents receive information about their related bus only.

Acknowledgement

For the sake of ALLAH, the most advantageous and lenient who gave us the information and boldness to deal with this examination region. We might initially want to thank our venture manager Sir Adeel Karim, he was essential part in the task as the exploration field was new for ourselves and we required right direction. Sir Adeel Karim was consistently there for us at whatever point we required any direction or help in the venture and upheld us all through the undertaking. We might want to thank every one of our instructors who directed us by their insight and experience, we might want to thank our folks who were continuously supporting and empowering us to improve. We are thankful for the result and progress of this task over the course of the year are appreciation towards individuals who have furnished us with the direction and help to have the option to finish this undertaking in such a troublesome time. In the end we might want to thank the Institution where we began our excursion, the strong workforce and great climate helped us and helped us expertly and actually.

Table of Contents

Contents

Revision History

Name	Date	Reason For Changes	Version

Project Proposal

Title: Trackify

Supervisor: Sir Adeel Karim

Batch/Sec: 2022

Reg. #: “1812174” “1812170”

Introduction:

Nowadays guardians are especially worried about their children, which has led to an expanded concern amongst parents today regarding the safety of their children on the way to school and back. They need to screen their children’s movements and know about their whereabouts. Nevertheless, this connection is inconvenient. To deal with this issue a Tracking System has been planned. With the use of this system, guardians can follow their children’s location and be able to track school buses. It will also help school administration to track all the school buses and hence providing a sense of comfort for the authorities and parents. This system will be getting data of children like their name, email, roll number, contact number and etc. The other form of data would be the one that we have to upload which is uploading the bus driver details, school names and the system will show the tracking of the bus.

Project Objective:

- In this project our main motive is to target schooling industry for the safety and security of students who travel by schools bus every day.
- This will make life easier for both the parents and school authorities as they will able to track their each child.
- The most part gives guardians and school authorities the capacity to track precisely the area of their school service vehicle.
- Furthermore transport administration companies can undoubtedly enlist new students and parents receive information about their related bus only.

- Trackify is a simple solution which will tackle all the rising security concerns, which includes a device and a web based program.

Problem Description:

Student safety is the top most priority for school authorities and parents as there is an increase in number of crime rates, heavy traffic and accidents. The tracking is the standard norm in the whole world but unfortunately in Pakistan this is nowhere to be seen but now due to rise in incidents and the concern of parents it has become absolutely essential to track the school buses as it ensures safety and security and also helps in increasing the school image as this feature is not available anywhere in Pakistan so any schools that become the first ones to implement this will get a first movers advantage and attract more business in the form of new admissions. Due to all these reasons we are implementing a system that will provide real time tracking plus alert notifications at finger-tips. Trackify ensures better well-being and security to students while they are driving from school to home or the other way around. Utilizing this tracking system, guardians can keep a track on the movement of buses, their children, its area and the software additionally maintain database of bus drivers and students. Guardians can without much of a stretch login to software using Student ID and password. The main problem which arises in the implementation of this is that a bus driver must have an active internet connection plus a smartphone so we are solving this with the creation of a hardware device.

Methodology:

This proposal is about our final year project on school bus tracking system and we have named it as TRACKIFY. The purpose of this project is to provide an organized web application software for parents and school authority so that they can track their children school bus. It is a simple application made to help parents and school management to guarantee their child safety. We have selected this project because it has a lot of amazing safety features by which we can implement the concepts of FYP very easily and perfectly.

Project Scope:

Trackify maintains a secure environment and it is easily accessible by both the school authorities and the parents. The school authority can track that their buses are not being used for any illegal work and it also helps working parents to know that their child is reaching and coming back home on time. At times a child can get on the wrong bus or a bus driver may unable to identify all students and will not be able to know if a child is missing so with the help of the tracking device all these issues will be solved easily. This software will also help school's image and reputation to be increased as student safety is a very important feature for a parent and as the parents will know that the most important thing to a school is a child safety it will definitely enhance the school profitability. This system gives security, adaptability, minimal expense and unwavering quality and this system depends on web application and work as an intelligent application.

Feasibility Study:

- **Risks Involved**: You would be required to have a mobile or computer with an active internet connection to be able to access the web application.
- **Resource Requirement**:
  - Active Internet Connection
  - Personal Computer/Mobile

Solution Application Area:

Trackify maintains a secure environment and it is easily accessible by both the school authorities and the parents. This software will also help school's image and reputation to be increased as student safety is a very important feature for a parent and as the parents will know that the most important thing to a school is a child safety it will definitely enhance the school profitability. This system gives security, adaptability, minimal expense and unwavering quality and this system depends on web application and work as an intelligent application.

Project Key Milestones:

- The Trackify system is portable. It is something vital to make a system portable because as time goes on new technology and new operating systems are developing in the market
- The system will be flexible because there will be option for editing. For example if the parent enroll their child for transportation service and if they had enter an old address, they can easily enter the updated address because of its flexibility.
- We will use windows style GUI.

Tools/Technology:

- Hardware
- Arduino Mega
- GSM and GPS module
- Buck convertor

- Software
- Internet connectivity
- Web based application
- Visual Studio Code

Expertise of the Team Members:

The team members include Syed Rafay Hasan (1812174) and Sheikh Muhammad Asad (1812170) who will be working under the supervision of Sir Adeel Karim. The information expected to finish the undertaking is notable to all team members. These abilities incorporate composing documentation, creating database, and creating web applications.

Project Schedule:

Gantt chart attached separately.

References

- https://ieeexplore.ieee.org/document/8862254
- https://www.researchgate.net/publication/260791266_Smart_Tracking_System_for_School_Buses_Using_Passive_RFID_Technology_to_Enhance_Child_Safety
- Jisha, R.; Jyothindranath, A.; Kumary, L.S.: Iot based school bus tracking and arrival time prediction. In: International Conference on Advances in Computing, Communications and Informatics (ICACCI), pp. 509–514 (20017)
- Badawy, E.; Elhakim, A.; Abdulhmeed, A.; Zualkernan, I.: An IoT Based School Bus Tracking and Monitoring System. In: International Conference on Education and New Learning Technologies, Barcelona, Spain, pp. 5537–5546 (2016)

Software Requirements Specification

For

TRACKIFY

Version 1.0 approved

Prepared by

Syed Rafay Hasan (1812174)

Sheikh Muhammad Asad (1812170)

Shaheed Zulfiqar Ali Bhutto Institute of Science and Technology

20th June 2022

Introduction

1.1 Purpose

Our overall project is based on a tracking system and we have named it as TRACKIFY. The purpose of this project is to provide an organized web application software for parents and school authority so that they can track their children school bus. It is a simple application made to help parents and school management to guarantee their child safety. We have selected this project because it has a lot of amazing safety features by which we can implement the concepts of FYP very easily and perfectly.

1.2 Document Conventions

The list of conventions utilized in this documentations are as follow:

- Font: Times New Roman
- Headings: 14 font size
- Body: 12 font size
- Line spacing: 1.5

  This document is organized by according to the software requirement specification template.

1.3 Intended Audience and Reading Suggestions

The audience of this project are all the individuals who have any interaction with the school, the intended audience are the parents and school admin authority. The school admin authority include security department and all the admin staff. And all the parents will also be the audience as they will use this to track the bus. And finally the bus driver will also be the audience of this project. The rest of the SRS document contains the interface requirements which include both the hardware and software interface. To make it easier to read the SRS document is divided into two different sections and all the Non-Functional requirements are discussed in detail. To totally comprehend the venture it is fundamental for the target group to peruse the documentation beginning from the exceptionally top as it will give you every one of the subtleties important to comprehend this undertaking.

1.4 Product Scope

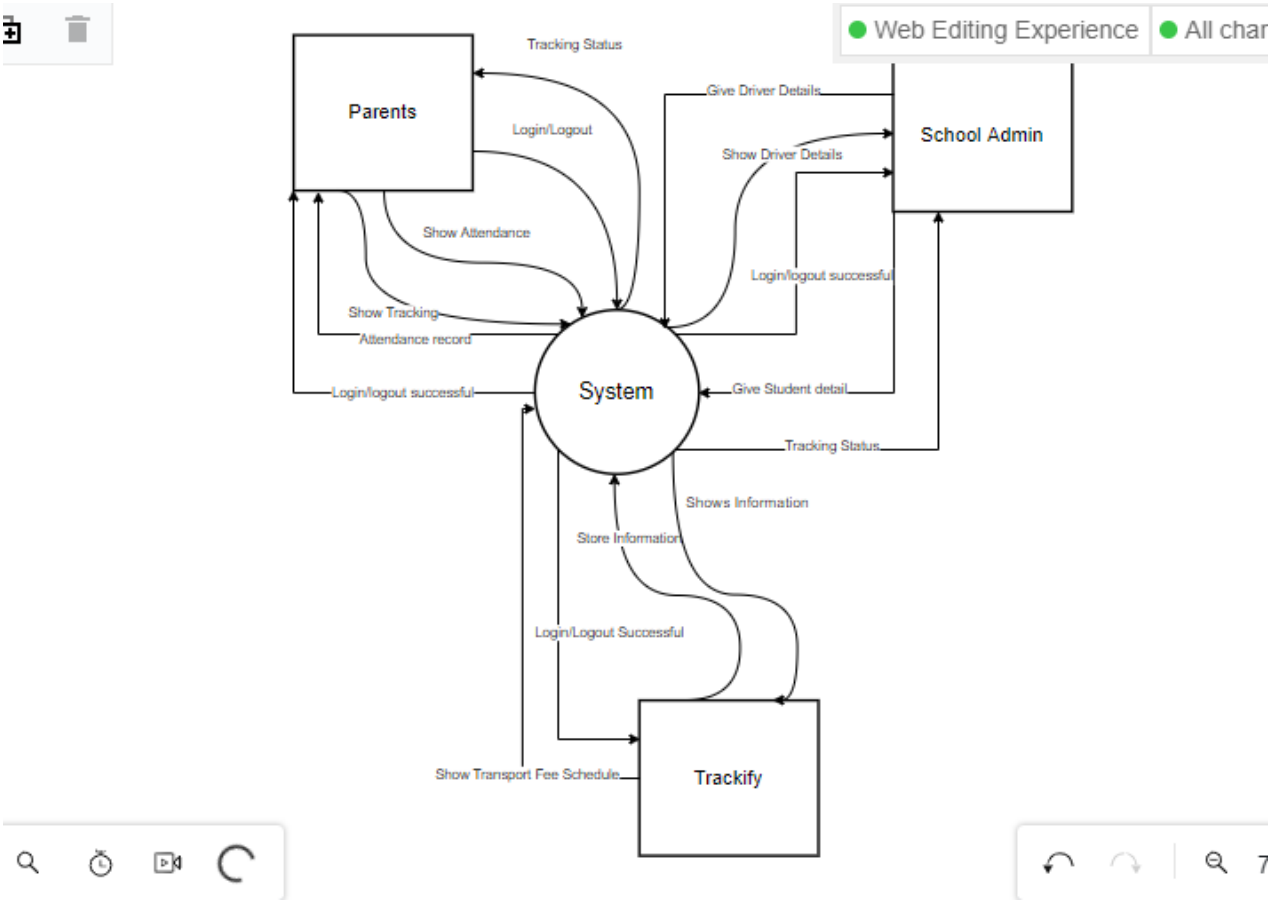
This TRACKIFY software provides a great sense of security to parents and as well as school authorities and the best part is, its software provides with various features. There are mainly five essential features of this software. The first one is Tracking, which allows the user to track the bus and check weather their child attendance is marked or not marked. The second one is alert notification, which will send any emergency notification to parents and school admin if there is any delay in reaching out to the location or if any problem arises. The third feature is new student admission, which allows parent to enroll their child for bus transportation. The fourth feature is student attendance notification, which will send a push notification to parents and school authorities that when their child enters the bus its attendance is recorded and when he leaves the bus it is marked as complete and the child is reached home. The fifth feature is Transport fee schedule, which gives the flexibility to parents to check the transportation charges instead of asking every other person. Apart from these five features, this software contribute to making life easier for working parents regarding the safety of their child and will also enhance school reputation to increase as there is no such feature available in Pakistan and any school that become the first one to implement this will get a first movers advantage.

