CLASS HELPER– AN EDUCATIONAL HYBRID APPLICATION

BY

MD. MOYNULL HASAN

201-15-14141

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

Supervised By

Md. Sadekur Rahman
Assistant Professor
Department of Computer Science and Engineering
Daffodil International University

Co-Supervised By

Raja Tariqul Hasan Tusher
Assistant Professor
Department of Computer Science and Engineering
Daffodil International University

DAFFODIL INTERNATIONAL UNIVERSITY
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APPROVAL

This Project titled "Class Helper– An Educational App", submitted by Md. Moynull Hasan to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 1st July 2024.

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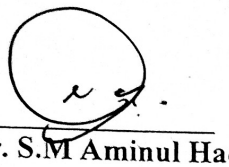

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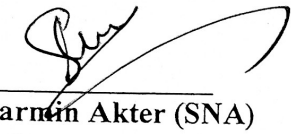

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Jagannath University

DECLARATION

I hereby declare that this project has been done by us under the supervision of **Md. Sadekur Rahman, Assistant Professor, Department of CSE, Daffodil International University, Daffodil International University.** I also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree.

Supervised by:

Md. Sadekur Rahman
Assistant Professor
Department of CSE
Daffodil International University

Submitted by:

Md. Moynull Hasan
ID: 201-15-14141
Department of CSE
Daffodil International University

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ABSTRACT

The Class Helper app addresses the numerous hurdles observed in traditional classroom settings, ranging from learners' lack of focus to the problems faced by those with hearing impairments. Developed on the Flutter framework, this unique solution blends a variety of elements to increase students' engagement and learning experiences. One of the primary functions of the app is live streaming, enabling students to attend sessions remotely and assuring access to educational content independent of physical presence. Additionally, the app contains a detailed class routine module, allowing students to receive timely reminders before each session, avoiding absenteeism and missed opportunities for learning. Moreover, the Class Helper app facilitates appropriate maintenance of academic records by enabling access to Cumulative Grade Point Average (CGPA) data. This feature encourages students to track their academic progress effortlessly, fostering accountability and motivation towards accomplishing their educational goals. Furthermore, the software enhances the attendance-taking process, freeing instructors of administrative tasks and maximizing class time allocation. Students may rapidly register their attendance through the app, enhancing speed and accuracy in record-keeping. The inclusivity of the Class Helper app extends to students with hearing impairments, offering real-time transcription and flexible audio settings to meet various learning needs. By enhancing accessibility and engagement, this software seeks to relieve educational disparities and create fair learning opportunities for all. In conclusion, the Class Helper app is a transformative tool for transforming classroom dynamics, enhancing student participation, and expanding inclusive teaching techniques. Its numerous traits promise to disrupt traditional teaching methodologies, ultimately enhancing learning outcomes and student well-being.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 01

INTRODUCTION

1.1 Overview

This project report explores thoroughly on the development and evaluation of the Class Helper app, a modern teaching tool aimed to promote classroom involvement and accessibility notably for students with hearing impairments. Using the customizable Flutter architecture, this app allows tracking of academic performance, attendance management, and live class broadcasting. By tackling shared educational issues, the Class Helper app attempts to establish an inclusive and disciplined learning environment, hence enabling equitable educational opportunities and boosting teacher-student communication. Apart from its aim, this article outlines the objectives, design, development, and execution policies of the app.

1.2 Background and Present State

The major purpose of the Class Helper app is to overcome the limitations of traditional classrooms. Especially for hearing impaired students and class A absent student, so that no crucial themes are missed. These problems can be alleviated if offline classes can be digitized. By using the features of modern mobile apps, the Class Helper app strives to offer an easier and more enjoyable learning experience. The motivation for this project comes from my personal experience of having trouble hearing and living away from campus. These experiences emphasize the need for an app that can bridge the gap between antiquated teaching methods and students' requirements for additional support. The Class Helper app attempts to use technology to expand accessibility, expedite learning chores, and provide a more dynamic and current learning environment.

Currently, the Class Helper app is in development mode. It is powerful and based on the Cross framework. Initially, the prototype demonstrated the feasibility of key features like live streaming of classes, attendance, quizzes, and academic results. The app's user-friendly interface and comprehensive functionality are designed to meet the needs of both students and educators. Users highlighted the app's potential to significantly improve classroom engagement and accessibility, especially for students with hearing impairments. Further development is focused on refining the app's

functions, increasing its stability, and ensuring seamless integration with existing education systems. Future plans include extensive field testing in various educational settings to further improve, add new functions, and fix previous bugs. Additionally, efforts are being made to explore the benefits of adopting the app and integrating it into standard teaching practices in collaboration with educational institutions. The goal is to launch a fully functional version of the Class Helper app that can be widely implemented to transform classroom dynamics and promote digital learning opportunities.

1.3 Problem Statement

Especially for students with hearing problems, regular learning environments often fail to meet the diverse needs of each student. For these students, this academic deficit can create significant barriers to communication and engagement. Many students unintentionally skip courses, thus hindering their academic development. For teachers, current methods for controlling classroom activities—such as attendance monitoring and academic progress tracking—often take effort as well as time. A unique solution that ensures accessibility, improves classroom engagement and simplifies administrative tasks will be widely sought and help create more inclusive and efficient classrooms. I tried to deploy the Class Helper app to solve these problems so that students can join the class quickly and actively participate regardless of geographical location or hearing ability.

1.4 Objectives

The primary purpose of the Class Helper app is to increase classroom attendance and accessibility for students, especially those with hearing impairments and involuntary absences, and to streamline administrative tasks for teachers. Specific objectives are:

- **Address Barriers for Students with Hearing Impairments:** Provide features that adapt to the requirements of students with hearing disorders, ensuring they may engage completely in classroom activities.
- **Enhance Accessibility and Inclusivity:** Create a learning environment that is accessible and inclusive for all students, regardless of their physical or mental ability.

