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An Undergraduate Internship on UShuttle

Akhi, Shayla Sharmin

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An Undergraduate Internship on UShuttle

By

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Autumn, 2022

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Independent University, Bangladesh

February 1, 2023

Dissertation submitted in partial fulfillment for the degree of Bachelor of Science in Computer Science

Department of Computer Science & Engineering

Independent University, Bangladesh

Attestation

I Shayla Sharmin Akhi bearing ID-1631127 declare that I am the sole author of this study, with the assistance of my esteemed faculty member Md. Asif Bin Khaled. I have completed and submitted this paper to Independent University, Bangladesh, in order to partially fulfill the criteria for the Degree in Computer Science and Engineering (IUB).

All of the material presented here is the result of my work at "Excellent Soft" and research from other blogs, research papers, and other sources that are cited in the report.

Shaylaa

Signature

02.02.2023

Date

Shayla Sharmin Akhi

Name

Acknowledgement

Thank you to all who supported me during the course. I appreciate their counsel, criticism, and guidance. I am grateful for their insights on course-related issues. My sincere gratitude to Independent University, Bangladesh (IUB) for their guidance and information. Thank you to my supervisor, Mr. Faruq Muttakin, for direction and encouragement. I appreciate the developers and staff of Excellent Soft for the internship and their time, attention, and guidance.

Letter of Transmittal

Date: February 1, 2023
Md. Asif Bin Khaled
School of Computer Science and Engineering
Independent University Bangladesh.
Subject: Submission of Internship Report.

Dear Sir,
I wish to express to him my sincere gratitude. I owe a great deal to Independent University, Bangladesh (IUB) for their guidance and constant oversight in providing crucial information on the course.

I spent three months working at Excellent Soft as part of my internship, where I not only received practical job experience but also came to understand the department's procedures and many elements. This report offers a thorough analysis of the office's operations and the department's capabilities. I completed every project I worked on during my internship periods, paying particular attention to their requirements, features, and technical specifications, as a record of my work during those times..

I hope and pray that this report will live up to your expectations and be pretty interesting. I did my best to prevent any errors, and I hope that my report will meet your needs. I also want to express my gratitude for allowing me the chance to submit my report once more..

Sincerely,
Shayla Sharmin Akhi
ID- 1631127

Evaluation Committee

30-01-22

Signature

Md. Mahmudul Kabir Payel

Name

Internal Examiner-1 / Panel Member-1

Signature

Mahmudul Islam

Name

External Examiner-2 / Panel Member-2

Signature

Asif Bin Khaled

Name

Supervisor of the intern

Signature

Name Mahady Hasan

Head, Department of Computer Science & Engineering

Abstract

UShuttle is a shuttle bus service designed for Bangladeshi students with the goal of providing reliable transportation while reducing traffic congestion and promoting eco-friendly transportation. The app combines the capabilities of real-time bus tracking, digital ticket purchasing, and more. The app, built using Flutter, allows users to view announcements, purchase tickets, track bus locations in real-time, and access the timetable. The database, created with Firebase, holds user information, ticket details, and other data, while the back end, developed with Node.js, handles data processing and ticket validation. The UShuttle project has received positive feedback from its users and stakeholders, demonstrating its success in meeting their transportation needs. The team looks forward to the continued growth and development of UShuttle, as it has the potential to have a significant impact on the community.

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Chapter 1

Introduction

1.1 Overview of the Work

A transportation service for students that was created to satisfy the rising need for quick and easy transit is the Ushuttle app. The software makes student transit more convenient and streamlined by utilizing features like live bus tracking, a virtual ticketing system for rides, and Firebase authentication for secure user access.

The live bus tracking function of the Ushuttle app is one of its standout features; it allows users to keep track of the whereabouts of their bus in real-time and plan their trips appropriately to minimize delays. Users no longer need to carry physical cards in order to ride shuttle buses thanks to the app's virtual card usage functionality.

The safety of its users is further ensured by the app's inclusion of a variety of emergency resources, including emergency numbers, police stations, hospitals, and pharmacies. The app serves as a useful tool for ensuring the wellbeing of kids because these materials are conveniently available through it..

The report will offer a thorough analysis of the Ushuttle app's design and development process, including any difficulties encountered and the measures taken to resolve them. It will also give a thorough evaluation of the app's functionality and user comments, emphasizing how the Ushuttle app has affected students' need for transportation.

The Ushuttle app, which offers students a practical, effective, and secure form of transportation, marks an important improvement in the field of transportation overall. The study will provide a comprehensive analysis of the app and how it affects students' transportation requirements.

1.2 Objectives

This project's goal is to create and develop the Ushuttle app, a student transportation option. Students will have access to a practical and effective form of transportation thanks to the app's use of a variety of technologies and features, including real-time bus tracking, virtual card usage, and emergency resources. The project seeks to provide for students' transportation requirements in a more organized and user-friendly manner. Additionally, user testing and usage data analysis will be part of the project to assess the app's effectiveness and collect input for any modifications that may be required. The project's ultimate goal is to release a productive and fully functional Ushuttle app to accommodate students' transportation requirements.

1.3 Scopes

Despite the prevalence of ride-sharing services like Uber, none of them, including Pathao, address the same issue. We therefore have the chance to make the software accessible worldwide in the future. It will be possible to provide this service in a variety of locations, including offices, schools, and universities, with sufficient money and support. For greater reach, the automation system might be used throughout the city. The scopes of this project include:

Design and development: The project's scope covers the design and development of the Ushuttle app, as well as the integration of technologies, features, and capabilities such real-time bus tracking, use of virtual cards, and access to emergency assistance.

User testing and feedback are included in the project to collect opinions and assess the functionality and usability of the app. Before the app launches, this will be utilized to make any necessary adjustments.

The project's scope also include the integration of the app with external systems, such as Firebase authentication, real-time bus tracking, emergency resources, and virtual card usage.

Implementation and deployment: The project's scope covers both the deployment of the finished product for usage by students as well as the implementation of the app, including testing and debugging.