1.5 References

- https://ieeexplore.ieee.org/document/8862254
- https://www.researchgate.net/publication/260791266_Smart_Tracking_System_for_School_Buses_Using_Passive_RFID_Technology_to_Enhance_Child_Safety
- Jisha, R.; Jyothindranath, A.; Kumary, L.S.: Iot based school bus tracking and arrival time prediction. In: International Conference on Advances in Computing, Communications and Informatics (ICACCI), pp. 509–514 (20017)
- Badawy, E.; Elhakim, A.; Abdulhmeed, A.; Zualkernan, I.: An IoT Based School Bus Tracking and Monitoring System. In: International Conference on Education and New Learning Technologies, Barcelona, Spain, pp. 5537–5546 (2016)

Overall Description

1.6 Product Perspective:



1.7 Product Functions

- Log in
- Log out
- Tracking
- Alert notifications
- New student admission
- Student attendance notification
- Announcements
- Transport fee schedule

1.8 User Classes and Characteristics

Parents

- Parents will able to log in
- Will be able to check bus location
- Will be able to check their child attendance
- Will be able to receive alert notifications
- Will be able to see the transport fee schedule
- Will be able to sign up for transportation service

School Admin

- Will be able to check bus location
- Will be able to check child attendance
- Will be able to update, add, delete child information
- Will be able to check bus timings
- Will be able to receive alert notifications

Driver

- Will be able to mark child attendance
- Will be able to send alert notifications
- Will be able to easily use the system
- Will be able to check how many students are present

1.9 Operating Environment

The operating system we will be using for our project is Microsoft Windows (Windows 10) and its hardware configuration is

Processor: Intel® Core™ i7-106G7 CPU @ 1.30 GHz 1.50 GHz

System Type: 64-bit Operating System, x64-based processor

1.10 Design and Implementation Constraints

We are not restricted to utilize a particular programming or equipment and there are no imperatives. It is exclusively dependent upon us to utilize anything we desire according to our solace and prerequisites of the venture. HTML, CSS and JavaScript were utilized for making this project. For hardware we have used Arduino Mega, GSM module sim 800L and GPS module.

1.11 User Documentation

This software accompanies three sorts of documents which are essential for the clients to go through to totally comprehend the elements of this website. The records are Software Requirements Specification (SRS) this report will give every one of the insights about the elements and functionalities of this website. Then, at that point, the following report is Software Design Specification (SDS) this record tells about everything identified with the plan of the undertaking. The last report with the venture is User Manual and this contains all the basics functions which will help the user to understand easily.

1.12 Assumptions and Dependencies

- All clients have PC information on the best way to sign in and utilize the functionalities in a website for any reason.
- Parents should have a student ID number with them in order to create an account.
- The System ought to have a steady web association with appropriately get login into the website and utilize its usefulness.

External Interface Requirements

1.13 User Interfaces

We will use windows style GUI as the GUI will be not difficult to use for all people. It checks usability condition and will be adjusted according to all the age group. It will verify data integrity and even the bus drivers who are not well-educated will easy use this system because of its simplicity and of its GUI which is easy to use by any individual.

1.14 Hardware Interfaces

A client can interface with the website by both the PC and a cell phone in whatever they are alright with. In case clients are utilizing a PC to interface with the website, they ought to simply require a mouse and a console to get to it. In case clients are utilizing cell phones to interface with the website, they ought to just be utilizing the dash of their cell phone to get to it with an active internet connection.

1.15 Software Interfaces

Our project runs on React and it is a web based application and have also use HTML and CSS. The project also uses API, libraries and web services such as API for maps which enables to display the bus location on our website which help the parents and school admin in locating the school bus and easily see the location of their child bus. The web also uses web services such as database of students who travel by bus and to easily manage the vast data.

1.16 Communications Interfaces

Hypertext Transfer Protocol Secure (HTTPS) is used for securing the data so that no one else gets access to the data provided by a specific person and no one gets the access to login to the application except the parents and school authorities who have access to it. Transfer Control Protocol (TCP) is also used for communicating over a network and makes sure a connection is established.

System Features

1.17 System Feature 1

Use-case name: Sign-Up

Summary of this use case/ its uses: this use case is used to create an account.

Actors: Users and School admin

Pre-condition:

- User must have an active internet connection
- User must have an Student ID allocated

Basic course of events/happy path:

ACTOR ACTION	SYSTEM RESPONSE
1.The actor will click on sign up button	2.The system will ask to enter all the necessary details
3. The actor will fill all the mandatory fields	4. The system will create an account successfully.

Alternative path:

3. If the user does not provide with all the necessary details, the system will not be able to create an account.

Post condition:

1. The user account will be created successfully.

Author Name: Muhammad Asad

SYSTEM FEATURE 2:

Use-case name: Tracking

Summary of this use case/its uses: this use case is to look up for live tracking of the bus

Actors: Users

Pre-condition:

- Users must have an internet connection
- User must click on the valid option
- User must know the correct website

Basic course of events/happy path:

ACTOR ACTION	SYSTEM RESPONSE
1.The actor will click on tracking	2. The system will show the tracking status of the bus.

Alternative path:

2. If the user does not have an active internet connection, the system will not display the tracking of the bus.

Post condition:

1. The user will get information about the bus location.

Author name:

Rafay

SYSTEM FEATURE 3

Use-case name: Alert notifications

Summary of this use case/its uses: this use case is to send emergency alerts to parents and school admin.

Actors: Users

Pre-Condition:

- User must have an active internet connection
- Users must click on the correct option to view the alert
- Users mobile number should be registered in the system

Basic course of event/happy path:

ACTOR ACTION	SYSTEM RESPONSE
1.The user will receive an alert notification	2. The system will ask to enter the Login credentials
3. The user will click on alert notification	4. The system will show the alert notification page

Alternative path:

2. If the login credentials are incorrect he/she will not receive the alert notification.

Post condition:

1. The user will get information regarding the emergency situation.

Author name: Rafay

SYSTEM FEATURE 4:

Use case name: Sign In

Summary of this use case/its usage: this use case is use to check the Login functionality.

Actor: User

Pre-condition:

- The user must have an stable internet connection
- The user must know the valid website
- The user must click on the correct option
- The user must enter the correct ID and password.

Basic course of event/happy path:

ACTOR ACTION	SYSTEM RESPONSE
1. Actor will click on Login button	2. The system will show the Login page
3. The actor will enter the login credentials	4. The system will show all the information

Alternative path:

1. If the Actor does not have a stable internet connection, the system will not be able to open the login page

Post condition:

1. The user will be able to view all the functionalities

Author name: Rafay

SYSTEM FEATURE 5

Use case name: new student admission

Summary of this use-case/its usage: this use-case is used to enter the details of the student who wants to enroll for bus transportation

Actor: user

Pre-condition:

- The student must be enroll in a particular school to use the transportation service
- User must have a stable internet connection
- User must know the correct website
- User must click on the correct option

Basic course of events/happy path:

ACTOR ACTION	SYSTEM RESPONSE
1. Actor will click on new student admission option	2. System will show the admission page which asks the user to enter the name of the student and all the mandatory fields.

Alternative path:

2**.** If the user does not provide with correct details the student will not be enroll in transportation service.

Post condition:

1. The user will be able to successfully join the transportation service.

Author name: Muhammad Asad

SYSTEM FEATURE 6:

Use case name: Student Attendance

Summary of this use case/its stages: This use case will mark attendance of the students who travel by bus to keep a record who is present and who is absent.

Actor: user, bus driver, school admin

Pre-condition:

- All the users must have an active internet connection
- The student must be enroll in the school transportation service
- The student must be in the bus at the time of attendance.
- The users must click on the correct option to view the attendance record.

Basic course of events/happy path:

ACTOR RESPONSE	SYSTEM RESPONSE
1. The bus driver must click on the present option.	2. The system will show the students who have been marked present.
3. The user must click on the attendance button.	4. The system will show the record of the student who are present and travelling in the bus.

Alternative path:

2. If the user and bus driver does not have an active internet connection it will not show the attendance of the student.

Post condition:

1. The user and the school admin must be able to view the attendance of their each child.

Author name: Rafay

Other Nonfunctional Requirements

1.18 Performance Requirements

There will be a huge expansion in the website's exhibition if the code behind it is productive. The code should be appropriately composed with the goal that the site doesn't crash when the client clicks a choice. The site ought to likewise run on a quick system so the clients can get to everything rapidly. Clicking on option such as “Tracking” and then displaying the information should not take more than 8 seconds. If the user want to register and create an account, the account should be created and submitted in less than 4 seconds without any delay. When the parent searches for transportation fee schedule, it should display the results in less than 5 seconds.

1.19 Safety Requirements

To guarantee that nobody of Trackify users loses any information while utilizing the website (because of an accident or a bug or some likeness thereof) we ensure that the entirety of the previous information, driver's information and student details are remained careful in our data set. In case the clients face any sort of issues at the website then they can generally call us on our helpline to get support.

1.20 Security Requirements

- The user of the system must be allotted an extraordinary login ID and set a protected secret password with the goal that nobody can get to the data.

- On the off chance that any record has been embedded erased or refreshed in the data set, the information base must be synchronized by that.

- the main school administrator staff is will ready to see and alter the information

- The guardians will have the choice to see every one of the information yet won't have consent to change the information.

1.21 Software Quality Attributes

- **Usability Requirements:**

  The system will be not difficult to use by the audience and it will likewise require less preparing time in light of the fact that the drivers, school admin and parents will all immediately get comfortable with it. There will be no hardships while finding a choice in light of the fact that the UI is easy to understand, and every one of the choices are not difficult to track down. For example the tracking option is on the top of the website and users can click on it easily

- **Delivery Requirement:**

  The end result provided to the user will have the following information; the date and time when the bus will reach, the live tracking of the bus. It will also provide with any emergency alerts or if the bus is getting late due to any reason. The users can also access to transport fee schedule and can also enroll their child for transportation services. For example if the parent click on "transportation fee schedule" the parent will get information according to that topic.

- **Legal Requirements:**

  The system will have its own logo so that no one can publish stuff by their name, otherwise it will create complications and create issues. All the information provided to the users will be published under the name of Trackify.

- **Flexibility Requirements:**

  The system will be flexible because there will be option for editing. For example if the parent enroll their child for transportation service and if they had enter an old address, they can easily enter the updated address because of its flexibility.

- **Reliability:**

  Legitimate coding, association, information base administration, and antivirus programming ought to be available in a Trackify system to make it liberated from an infections, bugs, or mistakes with the goal that it can't be a justification behind the disappointment and incorrectness of the system. For example, if a parent enroll their child for transportation service and id its information is not entered in the database of their system due to some problem by the system side, it will be an issue for both the parents and the school admin system as well as for the bus driver as he will not be able to find the name of that particular child in their system.

- **Interoperability:**

  File sharing option should be available in the systems so the data should be exchange between them. For example, if the Alert notification have been uploaded in the website by the driver, the school admin and parents should be able to view it.

- **Portability**:

  The Trackify system should be portable. It is something vital to make a system portable because as time goes on new technology and new operating systems are developing in the market. In today's time Windows 10 and Windows 11 has been launched and most of the system are running on Windows 10 these days because these system have a lot of advance features than the previous ones and Trackify will perform their task easily on these systems.

1.22 Business Rules

We have mainly 5 business rule for our Trackify system.

1. For logging in, the correct username and password should be enter otherwise it will keep on giving error. If a username is entered incorrect it will display a message of "Invalid Username and if a password is entered wrong it will display message of "Invalid password".
2. A child can have one or many home addresses.
3. Each parent can have one or many child records
4. School admin can have one or many address
5. A parent can use a smart phone for tracking as well as a computer system.

The Software Design Specification Outline

Introduction

1.23 Purpose of this document

SDS represents Software Design Specification which depicts the plan of the project. The motivation behind making a SDS Document for the project is on the grounds that it portrays the Trackify website architecture and plan by the pictorial portrayal about the functionalities of the highlights in it. It gives a reasonable and simple method for clarifying the website architecture and plan in a more productive and compelling manner.

1.24 Scope of the development project

The scope proposed in the project includes the design and development of aWeb app.

FYP 1 Scope:

The hardware components of the project which include hardware programming, location shown in terms of longitude and latitude to track the location.

FYP-2 Scope:

- **Admin and parent login:**
  In this property the user can Login using the right credentials.
- **New student admission:**
  In this property the user can add the details of his/her child and can enroll in the school bus tracking system.
- **Tracking integration:**
  Tracking integration include the integration of hardware with software and to show the location on the maps.

1.25 Definitions, acronyms, and abbreviations

The audience of this project are all on the whole individual who have any collaboration with the school system, the target group are all of the school system administration, bus drivers and the parents. Every one of the various offices like HR department, Administration department, and Security department will likewise be the crowd of this project. The parents will likewise be the crowd as they will utilize this to track their child bus and see their child attendance and so on. The remainder of the SDS archive contains the point of interaction necessities which incorporates the graphical UI of the website. The SDS is separated into various areas, to make it more straightforward for the per users to peruse. To totally comprehend the task it is fundamental for the target group to peruse the documentation beginning from the extremely top as it will give you every one of the subtleties important to comprehend this project, unique accentuation ought to be given to project extension and venture features.