- **Streamline Attendance Management:** Automate attendance tracking to save time and enhance accuracy for educators.
- **Enable Real-Time Class Streaming:** Allow students to join classes in real-time from any place, decreasing the impact of missed lessons and ensuring continuous access to educational information.
- **Facilitate Timely Alerts:** Provide reminders and notifications for class schedules and crucial deadlines to help students remain organized and punctual.
- **Empower Academic Progress Tracking:** Enable students to monitor their academic progress and Cumulative Grade Point Average (CGPA) conveniently.
- **Optimize Class Time Usage:** Minimize absenteeism and optimize the effective use of class time through planned scheduling and timely reminders.
- **Promote Efficient Record-Keeping:** Enhance the efficiency and accuracy of attendance and academic record-keeping.
  Improve Communication: Foster improved communication between educators and students, encouraging collaboration and support.
- **Foster a Dynamic Learning Environment:** Create a more engaging and interactive classroom experience that stimulates students to participate actively.
- **Reduce Educational Gaps:** Mitigate gaps in educational opportunities and outcomes, encouraging equitable learning for all students.
- **Conduct Rigorous Evaluation:** Perform extensive assessments to determine the app's efficacy in reaching its objectives and increasing educational outcomes.

1.5 Scope and Limitations

The Class Helper app is designed to significantly enhance the educational experience for both students and teachers. It targets students of all educational levels with a special focus on the hearing impaired and aims to provide educators with tools to simplify administrative tasks and enhance the digital version of the classroom. Key features of the app include remote participation, automatic attendance tracking, result tracking, quizzes, class recording and real-time class streaming functionality has been implemented to facilitate academic progress monitoring. Additionally, the app will provide timely alerts and reminders for class schedules and important deadlines, as well as improved communication channels between educators and students. The app is built using the Flutter framework, ensuring cross-platform compatibility and a seamless user

experience. Emphasis will be placed on creating an intuitive, user-friendly interface that is accessible to all users, including those with disabilities. Extensive testing and user feedback will be taken to evaluate the functionality of the app and identify areas for improvement. The app will be compatible with existing educational systems and tools to facilitate easy adoption and integration into the digital educational environment. The update will be rolled out in stages, possibly starting with beta testing at select organizations, followed by wider implementation based on feedback and performance.

The Class Helper app has certain limitations:

- **Technological Dependence**: The app relies on reliable internet connectivity and access to suitable devices (smartphones, tablets, computers) for both students and educators.
- **Accessibility Constraints**: The app may face challenges in fully supporting students with severe disabilities or those requiring specialized assistive technologies not supported by the app.
- **Privacy and Security**: Ensuring user data privacy and security is critical, with a risk of data breaches or misuse despite compliance with regulations.
- **Resource Intensive**: Development and maintenance require significant resources, including time, funding, and technical expertise, which may impact the speed and scope of development.
- **Dependency on Institutional Policies**: The app's adoption and effectiveness may be influenced by the policies and willingness of educational institutions to integrate new technologies.
- **Scope of Accessibility Features**: While the app supports students with hearing impairments, additional features may be needed for other disabilities, which are beyond the initial project scope.

1.6 Report Organization

Class Helper project report is split into seven chapters. On the initial chapter, I will start with into the introduction, covering the motivation for the project, the objectives that it's working for, the expected outcomes, and how I will manage the project, including financial budgeting. I will also detail how the balance of the report is written out. In the second chapter, I will look at the background. Here, I will define important project

terms, check related research, take on a comparative analysis, describe the extent of the topic, and discuss the problems I expect to deal with. In third chapter is all about requirement specifications. This covers business process modeling, collecting and evaluating requirements, use case modeling and information, the logical data model, and the design requirements for the project. In the fourth chapter, I will go into the design specification. I will discuss about the front-end design, the back-end design, the interaction design, the user experience (UX), and the implementation requirements for the project. In the fifth chapter deals with implementation and testing. I will cover the database implementation and front-end design. I will also go through the testing procedures, presenting the outcomes and data. In the last chapter, which is the conclusion and scope for the future, I will present my findings and conclusions. I will also look into the possibilities for additional development, setting out potential additional improvements and enhancements.

1.7 Summary

The Class Helper app aims to transform education by digitizing classrooms and increasing accessibility, especially for hearing impaired students. Built on the Flutter framework, the app features real-time class streaming, automatic attendance tracking, CGPA monitoring and timely reminders. It improves communication between educators and students, creating a more digitized learning environment. The project, inspired by his own personal challenges with hearing impairment, focuses on accessibility and digitization. Currently in development, initial beta testing has indicated positive results of usability and effectiveness. Main limitations include reliance on Internet connectivity, appropriate device requirements, privacy and security concerns, and the challenge of supporting students with severe disabilities. Despite these challenges, the app aims to create a more dynamic, efficient and equitable educational experience, addressing the shortcomings of the traditional classroom and promoting academic success. Continuous evaluation and feedback will be essential for the ongoing development and improvement of the app.

CHAPTER 02

LITERATURE REVIEW

2.1 Overview

“Class Helper” is an educational hybrid application. Now I will address my project's prospective scope and challenges, as well as associated works and comparative study with those. My project's time schedule will be added incorporated here.

2.2 Related Works

While numerous instructional apps exist on the Play and App Store, none correlate precisely with our app's goal. Most of these apps center on video live lessons, assignments, or quizzes, stressing digitalization of education in general. However, my focus is different. I've zoomed in on the needs of hearing-impaired pupils and those who struggle to attend class promptly. The primary issue I've noticed is the inefficiency of collecting attendance, which eats important teaching time. By tackling this difficulty and delivering features customized to the specific needs of these kids, such as real-time streaming, adjustable audio settings, and timely notifications, our app seeks to alter classroom dynamics. It's not only about digitizing education; it's about ensuring inclusivity, accessibility, and maximizing learning possibilities for all Student, regardless of their circumstances.

2.3. Comparison between existing works

In comparison research with existing educational applications, our program stands out for its targeted focus on addressing the requirements of hearing-impaired students and those having attendance issues. While other applications may offer live lectures and tasks, they typically lack elements particularly tailored to meet varied learning requirements. Our software separates itself by promoting inclusivity and accessibility, delivering real-time streaming, adjustable audio settings, and timely notifications to guarantee all students can fully participate in classroom activities. Moreover, our tool streamlines attendance tracking, saving important teaching time that would otherwise be spent on administrative activities. By emphasizing these unique qualities, our software outperforms existing solutions in its dedication to fostering equal learning opportunities for all students.