Maintenance and support: The project's scope also covers the app's ongoing maintenance and support, such as bug fixes, software updates, and support for troubleshooting.

The project's overall goal is to offer students a complete mobility option that is practical, effective, and secure. The design, development, testing, deployment, and maintenance of the Ushuttle app are all included in the project's scope.

Chapter 2

Literature Review

2.1 Relationship with Undergraduate Studies

All of the knowledge and abilities I've gained while studying computer science and engineering have culminated in this project. I was able to create this mobile application with the assistance of my prior work on numerous projects. CSE213 was one of the most significant classes I took because it was where I first learned about object-oriented programming. I still apply the skills I learned in this course on a daily basis. It served as the cornerstone of my journey toward developing applications properly. CSE303, a course that concentrated on database management, was another crucial course. In addition to giving me a solid understanding of databases, including the E-R model, normalization, data security, and optimizations, this course gave me insights into how an application functions internally. Lastly, CSE309, served as the foundation for the construction of my full-stack application.

2.2 Related works

The transportation service in Bangladesh has evolved over time, starting from the traditional, unreliable neighborhood shuttle services to the recent addition of ride-sharing services such as Uber and Pathao. However, these services are for single rides and can be expensive compared to public transportation. Recognizing the need for an affordable, frequent transportation solution for the working class and students, a company called "Shuttle" was established. Despite offering pre-booked rides, the service faced problems with customers being unaware of arrival times and having to wait for long periods. This prompted the creation of "Ushuttle," which offers better value and dependability with features such as real-time bus tracking, digital ticket purchasing, and 15 or 30-day packages. With Ushuttle, customers can easily plan their daily commutes and have a convenient, hassle-free transportation experience. [1]

Chapter 3

Management & Financing

3.1 Work Breakdown Structure

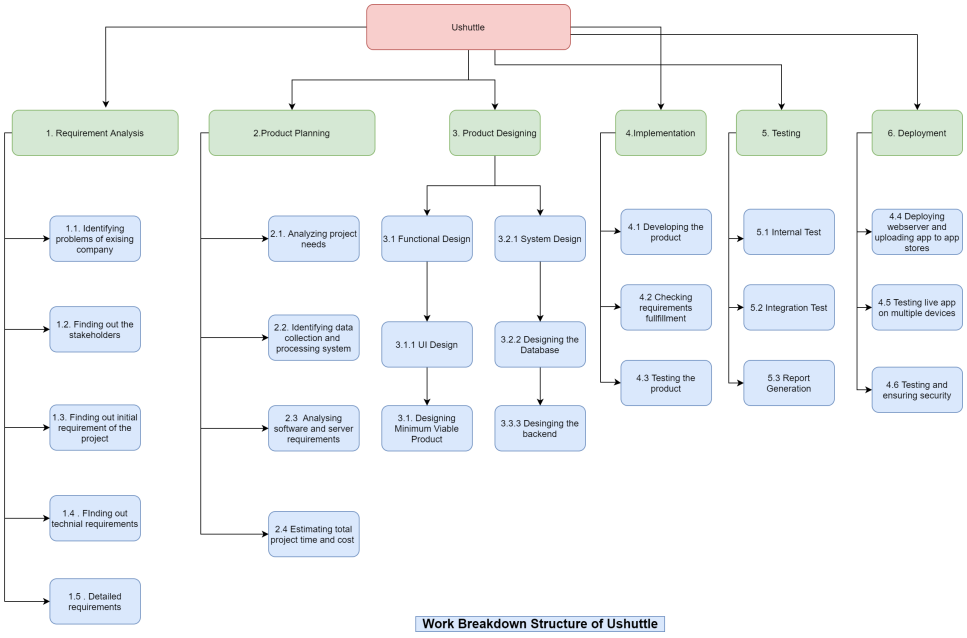


Figure 3.1: WBS

3.1.1 Activity wise Time Distribution

ID	Name	Start Date	End Date	Duration	Dependency
1	Proposal	Oct 17, 2022	Oct 25, 2022	7 days	
2	Acceptance	Oct 26, 2022	Nov 01, 2022	5 days	1FS
3	Collecting Requirements	Nov 02, 2022	Nov 08, 2022	5 days	2FS
4	Project Planning	Nov 09, 2022	Nov 15, 2022	5 days	3FS
5	Ui Ux design	Nov 17, 2022	Nov 18, 2022	2 days	4FS+1 day,3FS
6	Adding live Map	Nov 21, 2022	Dec 08, 2022	14 days	5FS
7	Adding Server	Dec 09, 2022	Dec 12, 2022	2 days	6FS
8	Designing Database	Nov 09, 2022	Nov 15, 2022	5 days	3FS
9	Adding Database	Nov 16, 2022	Nov 17, 2022	2 days	4FS,8FS
10	Server Intregration	Dec 13, 2022	Dec 19, 2022	5 days	9FS,7FS
11	Testing	Dec 20, 2022	Dec 26, 2022	5 days	9FS,10FS,6FS,5FS
12	Fixing Bugs	Dec 27, 2022	Jan 02, 2023	5 days	11FS
13	Re Testing	Jan 03, 2023	Jan 04, 2023	2 days	12FS
14	Final testing and fixing	Jan 05, 2023	Jan 18, 2023	10 days	13FS
15	Deployment	Jan 19, 2023	Jan 25, 2023	5 days	14FS