1.26 References

- https://ieeexplore.ieee.org/document/8862254
- https://www.researchgate.net/publication/260791266_Smart_Tracking_System_for_School_Buses_Using_Passive_RFID_Technology_to_Enhance_Child_Safety
- Jisha, R.; Jyothindranath, A.; Kumary, L.S.: Iot based school bus tracking and arrival time prediction. In: International Conference on Advances in Computing, Communications and Informatics (ICACCI), pp. 509–514 (20017)
- Badawy, E.; Elhakim, A.; Abdulhmeed, A.; Zualkernan, I.: An IoT Based School Bus Tracking and Monitoring System. In: International Conference on Education and New Learning Technologies, Barcelona, Spain, pp. 5537–5546 (2016)

1.27 Overview of document

The software design specification incorporate an appropriate compositional example and give a point by point plan. It incorporates configuration designs, sequence diagram, and class diagram, and UI plan exhaustively. The framework is planned with most extreme user productivity and usability. The system additionally incorporates a short portrayal of use cases and it has a structural plan to fill every one of the roles remembered for the System. Our project is based on React JS and in this SDS we will be providing with several different diagrams.

System architecture description

1.28 Section Overview

This part essentially centers around the system architecture of this project, the system design depicts the significant parts of the system and portrays how every one of the parts are connected with one another and how they cooperate. In this segment first, we talk about the overall requirements of the project, which incorporate both the software and hardware impediments. Then, at that point, we examine the information plan of the venture, this incorporates the plans of the data sets, and so forth from that point forward, we examine the program structure which incorporates the data about the compositional model picked and other significant parts. At last, we talk about the choices that might have been utilized for this project.

1.29 General Constraints

BROWSER:

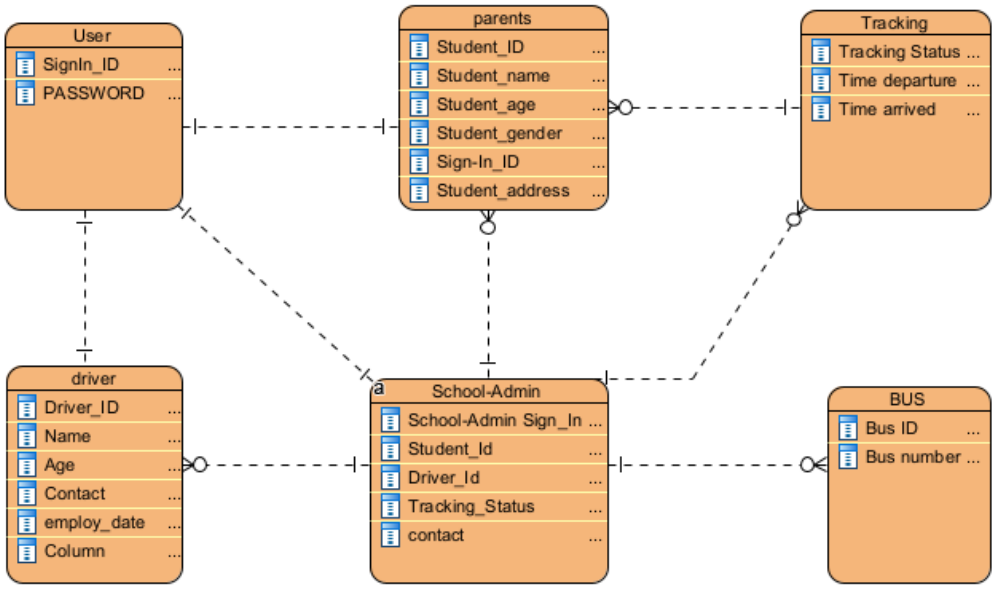
- Google Chrome
- Firefox
- Opera

Desktop:

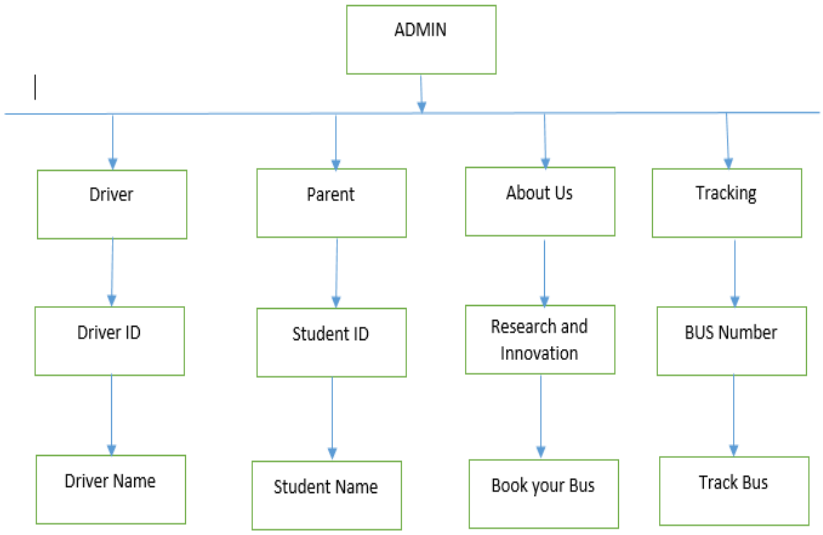
- Windows 7 till Windows 10
- MacOS

it is necessary that the user must have an active internet connection to run the website.

1.30 Data Design



1.31 Program Structure



1.32 Alternatives Considered

Businesses have begun to investigate Node Js development for cross-platform web applications since the platform offers numerous benefits, including significant cost and time savings. It is also an Open-Source platform that allows third-party libraries to be integrated. Building server-side application takes less time and money.

Detailed description of components

1.33 Section Overview

This section describes the complete description of all components in detailed with their functions dependencies, their relationships with other components. It describes the interface of each component with input and output requirements.

1.34 Component in Detail

Identification	Google Maps
Type	API
Purpose	The purpose of this maps API is to enable the users to locate the school bus easily
Function	The API will help in locating the school bus.
Dependencies	Users can enter their details and the maps will show the bus location
Data	Google Maps API data will be saved as integer in our database.
Identification	Student Data Record
Type	API
Purpose	This API is used to maintain the student Data Record
Function	This API helps school admin to provide the information about the student to someone who wants to know about it.
Dependencies	To display the student data record, this API is dependent to it because if this API is not present, the student Data Record cannot be shown.
Data	Student record data will be saved as both text and integer in our database because if we have to save the ID# of the student, it will be saved as integer while the student name will be saved as text.

Identification	Attendance Data Record
Type	API
Purpose	This API is used to maintain the attendance data record.
Function	This API helps school admin and parents to know the record of their child attendance and to keep a record weather a child was present or absent on a particular day. It also helps school admin to provide the attendance history of a particular child to their parents.
Dependencies	To display the Attendance data record, this API is dependent to it because if this API is not present, the Attendance Data Record cannot be shown.
Data	Attendance record data will be saved as both text and integer in our database because if we have to save the ID# of the student, it will be saved as integer while the student's name will be saved as text.

User Interface Design

1.35 Section Overview

This Overall Section depends on the User Interface (UI) Design of the site. It covers the screen captures of the GUI screens which shows the highlights and functionalities by which user interface with.

1.36 Interface Design Rules

The interface is flexible as it allows user to use on PC or mobile. There is no specific standard followed for designing this web based application. Users should always be informed of easy to understand and highly visible status displayed on the screen within a reasonable amount of time. Interface designers ensure that both the graphic elements and terminology are maintained across similar platforms. Users are unable to understand technical terminology, therefore error message should always be expressed in plain language to ensure that it is easily understood by all the users.

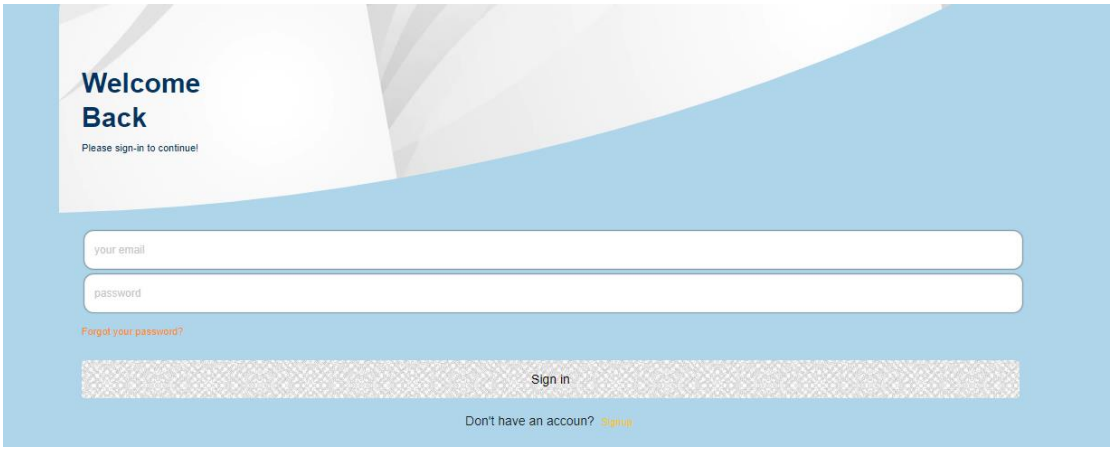
GUI Components

Google map API use for location service. This API is used in location component to display Google map in mobile application. It display the location of the bus and also in tracking the real-time location of the school bus.

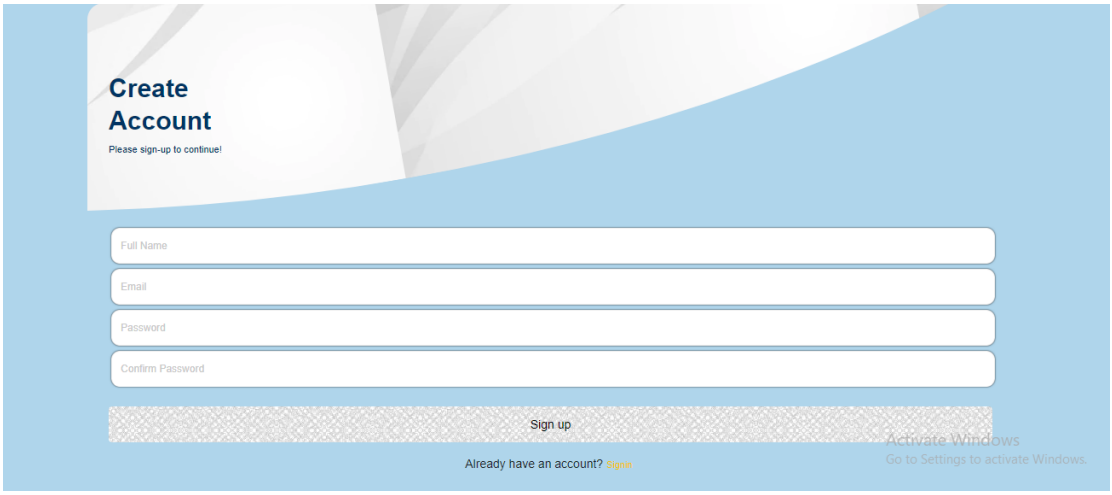
1.37 Web UI

- Home page:

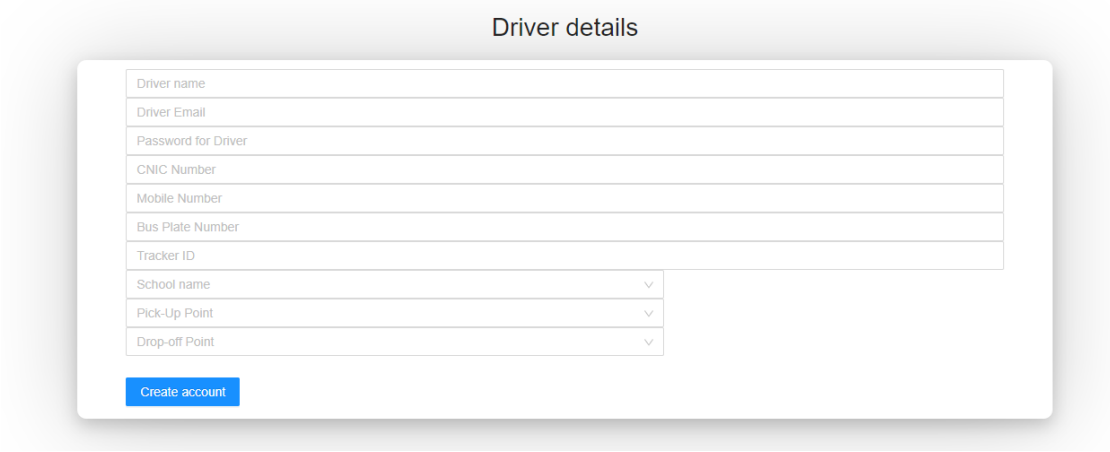
- Sign in page:



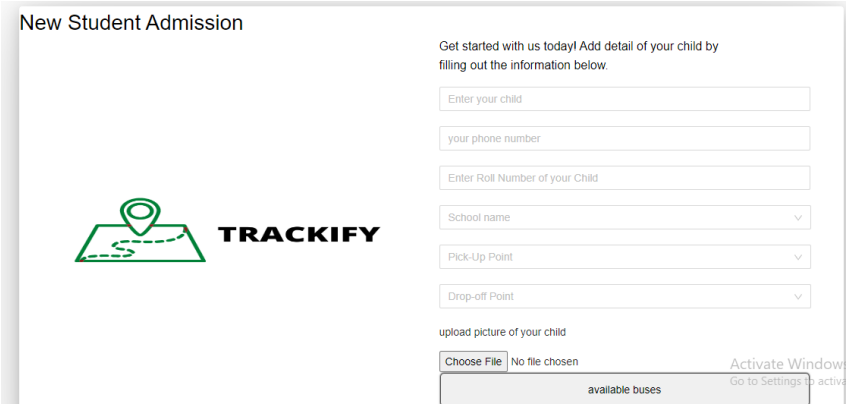
- Sign-up page:



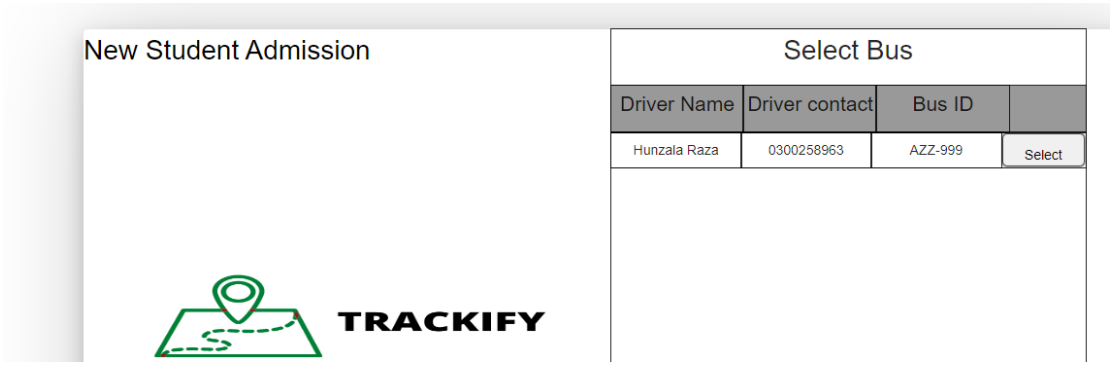
- Admin can add details of the driver:



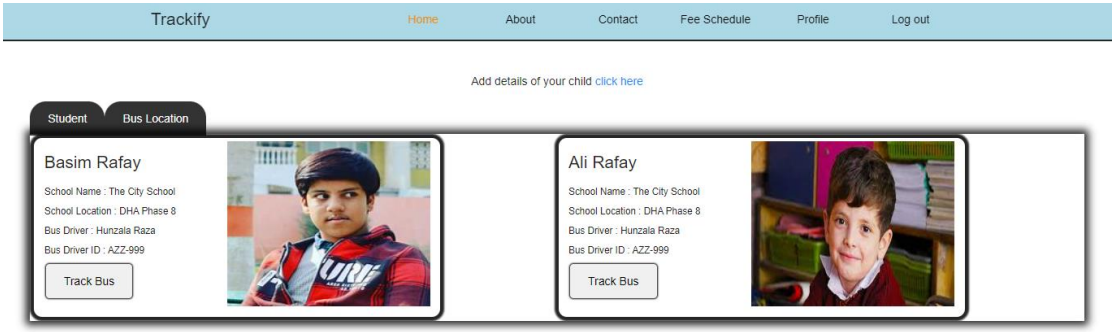
- Add new student:



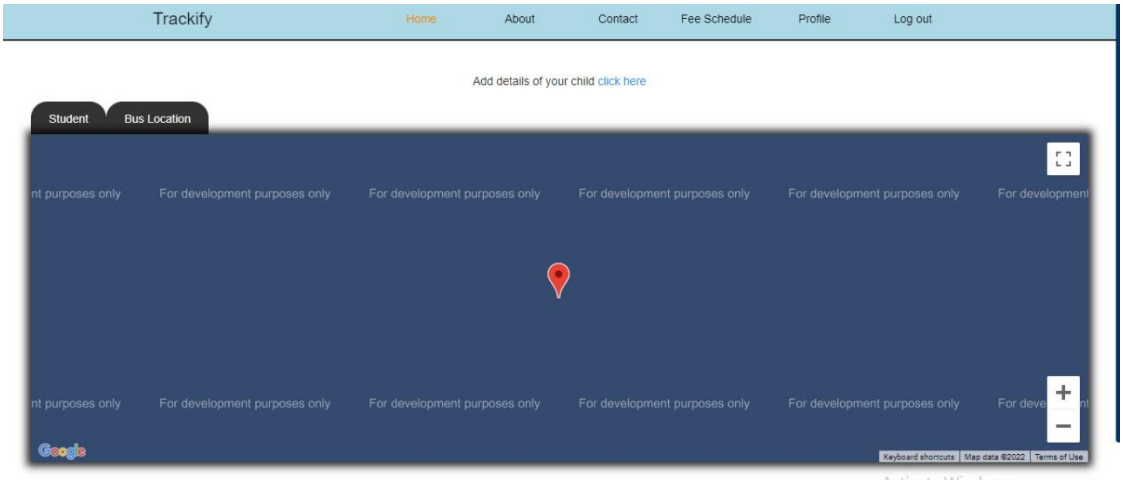
- Available bus drivers will be shown:



- Student profile will be shown:



- Tracking will be shown on Google maps:



1.38 Detailed Description

Login: Login form used by users to login in the application

Login with Gmail: signup or login with Gmail

Parent home page: used by parents to view the main page

Driver home page: used by driver to view his main page

Admin home page: used by admin to view their home page

Alert notifications: show request of bus to parents and school admin

Tracking status: shows the current location

Transport Fee Schedule: shows fee schedule

Student Attendance: shows details of each student attendance

Logout: exit application

2. Reuse and relationships to other products

Reusability allows developers to be more efficient because the same code can be developed once and used in many different applications. Secondly, reliability can be improved by reusing previously developed, and previously tested components. The development of new code entails additional costs in time and money for testing, validation and verification. Much of these expenses can be avoided by using already manufactured external components.

2.1 Design decisions and tradeoffs

The design decision to make the system more efficient. The system was made to promote the specific online market of educational stationary and accessories in Pakistan which is very rare. We design our site which will totally satisfy our users. We decided to make our user interface on React JS, due to its latest design components which are easy to develop and user friendly.

2.2 Pseudocode for components

- Login

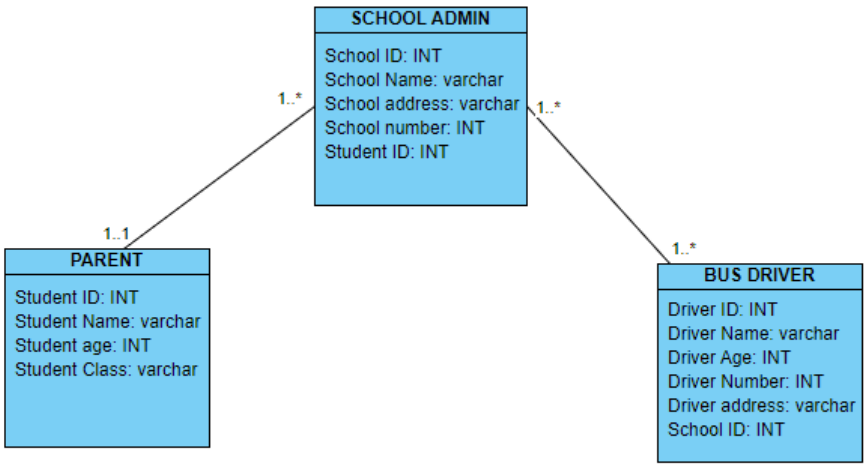
```
BEGIN
READ email
READ password
IF (signInWithEmailAndPassword == true)
   WRITE login successful
    DISPLAY Dashboard Screen
ELSE
    WRITE login failed
End
```

- Sign-up

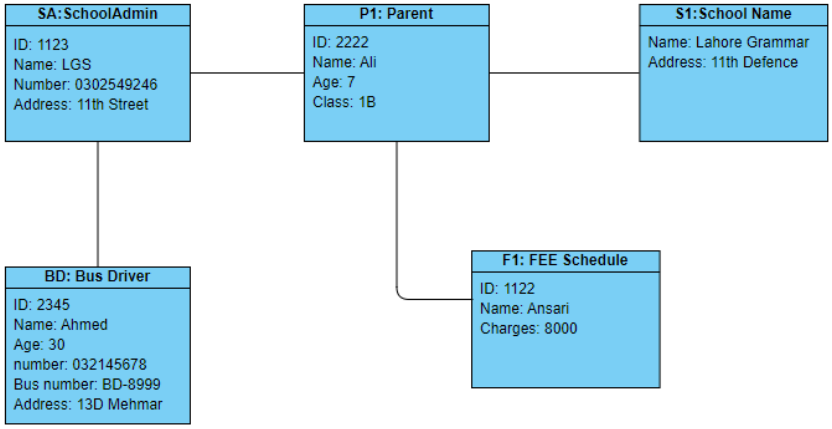
```
BEGIN
READ name
READ email
VERIFY (Email format == correct)
READ password
VERIFY (Password format == correct)
READ Confirm password
VERIFY (Password == Confirm password)
FUNCTION createUserwithEmailandPassword()
STORES in Database
WRITE Account created
END
```

Appendices

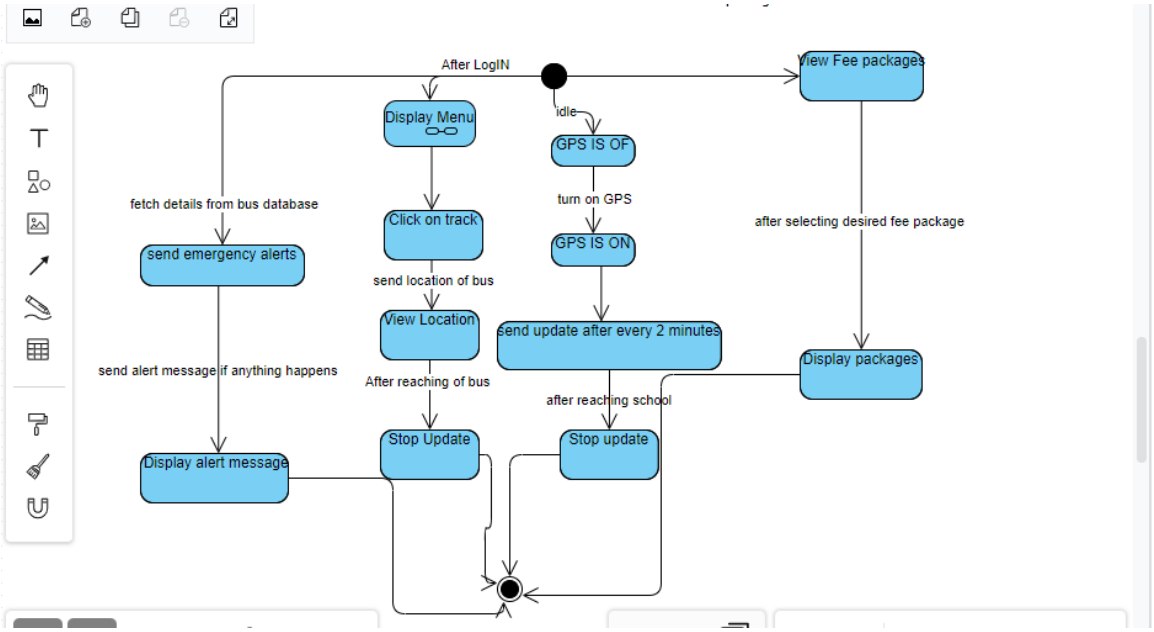
CLASS DIAGRAM:



OBJECT DIAGRAM:

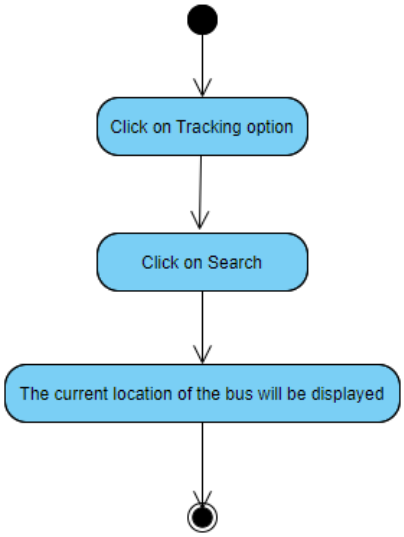


STATE CHART DIAGRAM:

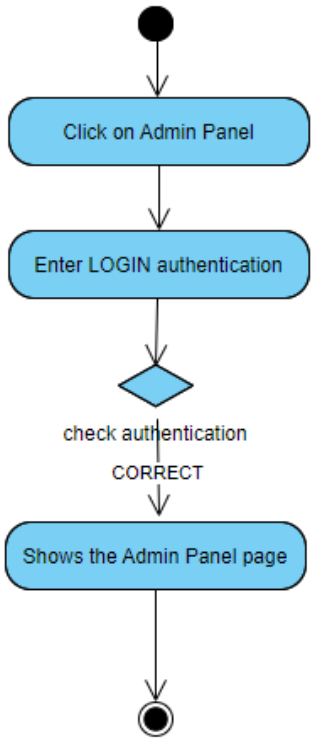


ACTIVITY DIAGRAM:

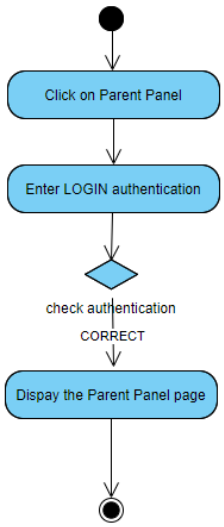
- Tracking:



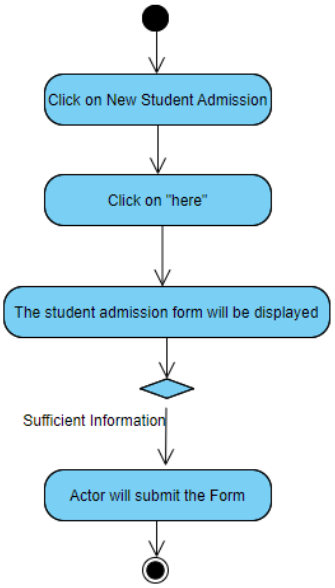
- Admin Panel:



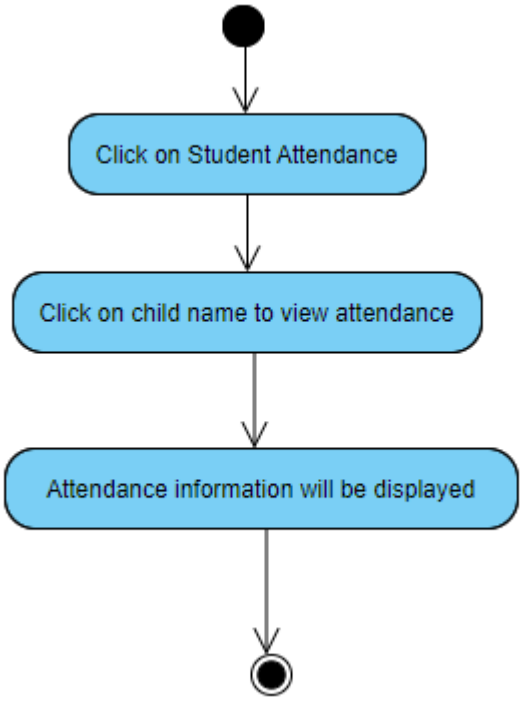
- Parent panel:



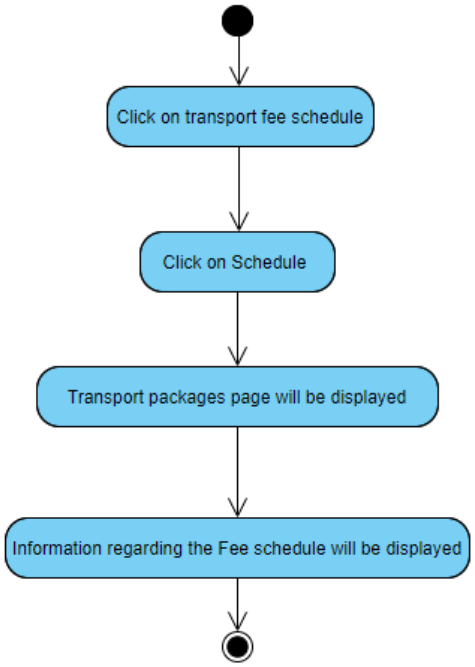
- NewstudentAdmission:



- Student attendance:

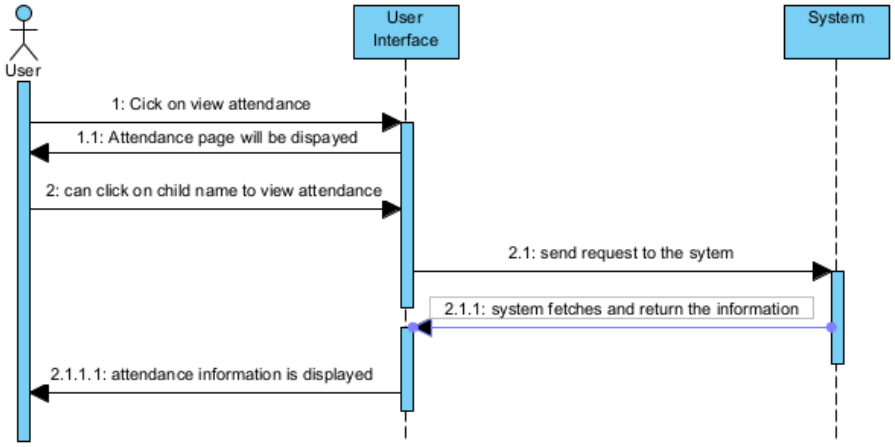


- Transport fee schedule:

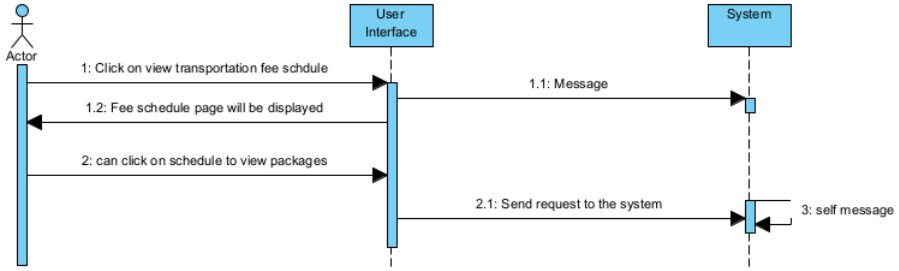


Sequence diagrams:

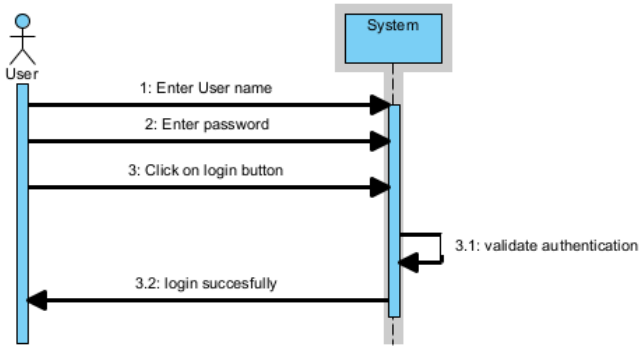
- Attendance sequence diagram



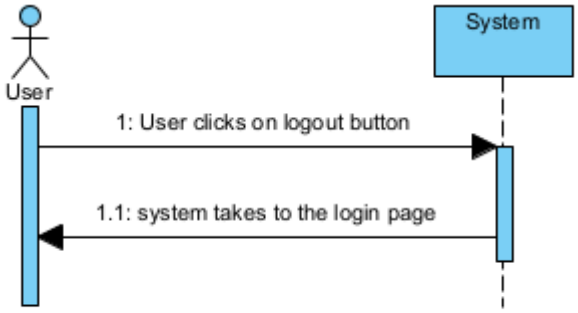
- Fee schedule sequence diagram



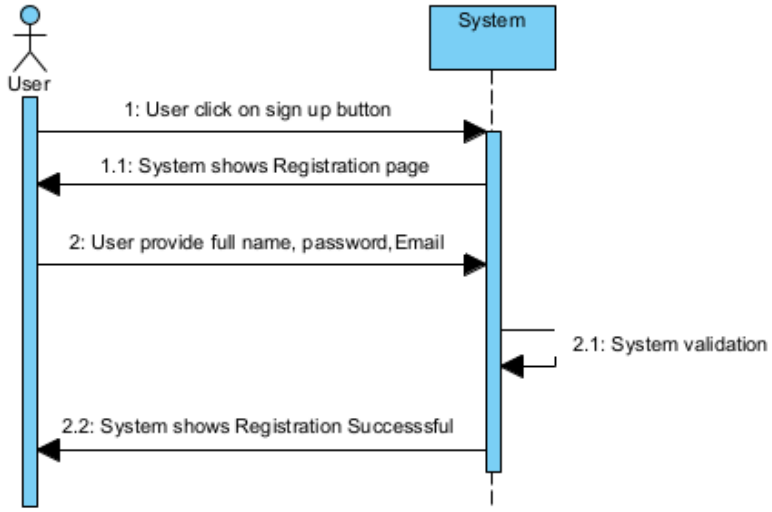
- Log in sequence diagram



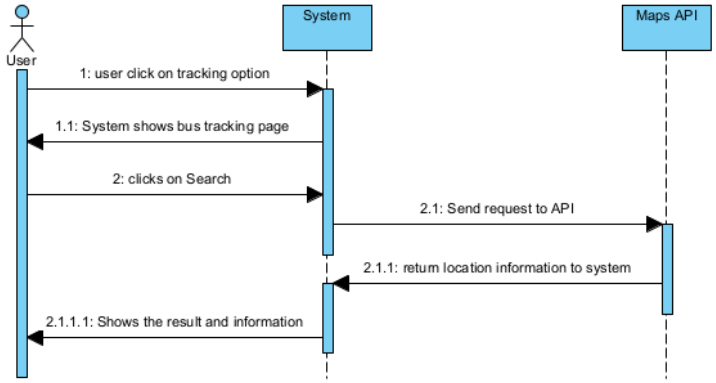
- Logout sequence diagram



- Registration sequence diagram

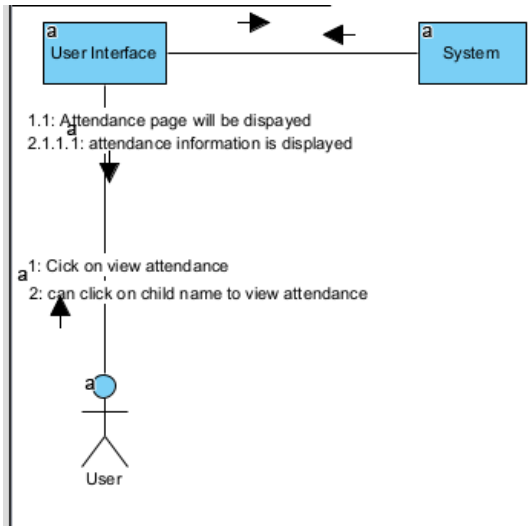


- Tracking sequence diagram

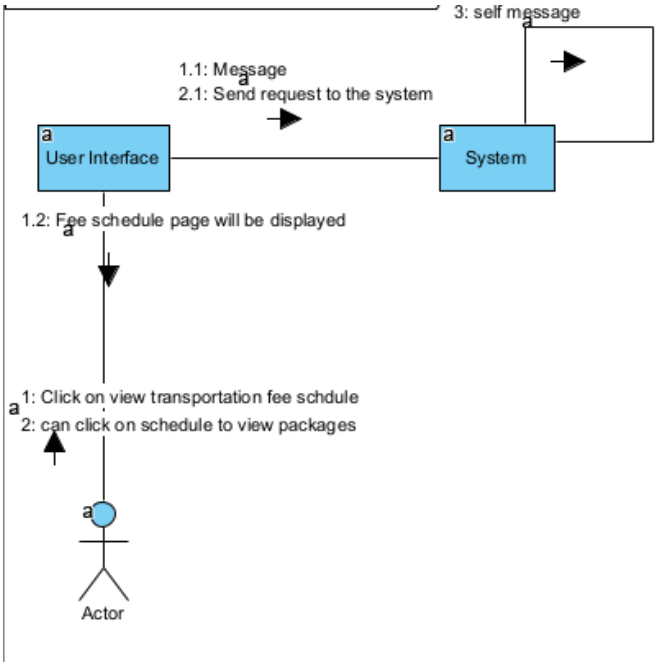


Collaboration Diagrams:

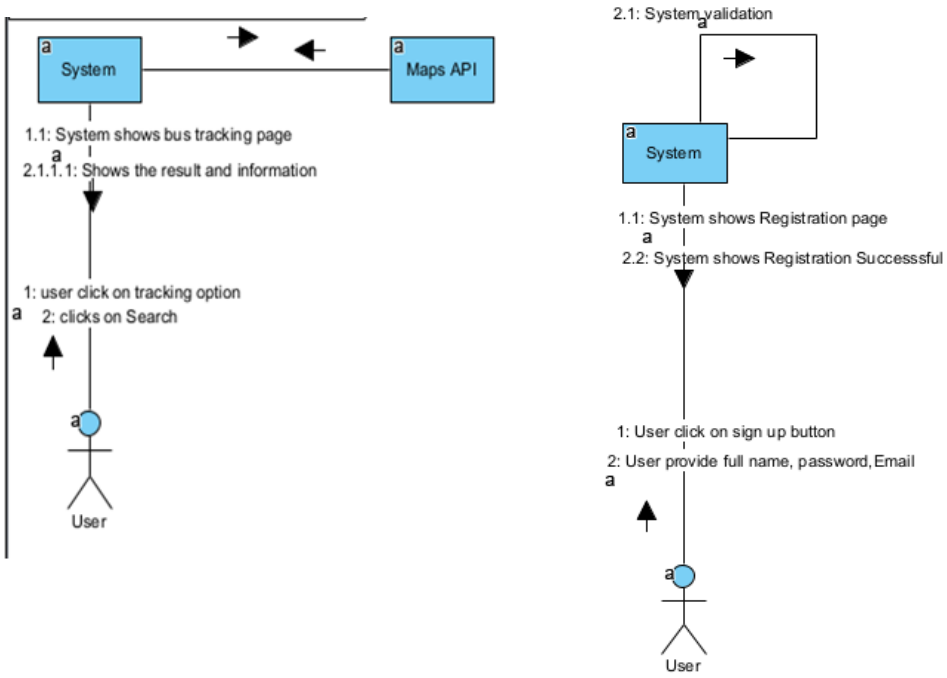
- Attendance Collaboration diagram:



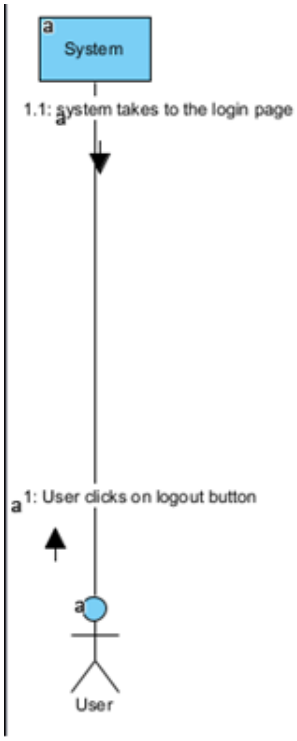
- Fee Schedule Collaboration diagram:



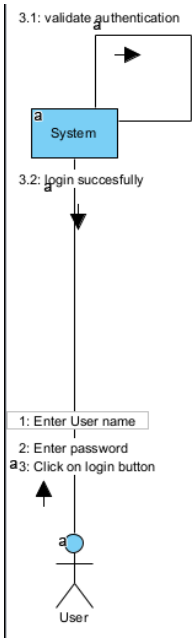
- Tracking collaboration Diagram:



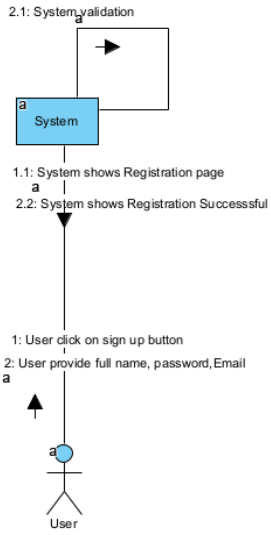
- Logout Collaboration diagram:



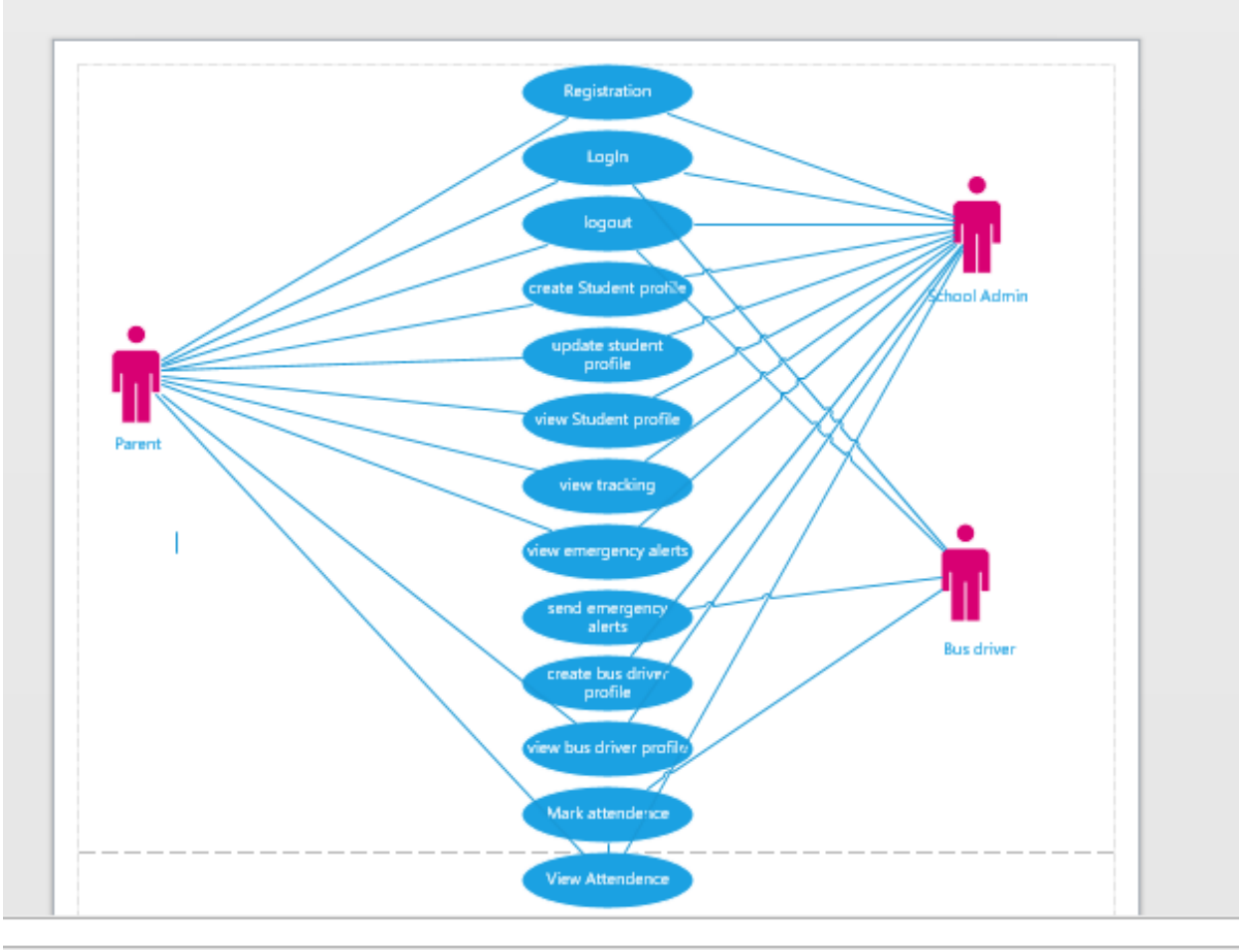
- Log-In Collaboration diagram:



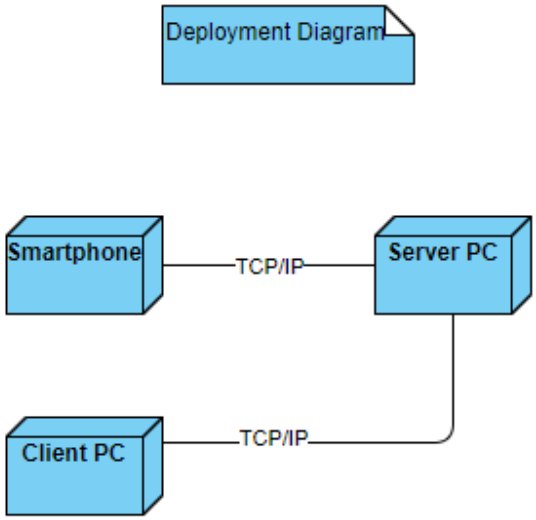
- Registration Collaboration diagram:



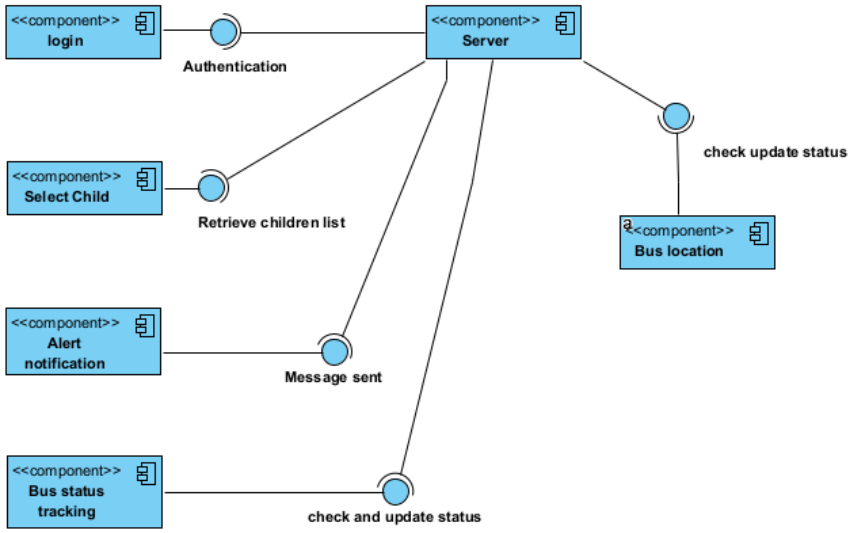
Use-case Diagram:



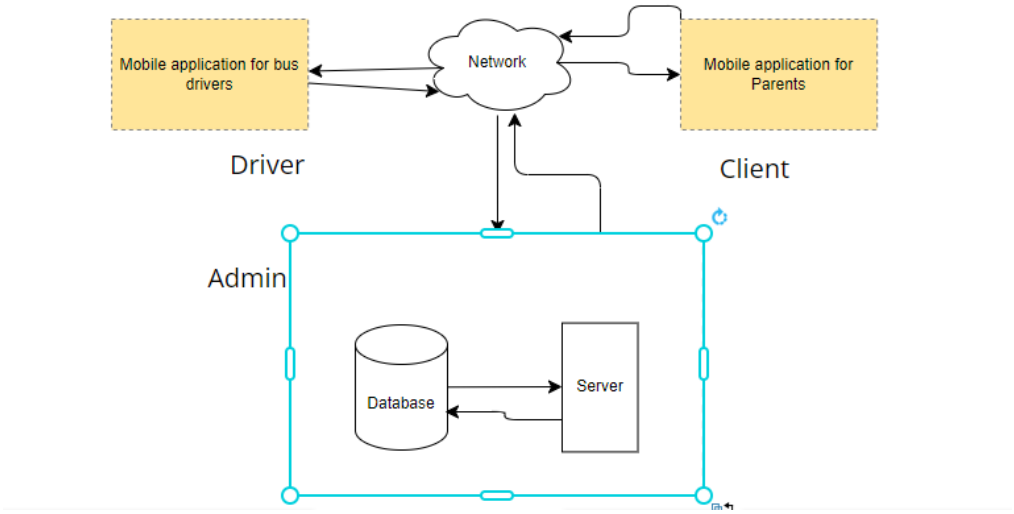
DEPLOYMENT DIAGRAM:



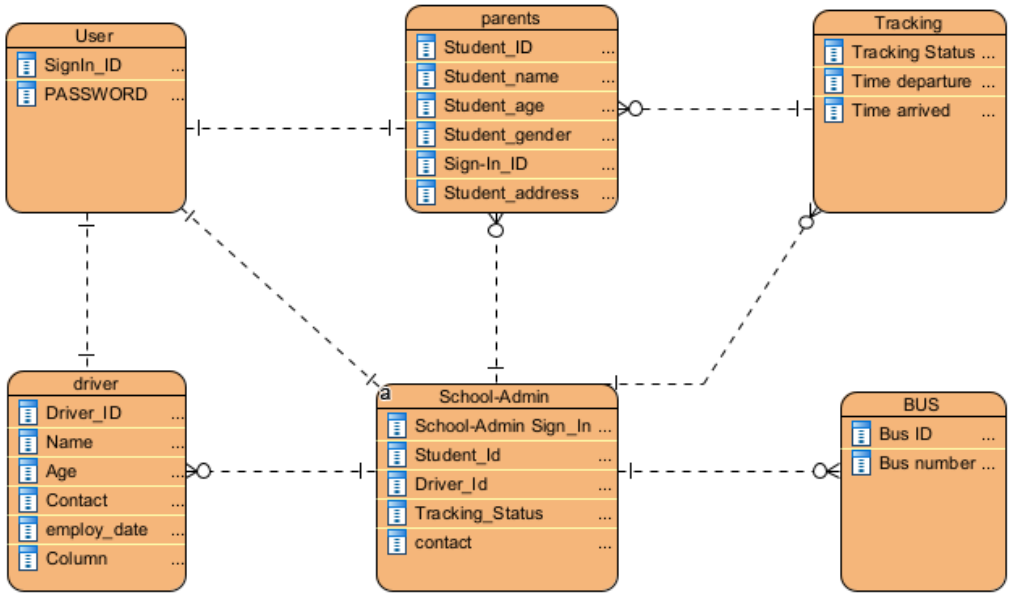
COMPONENT DIAGRAM:



System Block diagram:



Entity relationship diagram:



SOFTWARE TESTING DOCUMENT (STD)

GROUP MEMBERS:
SYED RAFAY HASAN (1812174)
SHEIKH MUHAMMAD ASAD (1812170)
DATE: 20TH June 2022

TRACKIFY

Software Testing Document (STD)

GSM MODULE:

Test Case ID	Test Case Name	Test Case Summary	Test Case Steps	Expected Result	Actual Result		Pass/Fail
1	GSM module	This test case is used to test the weather the GSM module is sending SMS.	1. Turn on the GSM module and connect with Arduino mega in which we have uploaded the code	The GSM module light will start blinking.	The GSM module light turn on and it is in working condition.		PASS
			2. Enter the SIM in the GSM module to send signals	The message will be send to the mobile number registered.	GSM module send signals via messages.		PASS

Arduino Mega

Test Case ID	Test Case Name	Test Case Summary	Test Case Steps	Expected Result	Actual Result	Pass/Fail
2	Arduino Mega	This test case is used to test whether the code is being uploaded in the Arduino	1. Connect the Arduino mega through a cable with the laptop.	The Arduino light will start blinking.	Arduino lights starts to blink and it is in working condition	PASS
			2. Upload the code in the Arduino mega and run it	The code will be successfully uploaded in the Arduino mega.	The code is successfully uploaded in the Arduino	PASS

GPS MODULE:

Test Case ID	Test Case Name	Test Case Summary	Test Case Steps	Expected Result	Actual Result	Pass/Fail
3	GPS module	This test case is used to test whether the GPS module is sending the current location.	1. Connect the GPS module with Arduino Mega and GSM module	The GPS module will turn on and its light will start to blink	The GPS light turn on it is in working condition	PASS
			2. Connect the GSM module with the antenna to catch satellite signals and send the current location.	With the help of the antenna the GPS module will send the location in terms of latitude and longitude	The latitude and longitude location are shown via SMS.	PASS

REGISTRATION TEST CASE

Test Case ID	Test Case Name	Test Case Summary	Test Case Steps	Expected Result	Actual Result	Pass/Fail
5	Registration	This test case is used to test the registration functionality.	1. Fill all the mandatory fields and click on register	Message displayed registration successful.	Registration successful and can login easily.	PASS
			2. Leave all the mandatory fields empty and click on to register.	Registration failure	Message displayed “fill all the mandatory fields”	PASS
			3. Fill all the fields and leave some fields empty.	Error message displayed.	Message displayed “Enter all the required fields”	Pass

LOGIN TEST CASE

Test Case ID	Test Case Name	Test Case Summary	Test Case Steps	Expected Result	Actual Result			Pass/Fail
4	Login	This test case is used to test the login functionality.	1. Enter correct ID and correct password.	Login successfully	Login successfully and main page is displayed			PASS
			2. Enter correct ID and Wrong password.	Login failure	Message displayed "Incorrect password"			PASS
			3. Enter wrong ID and correct password	Login failure	Message displayed "Enter correct ID"			Pass
			4. Enter wrong and wrong password	Login failure	Message displayed "Enter correct ID and correct password".			pass

TRACKING TEST CASE:

Test Case ID	Test Case Name	Test Case Summary	Test Case Steps	Expected Result	Actual Result	Pass/Fail
6	Tracking	This test case is used to test the functionality of the tracking feature.	1. Select student ID and the bus	The location of the bus will be shown.	The location of the bus is shown.	PASS
			2. Does not select anything and just click on tracking option	The location will not be shown.	The location cannot be shown as nothing is selected	PASS
			3. Click on any area on the list	Information of the location will be shown.	Information of the location is shown on the map.	Pass

NEW STUDENT ADMISSION TEST CASE:

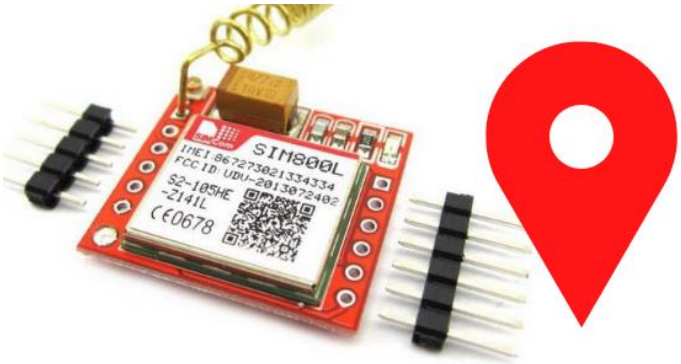
Test Case ID	Test Case Name	Test Case Summary	Test Case Steps	Expected Result	Actual Result	Pass/Fail
7	New student admission	This test case is used to test the new student admission page functionalities.	1. Fill all the fields to complete the form and press submit	Form submission should be successful.	Form is submitted and record is save in database	PASS
			2. Leave all the mandatory fields and press submit	Error message should be displayed.	Error message is displayed.	PASS
			3. Click on any area on the list	Information of the location will be shown.	Information of the location is shown on the map.	Pass

STUDENT ATTENDANCE NOTIFICATION:

Test Case ID	Test Case Name	Test Case Summary	Test Case Steps	Expected Result	Actual Result	Pass/Fail
8	Attendance notification	This test case is used to test the functionality of the attendance notification feature.	1. Select the desired student	The selected student attendance record is shown	The selected student attendance record is shown	PASS
			2. Does not select anything and just click on attendance option	Error message to select the student.	Error message is displayed to select the require student	PASS

HARDWARE MANUAL TRACKIFY

User guide Hardware Manual



Manufactured in Pakistan by Trackify

INTRODUCTION:

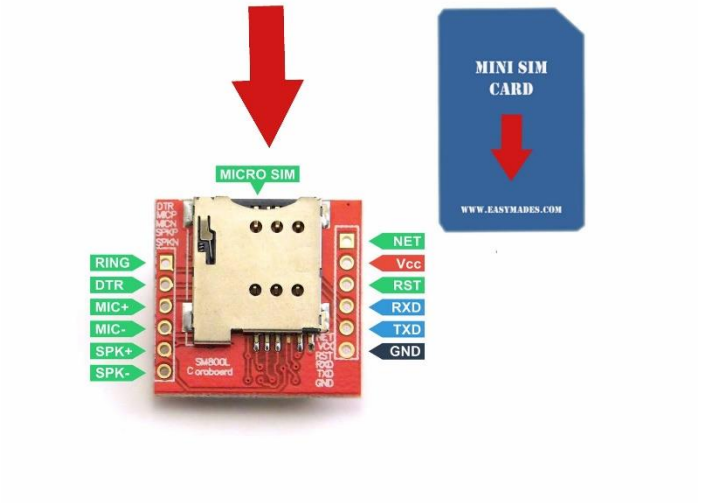
Welcome to the user equipment manual, a client guide for the equipment instruments. This manual gives a simple task by step interaction of how to utilize equipment instruments, a simple open-source stage utilized by any person.

KNOW YOUR DEVICE:

- Arduino Mega 2560
- GSM Module SIM800L
- GPS Module NEO7M
- Power supply 12-5 buck convertor

SIM CARD INSTALLATION:

- Power off the device
- Refer to the following picture for SIM card installation



GET STARTED WITH ARDUINO MEGA 2560:

- Connect your Arduino Mega 2560 with the computer
- Download or open the Arduino Software
- You can connect your Arduino Mega 2560 using the USB cable with your computer.
- Refer to the following picture to get started

OPERATING FREQUENCY OF ARDUINO MEGA 2560:

- Operating voltage 5v
- Microcontroller ATmega 2560
- Digital I/O pins 54
- Analog input units 16
- Flash memory 256 KB
- DC current per I/O pin 20mA
- SPRAM 8KB
- EEPROM 4KB
- LED BUILTIN 13
- Length 101.52 MM
- Width53.3 MM

ARDUINO LANGUAGE:

- C like Syntax
- Libraries can be written in C++
- Easy to re-use C-code from other projects

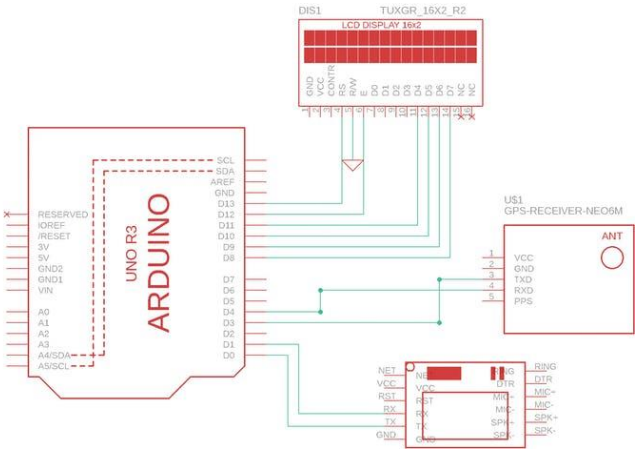
SAFETY INFORMATION:

To prevent injury to yourself and others or damage to your device, read the safety information about your device before using the device.