2.4 Open Issues

After the software development process, I implemented the hybrid application Class Helper. After completing one segment, I deal with the next. I've been working on this application for a year, but it took 6–8 months to build it for the first time.

“Class Helper” Application planning and time management schedules are provided below.

Time Scheduling

The timetable plan of my project is shown in table 2.0

Table 2.0: Time Scheduling

Planning	3 weeks
Design and Analysis	2 Weeks
Coding	4 Month
Testing and Implementation	2 Month
Total	7 Month and 2 Weeks

2.5 Summary

The Class Helper app attempts to promote educational accessibility by concentrating on hearing-impaired students and attendance difficulties. It offers unique features including real-time class streaming, audio settings and automatic attendance tracking, quizzes to maximize learning efficiency. Compared to existing educational apps, Class Helper offers alternative capabilities with personalized functionalities including class recording, CGPA tracking and offline material storage. The development approach extended seven months and two weeks, stressing thorough planning, design, coding, testing and implementation phases to produce a strong and user-friendly solution for educational empowerment through technology.

CHAPTER 03

REQUIREMENT ANALYSIS & DESIGN SPECIFICATION

3.1 Overview

This chapter focuses on critically reviewing the fundamental components of a Class Helper application, focused on business process modeling, requirements collecting, and detailed design features. This chapter navigates the integration of applications within the growing landscape of educational digitalization, showing its vital role in enriching the learning experience through features aimed to empower students. Key features include real-time audio streaming for speech clarity, an automatic attendance system to enhance efficiency, and tests with lengthy class records to promote flexible learning. The chapter ensures a complete grasp of the application's technical architecture, including the software and hardware prerequisites required for both the development and operational phases. Furthermore, using use case modeling and a logical data model, the chapter highlights the application's functional capabilities and data relationships, which are vital for guiding its development and boosting its efficacy in educational situations.

3.2 System Design

3.2.1 Business Process Modeling

In business process modeling in business process management and systems engineering, the activity of depicting processes of a company so that the present process may be examined, enhanced, and automated. The field of education is currently experiencing a significant shift towards digitalization, with mobile applications playing a vital role in enabling and enhancing the learning process. Class Helper is a smartphone application that promises to empower students by providing a wide range of features that are specifically tailored to improve their learning experience. The foundation of Class Helper is a customized student profile. This profile functions as a centralized platform, facilitating the smooth enrollment of students in subject-specific classes that are available within their academic program. No longer do we have to deal with the task of organizing physical calendars and written memos. Class Helper

simplifies the enrolling process, offering students a concise and well-structured overview of their selected courses. A notable aspect of Class Helper is the use of real-time audio streaming. When a teacher starts a class session via the app, a live audio feed begins. Students who possess headphones have the ability to actively engage in lectures and conversations, guaranteeing the highest level of clarity and concentration. This is especially advantageous in circumstances when a teacher's written instructions on the board may be challenging to interpret from specific sitting arrangements.

Furthermore, Class Helper promotes efficiency by adding an automatic photo recognition attendance system. This revolutionary feature eliminates the need for manual attendance checks, freeing up crucial class time for education and interaction. Additionally, students receive timely reminders about forthcoming classes, lowering the chance of missed sessions. Class recordings emerge as another significant advantage of Class Helper. All class sessions are automatically recorded, allowing students to study the material at their own speed. This is particularly beneficial for students who seek more clarification on specific topics or were unable to attend a live session due to unforeseen reasons. Notably, the software provides offline access to recorded lectures, enabling students to review the material without an internet connection. This provides a more flexible learning environment that responds to individual interests and learning styles.

Business Process Modeling “Class Helper” in figure 3.1.

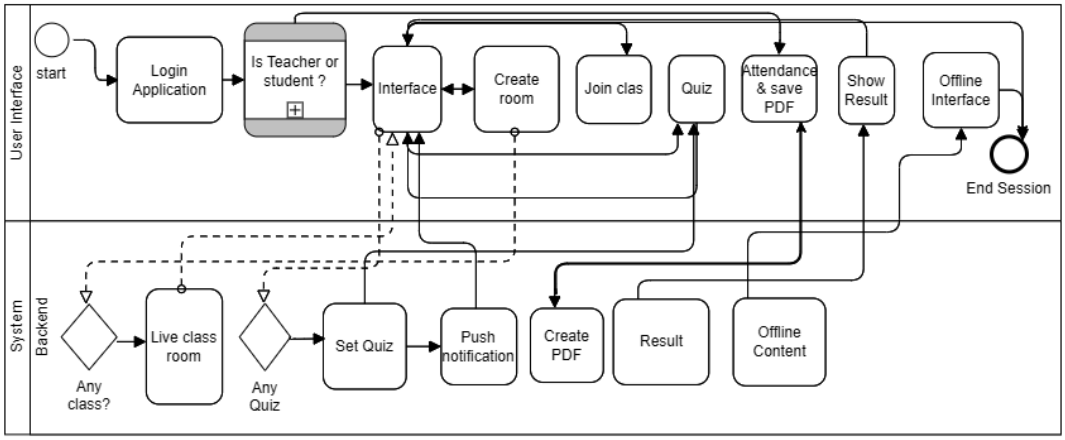

Figure 3.1: BPM

3.3 Requirement Collection and Analysis

3.3.1 Software Requirements

To develop this application, we used following Software Requirements:

- Operating System: Windows 10.
- System Design: Adobe XD, Frigma, camunda.
- Language: Flutter Framework, Dart.
- Database: Agora, Photo Recognized API.
- Tools: Android Studio, Visual Code Studio.
- Debugger: Dart Engine.
- Browsers: Firefox, Microsoft Edge, Chrome, Opera

Software Requirement:

- Operating System: Any Operating System. it is a Cross Platform Application.
- Network: Cellular or Network Wi-Fi.
- Compatible Browsers: Microsoft Edge, Firefox, Safari, Opera, Chrome.