Figure 3.2: Activity wise Time Distribution

3.2 Gantt Chart

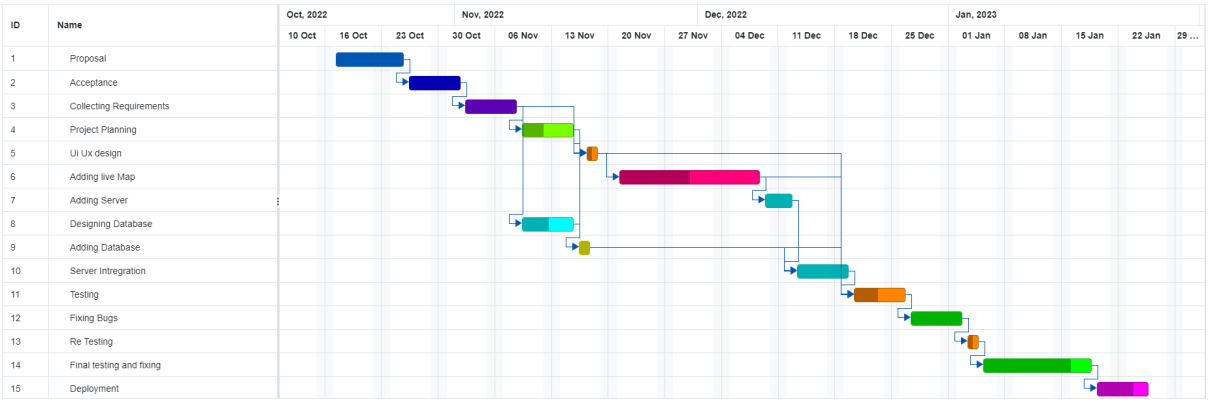


Figure 3.3: Gantt Chart for ushuttle

The first Gantt chart for the UShuttle timeline is shown below. For ease of use, the responsibilities are delegated to indexes in this case. In the chart, time is shown as green bars. And indexes are used to identify the tasks.

Table 3.1: Estimated Costing

Project Name : Ushuttle

Technology used : Flutter , Firebase , Node.js , Android , IOS,Open Street Map

Item/ Technology	Cost Tk
Map Api (Free tier)	zero
Domain (Free service)	zero
Hosting (Free Service)	zero
Flutter	zero
Firebase (Free tier)	zero
Android (Own Device)	zero
Total	00.00

Here is a rough estimate of how much our app will cost overall. To store data and carry out backend functions like serving live locations, we require a domain and server. To sign and submit our app to the Google Play Store, we need money.

Chapter 4

Methodology

The "UShuttle" project was developed using an agile development process. We were able to create and launch the "UShuttle" service using this method, and we were also able to quickly and iteratively adjust to shifting requirements and priorities. The Ushuttle app might have been developed using a variety of various software development approaches, including Waterfall, V-Model, and Spiral.



Figure 4.1: Caption for the image

Since Agile (Extreme Programming) is an effective and adaptable way for developing software that puts a priority on customer happiness and the prompt delivery of functional features, we decided to apply it when creating the Ushuttle app. Agile encourages active communication between development teams, stakeholders, and customers, which

was essential for our project because we were creating a shuttle bus service that would be available on a subscription basis and necessitated close communication with our customers.

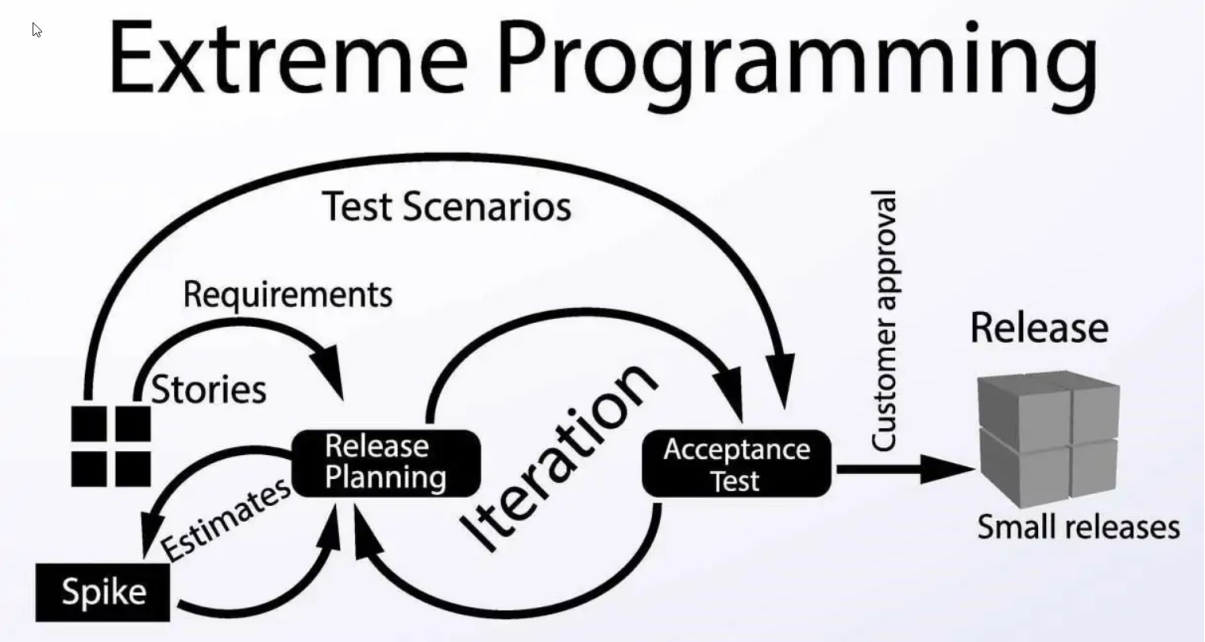


Figure 4.2: Caption for the image

We were able to divide the development process into digestible portions using Agile approaches, such as Extreme Programming, and provide functional app features rapidly. We were able to build a high-quality, user-friendly Android app using Flutter thanks to this strategy, which also let us discover and address any difficulties early in the development process. The Ushuttle app was developed using the Agile methodology, which turned out to be a great decision because it allowed us to provide our clients and end users with a useful, responsive, and user-friendly software.