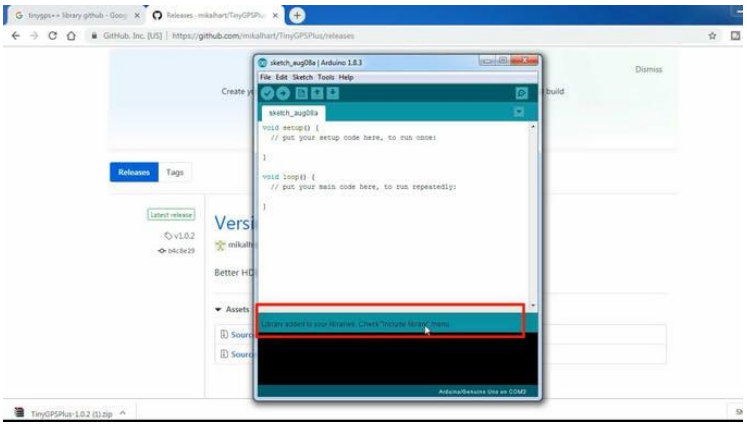
- Do not operate with wet hands.
- Do not bend your USB cable
- Do not drop your device

Protect the device from damage

CONNECT THE TX AND RX PIN OF THE GPS TO D3 AND D4:



ADD GPS LIBRARY:

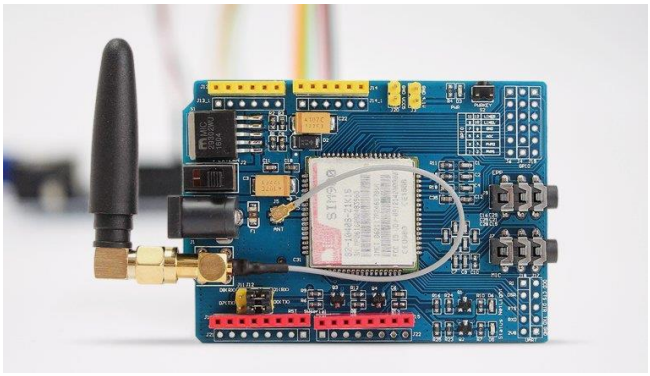


DOWNLOAD THE ARDUINO CODE:

TRACK VEHICLE TO THE SIM ON THE SIM MODULE:

- You have to turn on the hardware
- You have to check the blinking of the LED with the help of GSM module

YOU CAN RECEIVE THE RESPONSE SMS FROM GSM MODULE:



CLICK THE WEBLINK TO TRACK THE VEHICLE:

NOTICE:

- When turning on or turning off the unit by emergency operation switch, please press this switch with an insulating object other than metal.
- Do not step on the model as it may cause damage or personal injury.
- The unit must be installed according to the requirement provided by Trackify members

GSM:

- **GSM implies Global System For Mobile, it tends to be utilized to send and get a message.**
- **It can likewise go about as a GSM modem.**
- **It can have a PIN design**

Arduino Mega 2560 To GSM Board:

- Connect the RX pin of the GSM board to the 04 of the Arduino Mega 2560.
- Connect the TX pin of the GSM board to the 03 of the Arduino Mega 2560.
- Connect the 5V power supply to the Arduino Mega 2560.
- At last, connect the 12 DC voltage to the GSM board.

LED To Arduino Mega2560:

- Connect the positive pin is digital pin 11 in the Arduino Mega2560
- Connect the negative pin in the GND to the Arduino Mega 2560.

Neo 6m GPS module specifications:

- Configurable from 4800 Baud to 115200 Baud rates. (Default 9600).
- 5Hz position update rate.
- Operating temperature range: -40 TO 85°CUART TTL socket
- EEPROM to save configuration settings
- Rechargeable battery for Backup
- The cold start time of 38 s and Hot start time of 1 s
- Supply voltage: 3.3 V

Neo-6M GPS Module:

The NEO-6M GPS module is displayed in the figure beneath. It accompanies an outer radio wire and doesn't accompany header pins. So you should weld it.

The core of the module is a NEO-6M GPS chip from u-blox. It can follow up to 22 satellites on 50 stations and accomplishes the business' most significant level of responsiveness. Probably the best element the chip gives is Power Save Mode (PSM). It permits a decrease in framework power utilization by specifically turning portions of the beneficiary ON and OFF.

Position Fix LED Indicator:

There is a LED on the NEO-6M GPS Module which shows the situation with Position Fix. It'll flicker at different rates relying upon what express it's in

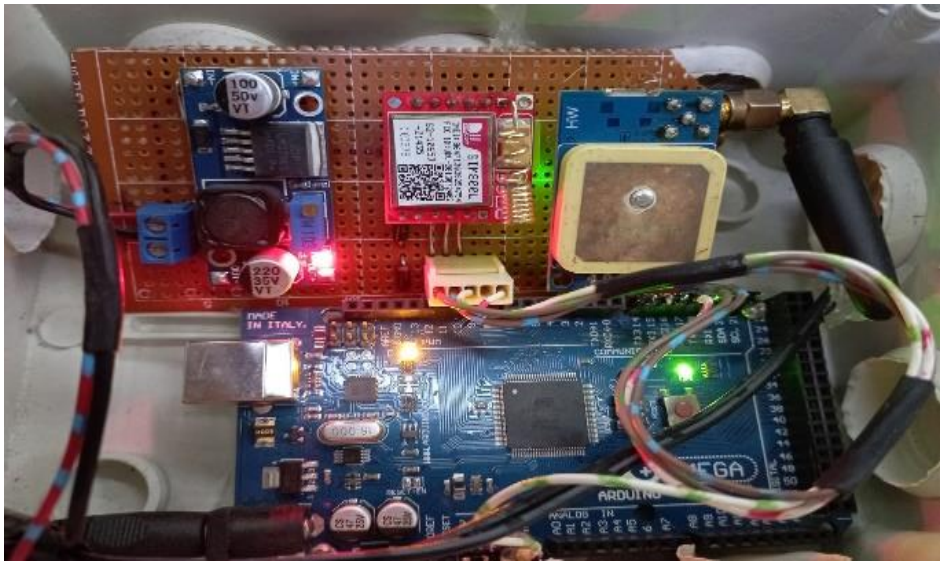
No Blinking ==> implies It is looking for satellites

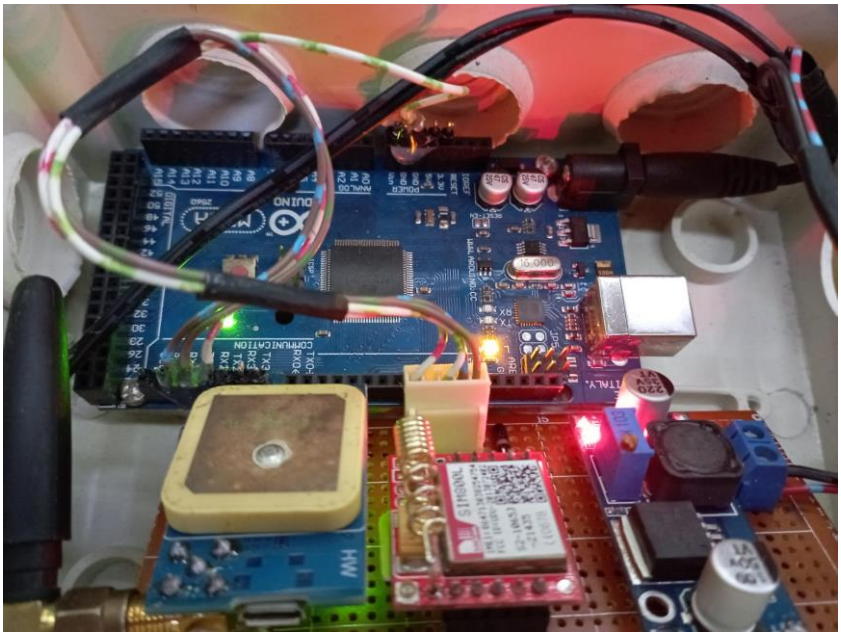
Blink each is - implies Position Fix is found

Pinout:

- GND is the Ground Pin and needs to be connected to GND pin on the Arduino.
- TxD (Transmitter) pin is used for serial communication.
- RxD (Receiver) pin is used for serial communication.
- VCC supplies power for the module. You can directly connect it to the 5V pin on the Arduino

TRACKIFY HARDWARE COMPONENTS:





These are the inside hardware components that we have used to make our tracking device. The components include:

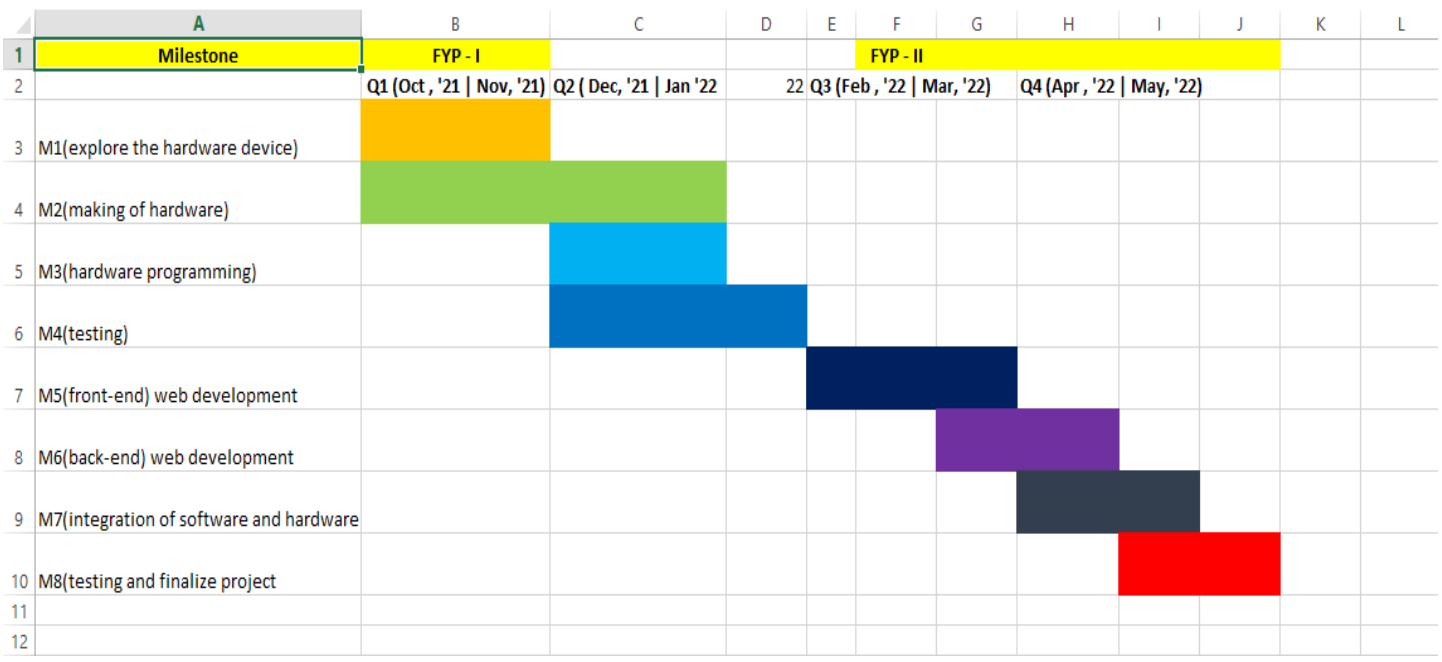
- Arduino Mega
- GSM Module SIM 800L
- GPS Module NEO 6M
- Buck convertor

Iteration Plan:

Iteration plan

S.No.	Features	FYP-I Iterations				FYP-II Iterations			
		Monthly Iteration-I	**Monthly Iteration-II**	**Monthly Iteration-**	**Monthly Iteration-IV**	**Monthly Iteration-I**	**Monthly Iteration-II**	**Monthly Iteratio**	**Monthly Iteration-IV**
1	proposal	meet supervisor (discussion)							
		creatin proposal document							
		defense							
2	Use cases		discussion						
			creating Use case(100%)						
3	SRS/SDS		Requirements						
			creating SRS document(100%)						
			SDS(sequence diagram 100%,						
			use case Diagram,						
4	Test cases		Requirments						
			Design(30%)						
5	remaining documentatio			SRS 100% revise					
				SDS 100%	whole doc revise				
				test cases 100%					
				use cases 100% revise					
6	Hardware		hardware coding						
			integration of arduino with GSM SIM 800L						
			sending GSM signals of location						
6	Hardware				GPS coding				
					integration of arduino with GSM and GPS				
					Receiving current location status				
7	Web App					Web Front End			
							Web Back End		
8	Documentation Revisio								
							Revising and Finalizing Document		
9	Testing							Testing	

Gantt chart:



Project meeting Log sheet

Title: **TRACKIFY**

Supervisor: Sir Adeel Karim Batch/Sec: 8B

Reg. # : Syed Rafay Hasan (1812174), Sheikh Muhammad Asad (1812170)

Sr.	Task Assigned	Due	Task Completed (S)	Date (S)/Sign.
1	Completed changes in Hardware	21/2/22	Completed	
2	Meeting with supervisor after FYP-1	1/3/22	Completed	
3	Working on Front-end	22/3/22	Completed	
4	Continuation of Front-End	1/4/22	Completed	
5	Working on Back-end	10/4/22	Completed	
6	Testing and Documentation	10/5/22	Completed	
7	Changes in Front-End	17/5/22	Completed	
8	Changes in Back-End	24/5/22	Completed	

9	Connection with database	27/5/22	Completed	
10	Google Maps	31/5/22	Completed	
11	Integration of maps	2/6/22	Completed	
12	Working on Arduino	7/6/22	Completed	
13	Completion of hardware	9/6/22	Completed	
14	Completion of web App	14/6/22	Completed	
15	Testing and Documentation Final	17/6/22	Completed	

Supervisor's Authentication (Completed report): _____

Dated:_____ FYP Coordinator

Authentication:_____ Dated:_____

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