3.3.2 Hardware Requirement

This application development I need the following Hardware Requirements:

- Processor: Intel Core I5
- Space on disk: 70GB
- RAM: 4GB

3.3.3 Functional Requirement

- Graphical User interface (UI).
- Connect with Wi-Fi or cellular network for Firebase Store that stores the data to be displayed to the user.

3.3.4 Use Case Model and Description

3.3.1 System Model

- Users
- System

3.3.5 Use Case Diagram.

Figure 3.2 shown Class Helper system use case diagram.

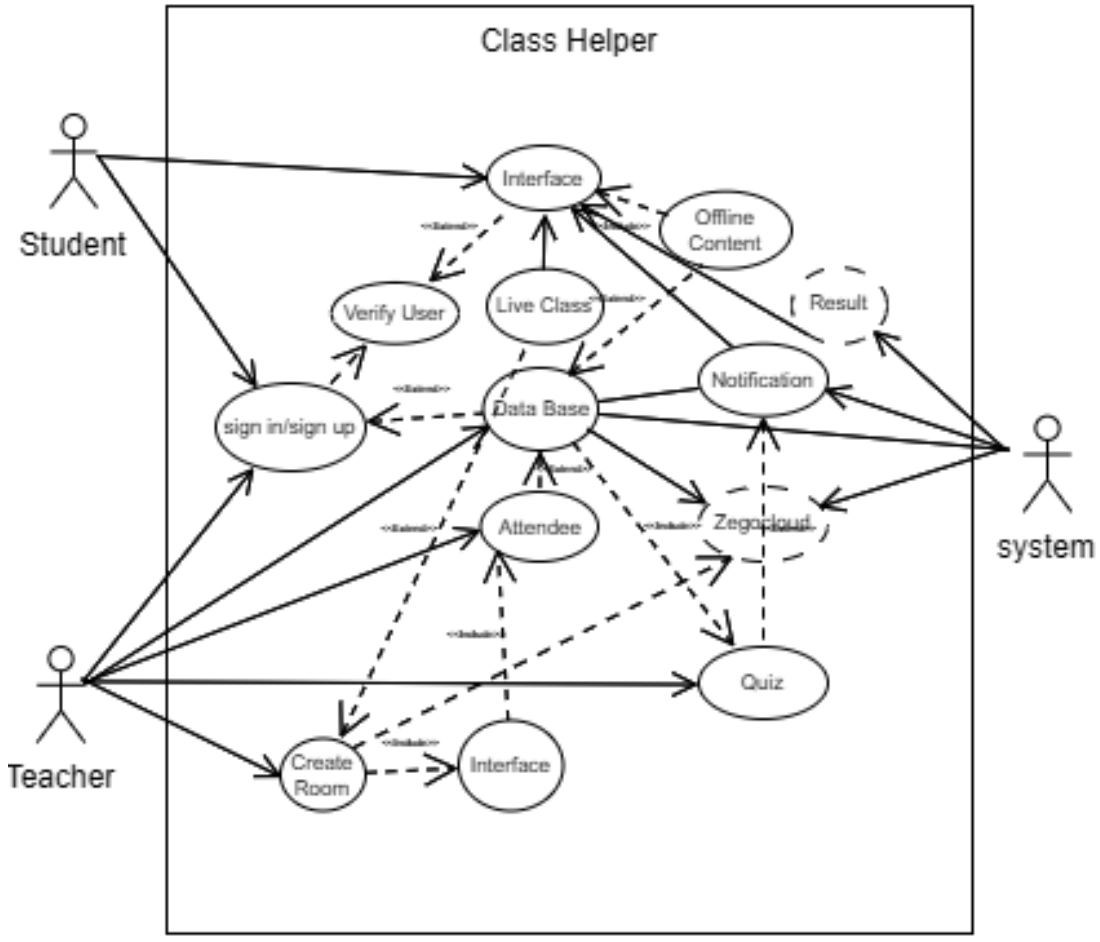

Figure 3.2: Use Case Diagram

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3.3.6 Logical Data Model

The Relationship Diagram represents the logical data model, shown in figure 3.3.