Chapter 5

Body of the Project

5.1 Work Description

A shuttle bus service called "UShuttle" was created especially for Bangladeshi students. Its main objective is to give students a dependable and practical transportation choice while also addressing problems like the unreliability of public transit and the lengthy commutes that many students must endure. In order to do this, the "UShuttle" service provides a number of practical features, like real-time bus tracking and digital ticketing. Students can view the real-time location of their bus and receive an exact arrival time estimate thanks to the live bus tracking tool. This is a great benefit because it removes the need to hang out at the bus stop and wait for the bus without knowing when it will arrive. Students no longer need to carry real tickets or cash thanks to the digital ticket buying function, which also makes it simple to buy and access tickets using smartphones. The "UShuttle" project's overall goal is to make it simpler for students to go to and from school or university by offering a more practical and effective mode of transportation. The "UShuttle" service's design and execution, as well as an assessment of the service's user experience and effect so far, will all be covered in detail in this report. Understanding the "UShuttle" project's advantages and disadvantages will help us find opportunities to develop and broaden the service in the future, thereby helping more Bangladeshi students.

5.2 Requirement Analysis

5.2.1 Rich Picture

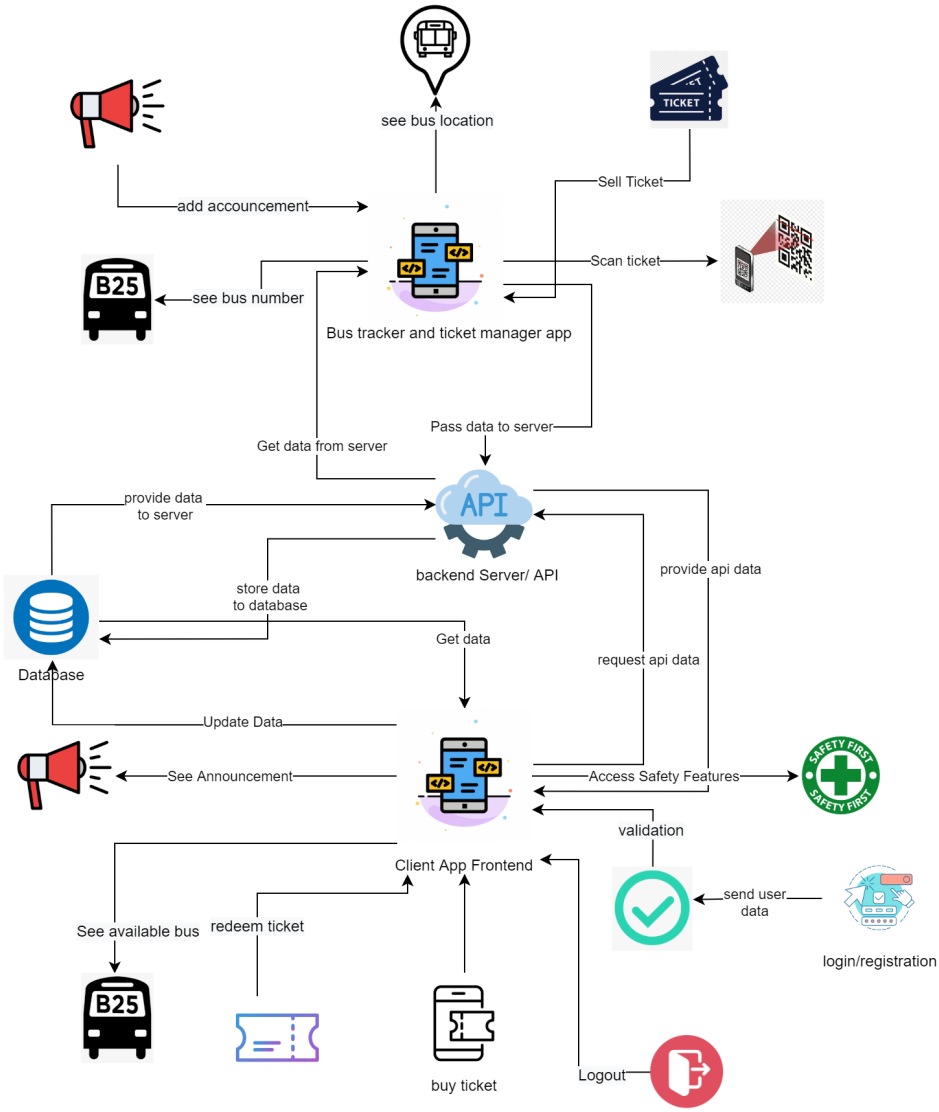


Figure 5.1: Rich Picture

5.2.2 Functional and Non-Functional Requirements

Functional Requirements:

- The "UShuttle" service must provide users with a mobile application that allows real-time tracking of the shuttle bus location.
- Digital payment methods must be made available through the service for users to pay for rides

- The service must prioritize the safety and security of passengers, including measures such as background checks for drivers and regular vehicle maintenance.
- In order to optimize pick-up and drop-off locations, the service must collaborate with educational institutions to establish efficient shuttle bus routes and schedules.

Non-Functional Requirements:

- The "UShuttle" service needs to be dependable, with little downtime and a high uptime.
- As the service expands, it must be scalable and able to manage a rising number of customers and routes.
- The service must have an easy-to-use interface with straightforward directions and simple navigation.
- To safeguard user data and prevent illegal access, the service must have robust security mechanisms in place.
- The service must be usable and supported by a variety of web browsers and devices. [2]

5.3 System Analysis

5.3.1 Six Element Analysis

Process	System Roles					
	Human	Non-Computing Hardware	Computing hardware	Software	Database	Network and communication
Login/registration	Admin and user can register and login	N/A	Android or iOS smartphone	Vs Code, android studio, node.js, XCode	Firebase	Internet
Live bus tracking	Admin and user can see live update	N/A	Android or iOS smartphone	Vs Code, android studio, node.js, XCode	Firebase	Internet and GPS
Purchase ticket	Users can purchase ticket	N/A	Android or iOS smartphone	Vs Code, android studio, node.js, XCode	Firebase	Internet
Use ticket	Users can use available tickets	N/A	Android or iOS smartphone	Vs Code, android studio, node.js, XCode	Firebase	Internet
Sell ticket	Bus manager can sell ticket	N/A	Android or iOS smartphone	Vs Code, android studio, node.js, XCode	Firebase	Internet
Scan ticket	Bus manager can scan passenger's ticket	N/A	Android or iOS smartphone	Vs Code, android studio, node.js, XCode	Firebase	Internet
Add Announcement	Bus manager can add important announcement	N/A	Android or iOS smartphone	Vs Code, android studio, node.js, XCode	Firebase	Internet
See bus stoppages	Users can see available bus stoppages	N/A	Android or iOS smartphone	Vs Code, android studio, node.js, XCode	Firebase	Internet
See bus fares	Users can see available bus fares	N/A	Android or iOS smartphone	Vs Code, android studio, node.js, XCode	Firebase	Internet
See bus Schedules	Users can see available bus Schedules	N/A	Android or iOS smartphone	Vs Code, android studio, node.js, XCode	Firebase	Internet

Figure 5.2: Six element analysis

5.3.2 Feasibility Analysis

Technical Feasibility:

The technical feasibility of the "UShuttle" service is confirmed through the widespread use and successful implementation of GPS tracking and digital payment systems in other transportation services. The team has the necessary expertise and resources to design and implement the service, including integration of GPS tracking and payment features.

Financial Feasibility:

In terms of financial feasibility, the launch of the "UShuttle" service incurs significant upfront costs for the implementation of GPS tracking and payment systems, as well as the acquisition of shuttle buses. However, the revenue generated from ticket sales is expected to cover these expenses over time.
Since the "UShuttle" service meets a need for safe and practical transportation for students, demand for it is anticipated to be considerable. This means that the firm might be able to bring in enough money to cover its expenses and perhaps even turn a profit.

Operational Feasibility:

The "UShuttle" service necessitates the coordination of pick-up and drop-off schedules as well as the administration of a bus fleet. However, the group is equipped with the skills and tools needed to efficiently run the service.
Since the "UShuttle" service meets a need for safe and practical transportation for students, demand for it is anticipated to be considerable. This implies that the service may be in great demand and could be profitable in the long run.
Overall, it seems that the "UShuttle" project is doable from a technological, economical, and operational standpoint. The "UShuttle" initiative has the potential to be a profitable and sustainable transportation choice for students in Bangladesh if it has the required knowledge and resources, as well as significant demand for the service.

5.3.3 Problem Solution Analysis

Bangladesh's students face a problem with a lack of dependable public transportation choices. Solution: The "UShuttle" project uses a fleet of shuttle buses and real-time bus tracking to give students a dependable and practical transit choice. Students' lengthy commutes are a problem. Solution: By giving students a direct transit alternative that can avoid traffic and make many stops along a predetermined route, the "UShuttle" service can assist in shortening their commuting times. Problem: Fears about taking public transit safely. Solution: By giving kids a safe and controlled commuting environment, the "UShuttle" service can assist in addressing safety concerns. By enabling real-time tracking and contactless payment alternatives, the usage of GPS tracking and digital payment systems can also contribute to improving safety. The "UShuttle" project's overall goal is to use cutting-edge technologies and an emphasis on safety to solve the dearth of dependable and practical transportation options for students in Bangladesh. The team

can identify and handle any problems that might occur throughout the development and implementation of the project by performing a problem-solution analysis.

5.3.4 Effect and Constraints Analysis

Effects:

- Positive outcomes: The "UShuttle" project could result in a number of favorable outcomes, including:
  - supplying students with a dependable, practical means of transportation that can speed up commutes and improve security
  - Generating ticket sales.
  - enhancing Bangladesh's overall transportation system for pupils.
- The "UShuttle" project might also have some negative repercussions. such as:
  - Due to the shuttle buses' shared routes with other vehicles, there will be more traffic and congestion on the roads.
  - If the shuttle buses are not fuel-efficient, there could be negative environmental effects like air pollution.
  - Potential danger to one's finances if the service is unsuccessful or does not bring in enough money to cover costs.

Constraints:

- Technical constraints:
  - GPS tracking and electronic payment system accessibility and costs.
  - the necessity of using certain equipment, such shuttle vehicles, to provide the service.
  - the requirement for a knowledgeable group of engineers and specialists in transportation to plan and create the service.
- Financial constraints:
  - The price of buying shuttle buses and creating GPS monitoring and payment systems, which are part of the initial costs of launching the service.
  - the continuing expenses involved in running the service, including fuel and maintenance charges.
  - the possibility for ticket sales to generate income.

- Operational constraints:
  - the requirement for collaboration with educational institutions to choose the shuttle buses' most effective routes and schedules.
  - the administrative aspects of running a fleet of shuttle buses, such as scheduling, employing drivers, and performing maintenance.
  - regulatory restrictions that might apply, including the conditions for running a transportation service.

5.4 System Design

5.4.1 UML Diagrams



Figure 5.3: Use Case Diagram
[3]

5.4.2 Architecture

The Ushuttle app was created utilizing a multi-tier architecture, which divides the application's many parts into discrete levels. The front-end of the application, or Presentation Tier, includes the user interface, forms, and controls and engages in user interaction. The business rules, logic, and processes that direct the application are found in the application tier, also referred to as the business logic tier. In order to carry out particular functionality, it interacts with the display and data levels. The Data Tier, which contains the database, data access objects, and any additional data storage and retrieval mechanisms, is in charge of storing and retrieving data. Better flexibility, scalability, easier testing, and easier maintenance are all made possible by this method. Additionally, it enables greater performance since different levels can be tuned for various uses and better security because different layers can be guarded in various ways. This multi-tier architecture was used to ensure that the Ushuttle app is simple to use, effective, and offers users a smooth experience. [4]

5.5 Implementation

A cross-platform mobile app we created called "UShuttle" was created with Flutter. For the backend, we combined Firebase, Node.js, and Flutter. Two of the many indigenous components that have been used are the GPS and camera modules. To ensure that the mobile application and backend system were created, tested, and deployed in an efficient and effective manner, the "UShuttle" project's implementation phase was split into many stages.