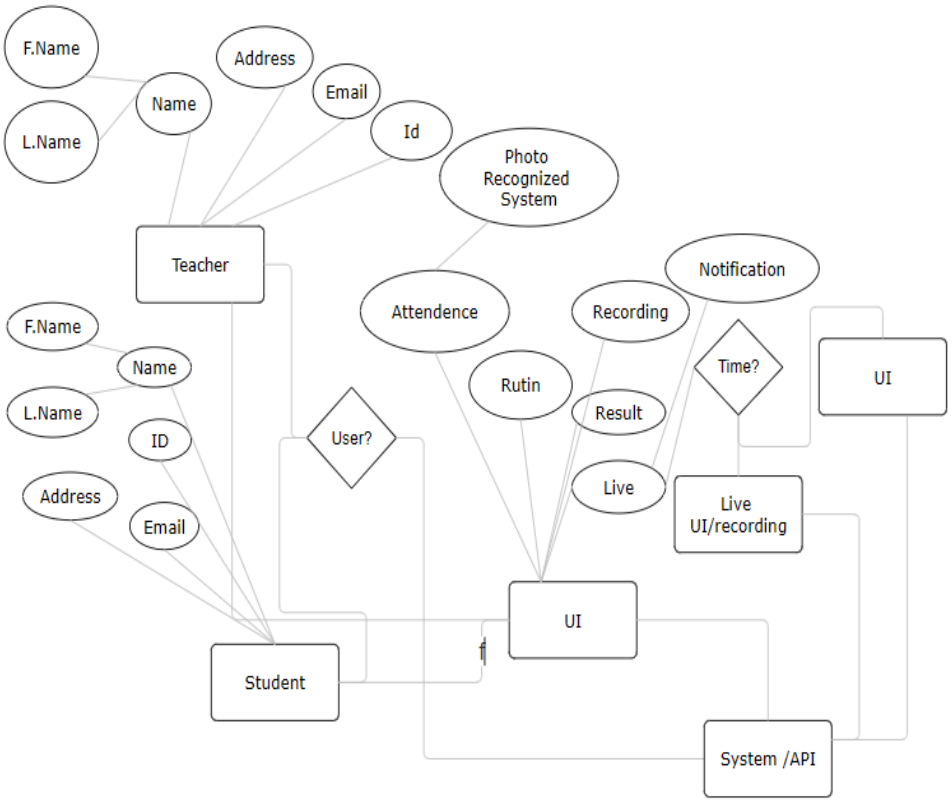

Figure 3.3: ER-Diagram

3.4 Project Management and Financial Analysis

Effective project management is the foundation of the development of Class Helper applications. The project begins with rigorous planning to define scope, establish timetables, designate academic outcomes – including human capital and technical infrastructure – and undertake detailed risk assessments. Task scheduling is handled extremely carefully to ensure adherence to milestones using debugging engines like Dart Engine as well as development tools like Flutter and Dart to maintain rigorous software quality requirements. Communication and cooperation are enabled by industry-standard platforms such as Android Studio and Visual Studio Code, promoting transparency and effective issue solving among team members and stakeholders. Financial analysis serves a crucial role in monitoring project expenditures and estimating potential return on investment. Budget allocations will cover software

development expenditures, hardware acquisition, and license fees for essential APIs such as Zegocloud and photo recognition technology. Cost control system is strictly maintained to monitor the cost owing to which API trial version is utilized, frequent financial reporting and planning is used to maintain discipline. Expected benefits include greater accessibility, engagement, and enhanced educational outcomes through effective attendance management assisted by features such as real-time class streaming and automated attendance systems. Risks such as unanticipated financial fluctuations or unforeseen expenses are carefully analyzed and addressed to ensure that the project stays financially viable and consistent with its strategic objectives throughout its life cycle.

3.5 Summary

Beginning with comprehensive planning, resource allocation, and risk assessment, the development of the Class Helper application hinges on excellent project management. High software quality is guaranteed utilizing tools such Flutter, Dart, and debugging engines; platforms like Android Studio and Visual Studio Code help to promote smooth team member and stakeholder communication and cooperation. Covering software development, hardware acquisition, and API licensing charges, financial analysis dictates budget allocation. Frequent financial reporting and expense control measures help to retain budget discipline. Supported by techniques like real-time class streaming and automatic attendance systems, predicted benefits include improved educational results through expanded access and interaction. Carefully managed risks help to maintain project alignment with strategic objectives and financial viability.

CHAPTER 04

IMPLEMENTATION

4.1 Overview

The Class Helper application increases educational accessibility and quality of instruction by combining clever front-end design with a strong back-end architecture. Its user-centric design makes simple navigation possible for services such live class attendance, academic tracking and dark mode settings as well as for Driven by Firebase, the software guarantees essential for efficient classroom management and user interactions: safe data storage, authentication, and real-time changes. This integration maximizes the user experience by providing dependable access to instructional materials and interactive tools, therefore improving the quality of educational technology and enabling students with higher learning capacity.

4.2 Front-end Design

The primary attraction of an application is in its front-end design. The primary allure of an application is its ability to captivate users. It should be designed with a high level of usability. My application is created with an aesthetically pleasing front-end design. I also attempted to optimize its usability

4.2.0 User Interface design

4.2.1 Sign Up

Our system provides a dedicated registration and login page for new users. If an individual does not hold an existing account, they are led to the registration page, where they can establish a new account. The registration procedure is designed to be basic and user-friendly, ensuring that all necessary prerequisites are clearly described and easy to follow. Users are asked to submit basic information such as a unique username, a secure password, and a valid email address. Upon satisfying these prerequisites, the system will successfully establish a new user account. This process is critical to guarantee that only authentic and validated users have access to the system, boosting security and user experience. The registration page is equipped with validation checks to prevent errors and guarantee that all submitted information fulfills the stipulated criteria, hence supporting a smooth and quick account creation procedure.