The final designs for the backend system and mobile app came first. Complex UML diagrams had to be created, the mobile app had to be coded using the Flutter framework, and the backend needed to be coded using the Node.js platform. The system's design was based on the project's requirements and constraints as well as the team's goals and objectives.

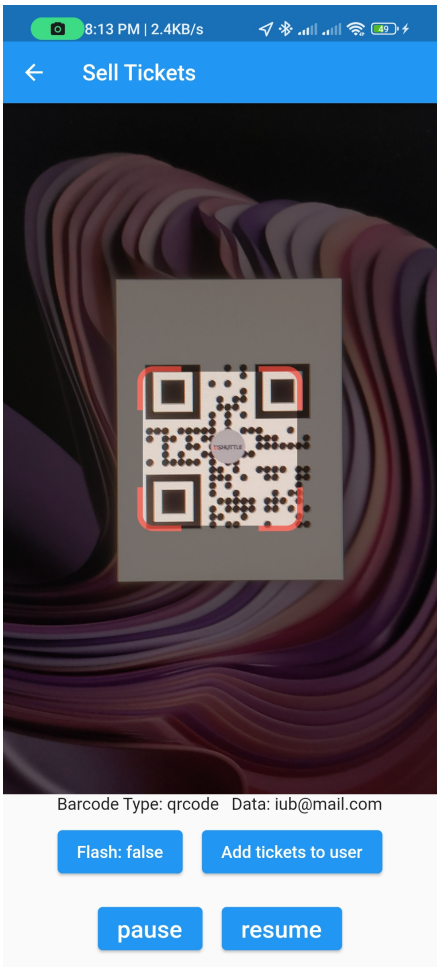
Following the design, the backend system and mobile app were developed. To do this, it was necessary to write code, set up servers, integrate the Firebase database, and utilize any necessary third-party systems or services. To ensure the system's scalability, adaptability, and security as well as the implementation of all required features, the development process was strictly managed. After being developed, the backend system and mobile app underwent extensive testing to guarantee that they were reliable and met the requirements of the project. Before the system was put into production, unit testing, integration testing, and acceptability testing were done in order to identify and fix any issues.

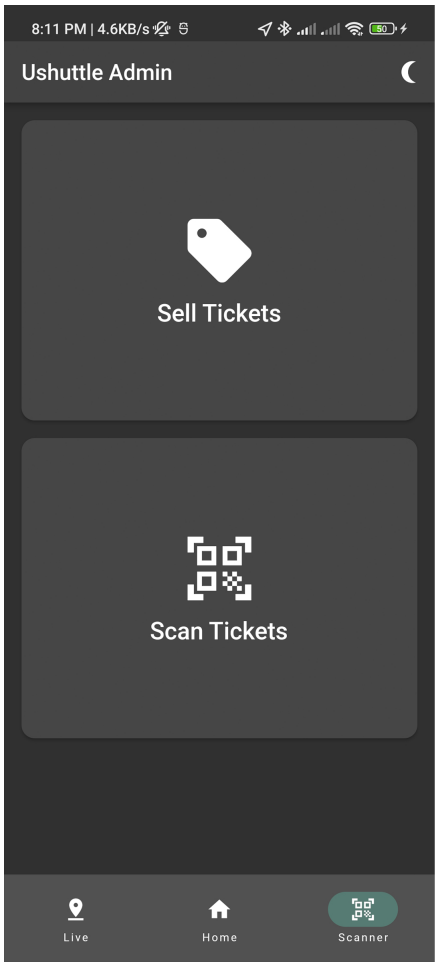
The backend system and mobile application were put into a production environment after being examined and given the all-clear. In order to do this, the system had to be installed on servers, any necessary infrastructure had to be created, and any third-party systems or services had to be configured.

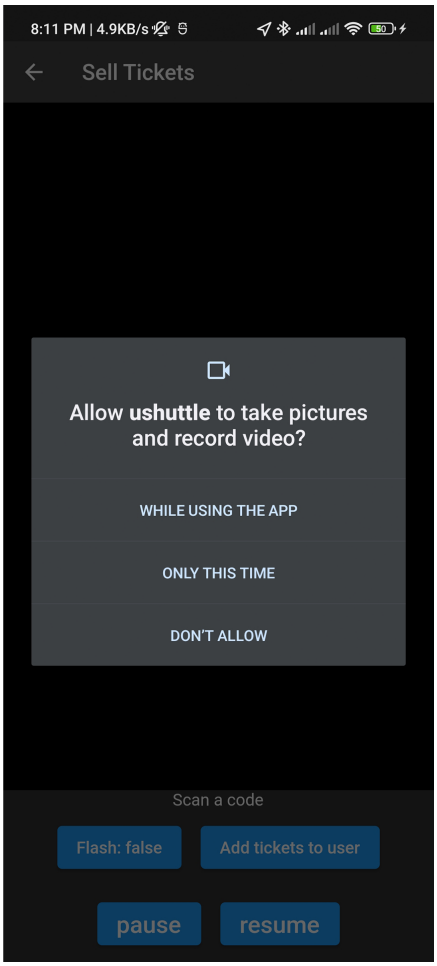
To make sure they could satisfy the needs of consumers and stakeholders, the mobile app and backend system were carefully watched over and maintained. This required checking the system logs, correcting errors, and updating the system as necessary.

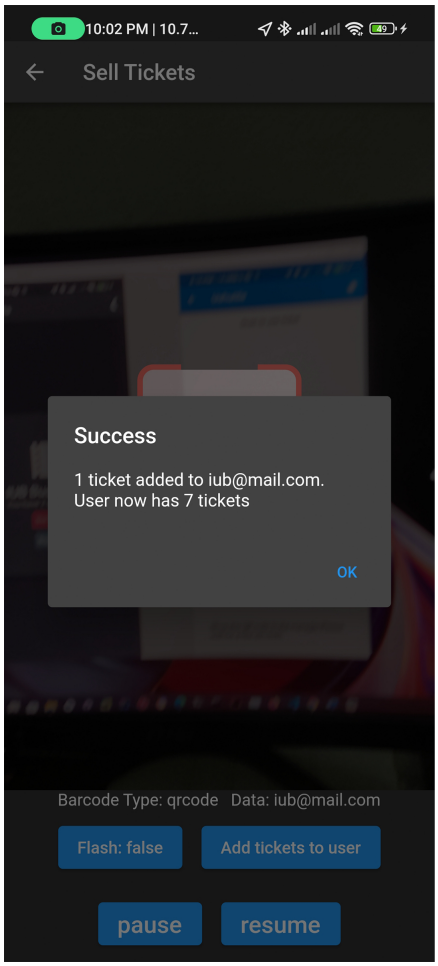
The "UShuttle" project was successfully implemented overall, resulting in the development of a mobile application and backend system that satiated users' and stakeholders' needs while assuring the project's long-term sustainability.

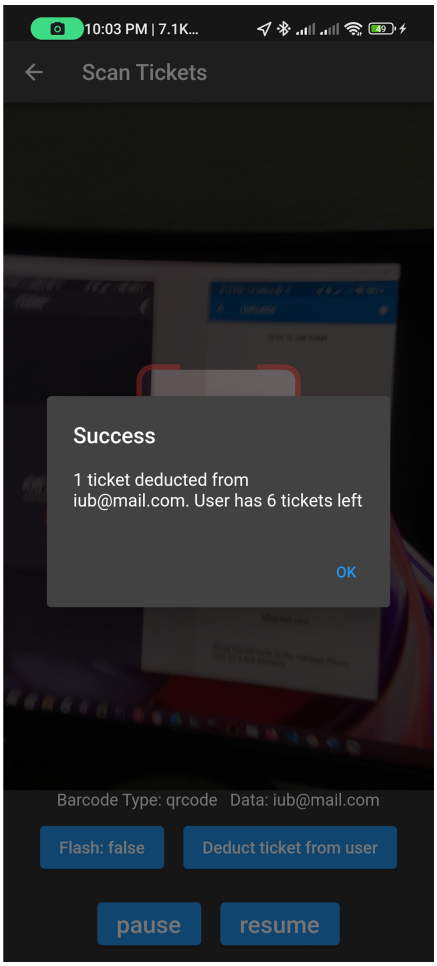
5.6 Testing


8:13 PM | 2.4KB/s
Sell Tickets
Barcode Type: qrcode Data: iub@mail.com
Flash: false
Add tickets to user
pause
resume


8:11 PM | 4.6KB/s
Ushuttle Admin
Sell Tickets
Scan Tickets
Live
Home
Scanner


8:11 PM | 4.9KB/s
Sell Tickets
Allow ushuttle to take pictures and record video?
WHILE USING THE APP
ONLY THIS TIME
DON'T ALLOW
Scan a code
Flash: false
Add tickets to user
pause
resume





Input

Designing Test Cases

We created a collection of test cases as part of the planning and execution of the "UShuttle" project to make sure that the system's many features and functionalities were operating as intended. These test cases tested the system's many components and covered a variety of scenarios to make sure it was dependable and efficient.

In order to confirm that customers could buy tickets and use them to board shuttle buses, we also evaluated the functioning of ticket purchase and use. To make sure the system was handling these situations correctly, we evaluated many scenarios, including various ticket types and payment methods. In order to confirm that users could read and receive announcements from the system, we also tested the announcement feature. To ensure the system was working properly, we evaluated a variety of scenarios, including various announcement types and notification settings.

An essential stage in confirming the excellence and durability of the "UShuttle" system was designing and executing these test cases. By testing a variety of scenarios and taking into account all the crucial functions and features of the system, we were able to ensure that the "UShuttle" project could satisfy the demands of our users and stakeholders.

Output

5.6.1 Test Results

Table 5.1:

Test Results	
Features	Status
Virtual Ticket	OK
Ticket System	OK
Ticket Scan	OK
Online payment	Not implemented
Payment History	Not implemented

Chapter 6

Results & Analysis

Table 6.1:

Features	Attempted	Success	Failure	Success rate	Final Status
Ticket Card	5	5	0	100%	OK
TicketSystem	5	5	0	100%	OK
Scan Ticket	5	5	0	100%	OK
payment Online	1	0	1	0%	Not implemented
Payment	1	0	1	0%	Not implemented

Analysis:
According to our testing, the majority of the app's functionalities have been realized. Almost all of the necessary parts are functioning as intended. Additionally, several functionality are lacking. Most often, that calls for a payment method. We may infer from our test that around 80

Chapter 7

Project as Engineering Problem Analysis

7.1 Sustainability of the Project/Work

7.1.1 Sustainability

Any initiative, including the UShuttle project, should prioritize community involvement. The process of including members of the community in the design, development, and implementation of a project is referred to as community engagement. The UShuttle project can make sure that it is addressing the needs and worries of regional stakeholders by interacting with the community. [5]

Potential Strategies

The "UShuttle" project could be sustained via a number of different alternative tactics. These include:

- Consulting with community members: One way to engage with the community is to consult with community members during the planning and development stages of the project. This could involve holding public meetings or surveys to gather feedback and ideas from local residents.
- Partnering with local organizations: Another way to engage with the community is to partner with local organizations and stakeholders. This could involve working with schools, universities, or other local groups to ensure that the Ushuttle project is meeting the needs of the community.
- Involving community members in decision-making: The Ushuttle project can also involve community members in decision-making by creating opportunities for them to participate in the planning and implementation of the project. For example, the

project could establish a community advisory board or hold public forums to gather input from local residents.

Overall, engaging with the community is an important aspect of the Ushuttle project. By involving local residents and stakeholders in the planning, development, and implementation of the project, the Ushuttle team can ensure that the project is meeting the needs and concerns of the community.

7.2 Social and Environmental Effects and Analysis

Both social and environmental aspects of the "UShuttle" project should be taken into account while analyzing it.