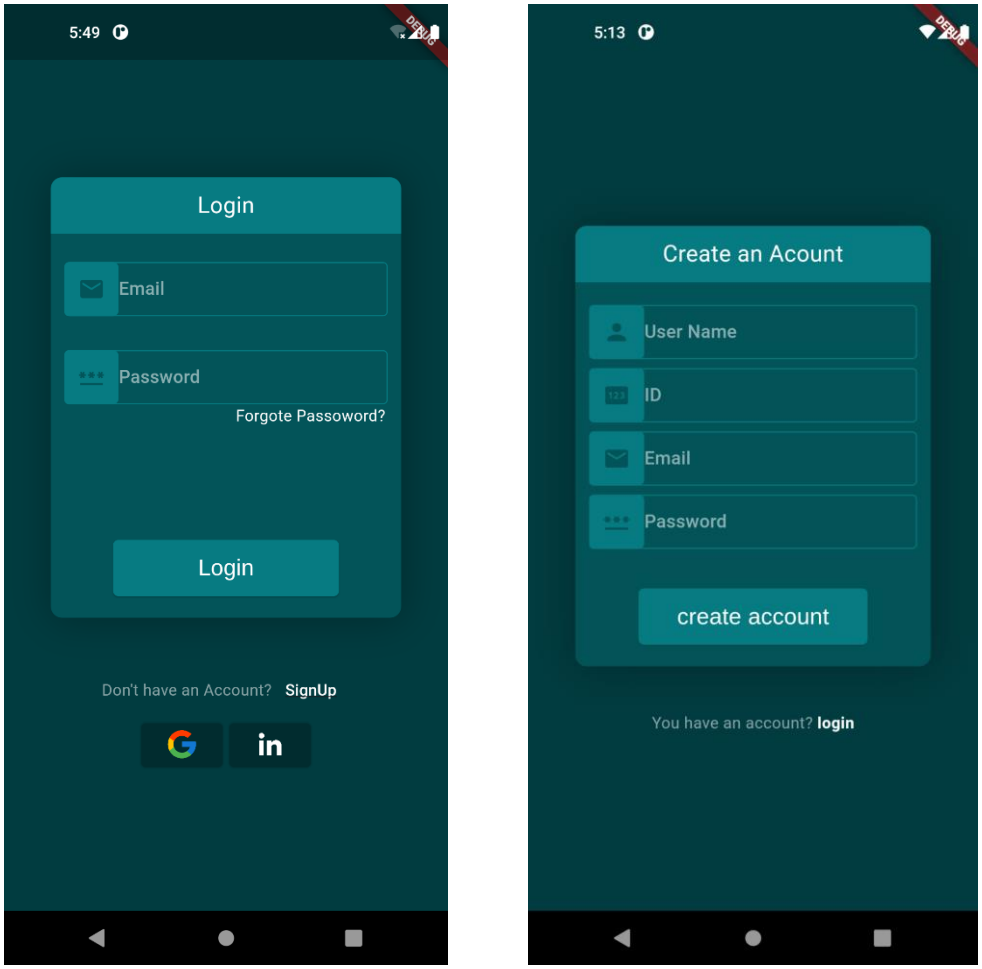

Figure 4.1: Sign in and Create Account Form

4.2.2 User Guide

Upon successful registration, users are routed to the home page interface. This interface acts as the central middle for all user interactions. For students, this home page is particularly functional, allowing access to a number of services suited to their needs. From here, students can observe and join any live classes that are currently in session. The interface is supposed to be intuitive, providing a list of active classes along with essential details such as the subject, instructor, and start time. This seamless integration guarantees that students may effortlessly engage in their planned live sessions, boosting their learning experience.

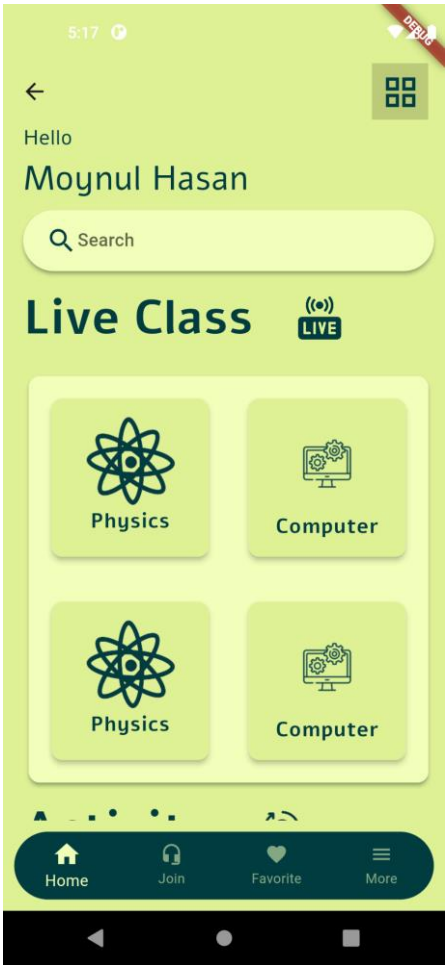

Figure 4.2: Home Page

4.2.3 Join

Students can join live classes from anywhere. Only the classes which are in session currently will come forth. After the join page, the end joining button will appear on the live screen above. Clicking on the button will bring up a dialog box. Here if the user is a teacher then click on the host button with all the information. Then a new room will be created. If the user is a student, then he can join the room given just the subject and room id.

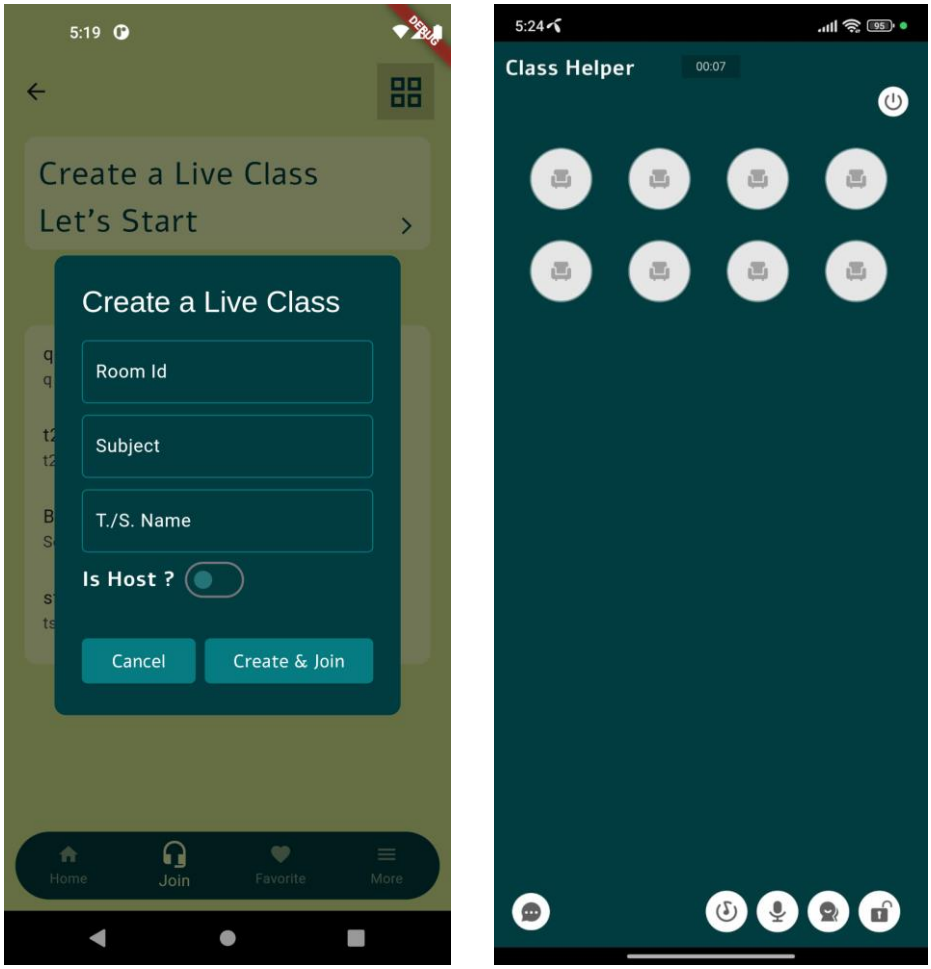

Figure 4.3: Class Joining

4.2.4 Favorite

The "Favorite" option allows students to keep their preferred subjects in one place for easy access. Additionally, the "More Classes" section provides pre-recorded lectures, offering supplementary materials for students to revisit and reinforce their learning. This setup ensures both live and recorded resources are readily available.