- Customer satisfaction: Ensuring that customers are satisfied with the Ushuttle service is an important ethical consideration. This may involve providing high-quality customer service, addressing customer complaints and concerns in a timely manner, and continuously seeking ways to improve the customer experience.
- Safety: Ensuring the safety of passengers and employees is a top priority for the Ushuttle project. This may involve implementing safety protocols, training employees on safety procedures, and regularly inspecting and maintaining vehicles.

Environmental impact: As mentioned earlier, the Ushuttle project has the potential to have both positive and negative environmental impacts. It is important to consider these impacts and take steps to minimize any negative impacts, such as by implementing environmentally friendly practices and sourcing materials sustainably.

7.3 Addressing Ethics and Ethical Issues

In addition to the ethical issues mentioned above, there are several other ethical considerations that should be taken into account in the Ushuttle project. For example:

- Customer satisfaction: Ensuring that customers are satisfied with the Ushuttle service is an important ethical consideration. This may involve providing high-quality customer service, addressing customer complaints and concerns in a timely manner, and continuously seeking ways to improve the customer experience.
- Data privacy: It's crucial to make sure that users' privacy is respected because the "UShuttle" project involves the gathering and storing of personal data. This can entail putting in place safeguards like secure servers, encrypted data storage, and transparent privacy rules.

- Community responsibility: As a service that provides goods and services to the community, the "UShuttle" initiative has a duty to take into account the wants and requirements of the community. This may entail being receptive to the needs of the community and collaborating with community stakeholders to address any problems or worries.

By addressing ethics and ethical issues in a proactive and transparent manner, the "UShuttle" project can ensure that it is operating in a responsible and ethical manner and providing a positive contribution to the community.

Chapter 8

Lesson Learned

8.1 Problems Faced During this Period

We ran into a number of issues when creating and implementing the UShuttle project, specifically with the system's map and live data capability as well as the QR code creation and reading functionality.

• We had trouble integrating these capabilities with the rest of the UShuttle system, which was one problem. This method involves integrating the data with the database and connecting to the relevant APIs, which was a challenging task that required careful preparation and coordination.

• Another difficulty was ensuring the precision of the real-time data being displayed on the map. We had to make sure that the GPS data provided by the bus drivers was correct and up-to-date in order for the map to appropriately display the real-time location of the buses. This was a crucial need for the Ushuttle system because users depend on real-time information to track the location of their shuttle bus.

• In addition to these problems, we also needed to guarantee the security of the real-time data that the Ushuttle system was handling. To do this, it was necessary to put in place security measures like encrypted data storage, protected servers, and strict access controls. For the privacy and security of our users, it was crucial that we ensure the protection of this sensitive data.

• For the Ushuttle project, we also had to create and implement the functionality for creating and reading QR codes. This entailed integrating this feature with the Firebase database, making sure it could create distinct QR codes for each ticket, and making sure those codes could be correctly read by the bus driver app when scanned.

Overall, the Ushuttle project encountered a number of difficulties when it came to the operation of the map and live data, the generation and reading of QR codes, and the integration of these elements with the rest of the system. However, we were able to overcome these obstacles and make sure that these features satiated the needs of our

customers and stakeholders by tackling these problems pro-actively and methodically.

8.2 Solution of those Problems

We used a number of methods to address the issues we ran into while creating and implementing the "UShuttle" project.

- In order to handle the integration issues with the map and live data capacity, we developed a thorough integration strategy that outlined the steps necessary to connect to the necessary APIs and merge the data with the database. We also created regular check-ins and progress assessments to ensure the integration process was moving forward and to identify and address any issues as they arose.

- We put in place a thorough testing and quality assurance procedure that comprised unit testing, integration testing, and acceptance testing in order to guarantee the accuracy of the real-time data being presented on the map. As a result, we were able to find and address any problems with the data accuracy prior to the system's deployment.

- Keeping the live data handled by the Ushuttle system secure requires that We put in place a number of security precautions, such as secure servers and encrypted storage of data and strong access constraints. We also carried out routine security. audits to make sure the system was safe and to find and fix any potential weaknesses.

- We closely collaborated with the relevant teams to design and construct the ticketing system, ensuring that it was flawlessly connected with the rest of the Ushuttle system. Additionally, we tested the scanning capabilities in-depth to make sure it was accurate and dependable and that the tickets were generated properly.

Overall, we were able to overcome the difficulties we encountered and make sure that the Ushuttle project could satisfy the needs of our customers and stakeholders by putting these ideas into practice and by adopting a proactive and systematic approach.

Chapter 9

Future Work & Conclusion

9.1 Future Works

Future revisions of the Ushuttle project might deal with a number of issues. These consist : enlarging the service area, boosting the project's sustainability, enhancing the user experience, and adding new services. Increasing the number of routes or covering a larger geographic area could both contribute to expanding the service area. By incorporating new features or functionality based on user feedback or by making existing features more effective, the user experience can be improved.The Ushuttle initiative might potentially think about adding further services, like a carpooling choice or shuttle service for special occasions. The Ushuttle project may need to employ cost-cutting strategies or create new revenue streams in order to be long-term sustainable.

9.2 Conclusion

In conclusion, by providing a dependable and efficient shuttle bus service for college students, the Ushuttle program has the potential to be advantageous to the community. The convenience and entertainment of the shuttle experience are improved by features like digital ticketing and real-time bus tracking. Although the creation and implementation of the Ushuttle project presented some challenges, we were able to successfully overcome them with careful planning, rigorous testing and quality assurance procedures, and strong security measures. The Ushuttle project has a lot of potential for future growth and development, including the chance to increase customer satisfaction, expand the project's service area, introduce additional services, and ensure its long-term viability. In our perspective, the Ushuttle program has the potential to significantly and permanently improve the neighborhood.

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An Undergraduate Internship/Project on Ushuttle

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The student modified the internship final report as per the recommendation made by his or her academic supervisor and/or panel members during final viva, and the department can use this version for achieving.

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Signature of the Supervisor

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