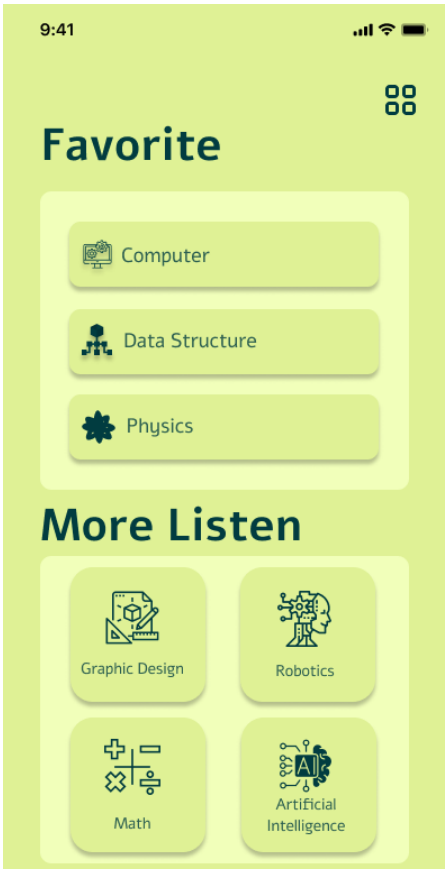

Figure 4.4: Favorite

4.2.5 More

On this page, students have access to various vital elements meant to enhance their academic development. They can examine their attendance records, track their success through outcomes, and access pre-recorded sessions for additional learning support. Furthermore, the routine option offers students a precise calendar of their classes and activities, helping they keep organized and informed. This complete interface is built to support an efficient and productive educational experience, allowing students to manage all areas of their academic life in one convenient location.

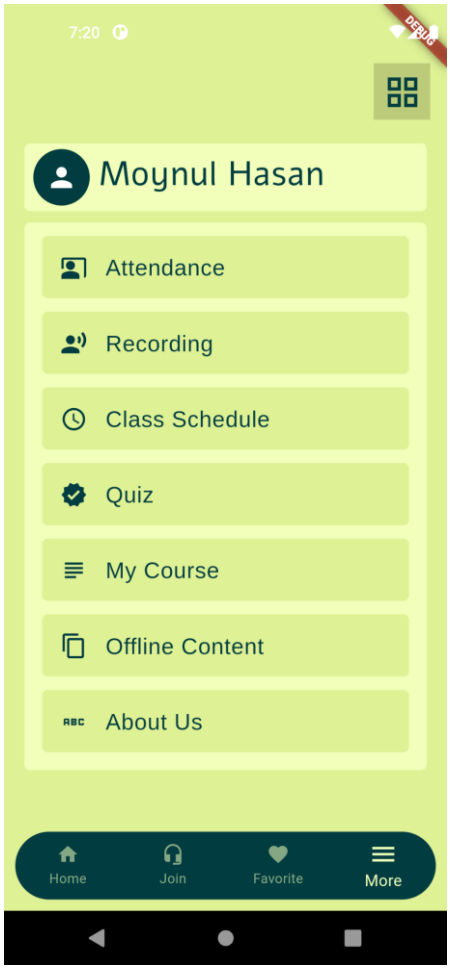

Figure 4.5: More

4.2.6 Quiz

There is a quiz system up to assess the student's level of study performance. By select the quiz button, a comprehensive list of topics will be showcased. The student's quizzes can be seen together. The final score will be displayed when submitting the quiz.

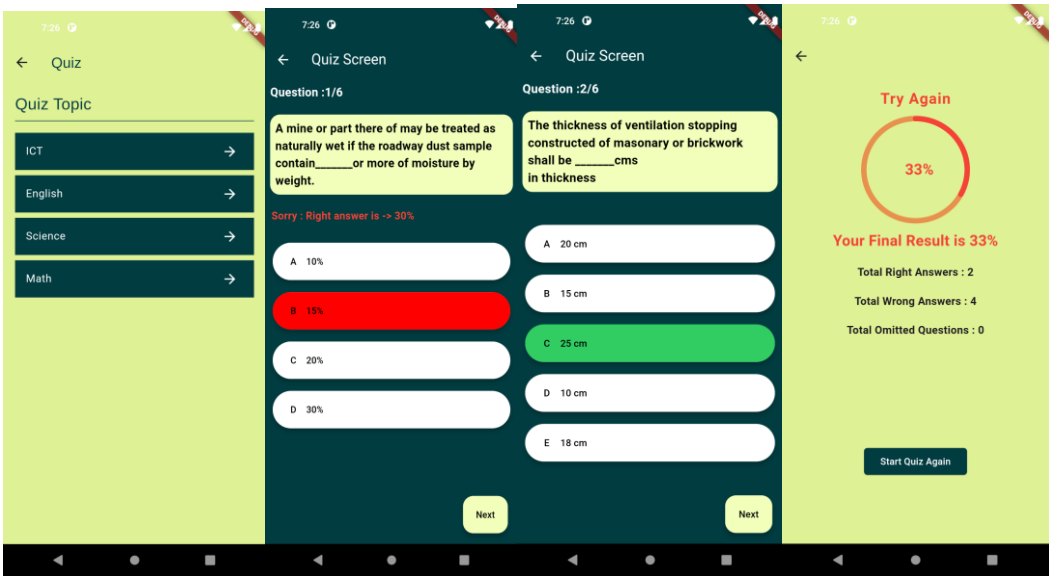

Figure 4.6: Quiz

4.2.6 Splash Screen

When running the application, a splash screen will first show, serving as a brief introductory display. This is followed by the home navigation screen, which provides users with a consolidated interface for accessing numerous features and options. This seamless transition boosts user experience by ensuring an intuitive and orderly entry point into the application's functions.

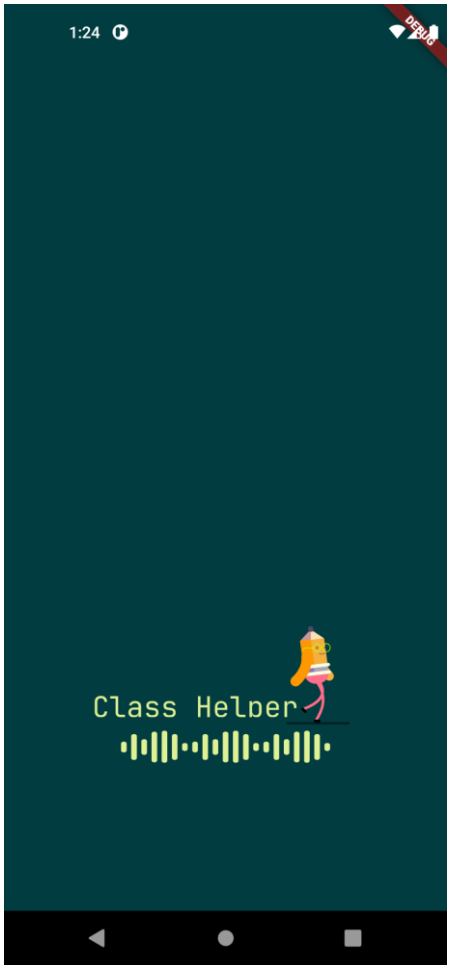

Figure 4.7: Splash Screen

4.2.7 Menu drawer

The menu drawer contains an option to enable dark mode for the application, boosting visual comfort in low-light conditions. Additionally, it offers seven key options such as Notifications and Settings, allowing users to tailor their experience, manage alerts, and alter numerous preferences, thereby giving a comprehensive and user-friendly interface for optimal engagement.

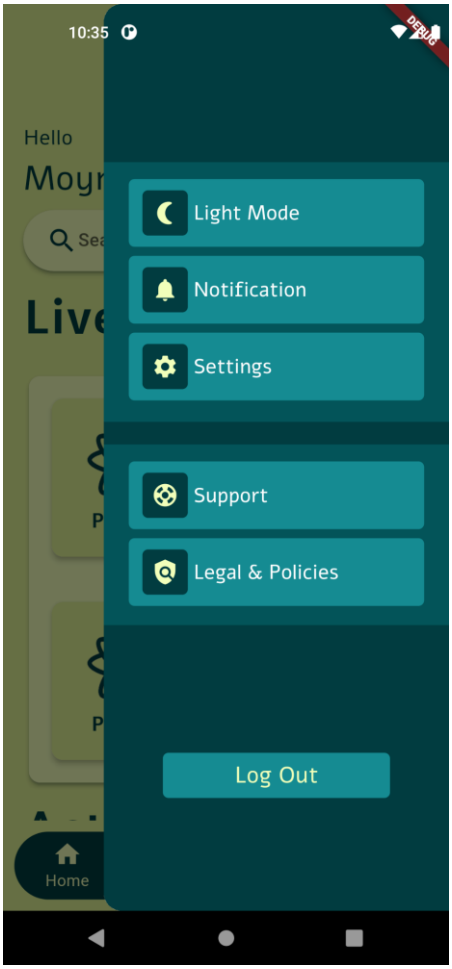

Figure 4.8: Menu Drawer

4.2.8 Back-end Design

Android app, plays with back-end. A role since it handles data storage, privacy, and business logic. When you think of the back-end as the server for mobile apps, it controls all the critical information that users don't see. For my application, I am using Firebase for the database. All the app’s data is saved there. If you look at Figure 4.16, you'll see the authentication page for my Firebase project. This is where all the admin emails and passwords are maintained.

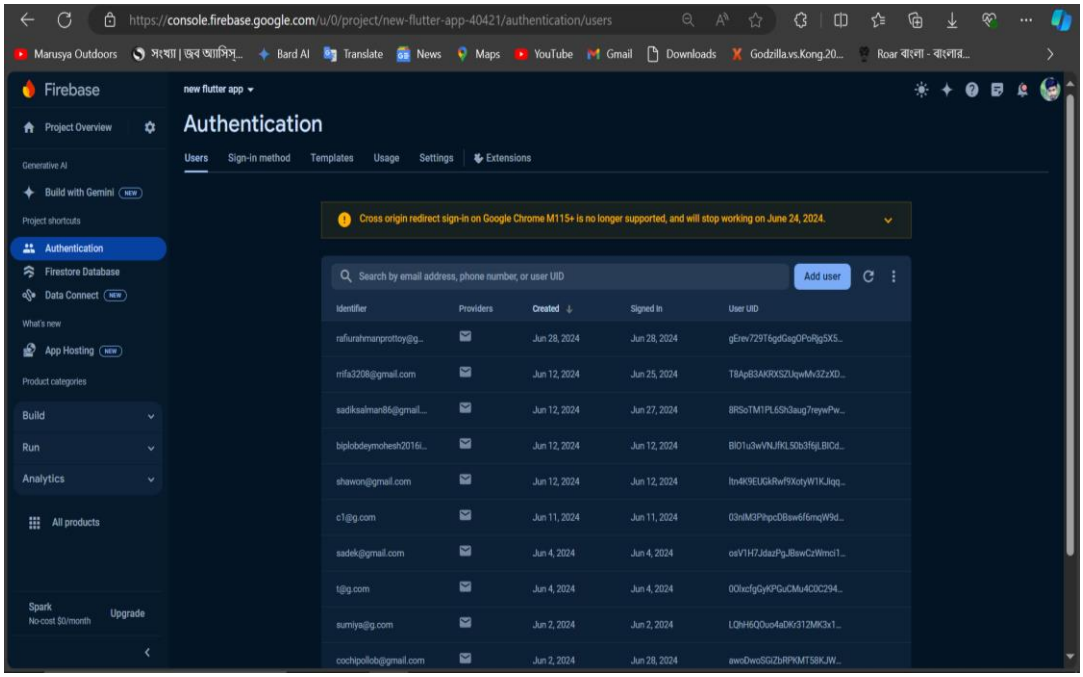

Figure 4.9: Authentication

When a user or teacher creates a room it saves its token. This is done through firestore database. The data is later utilized to join the classes.

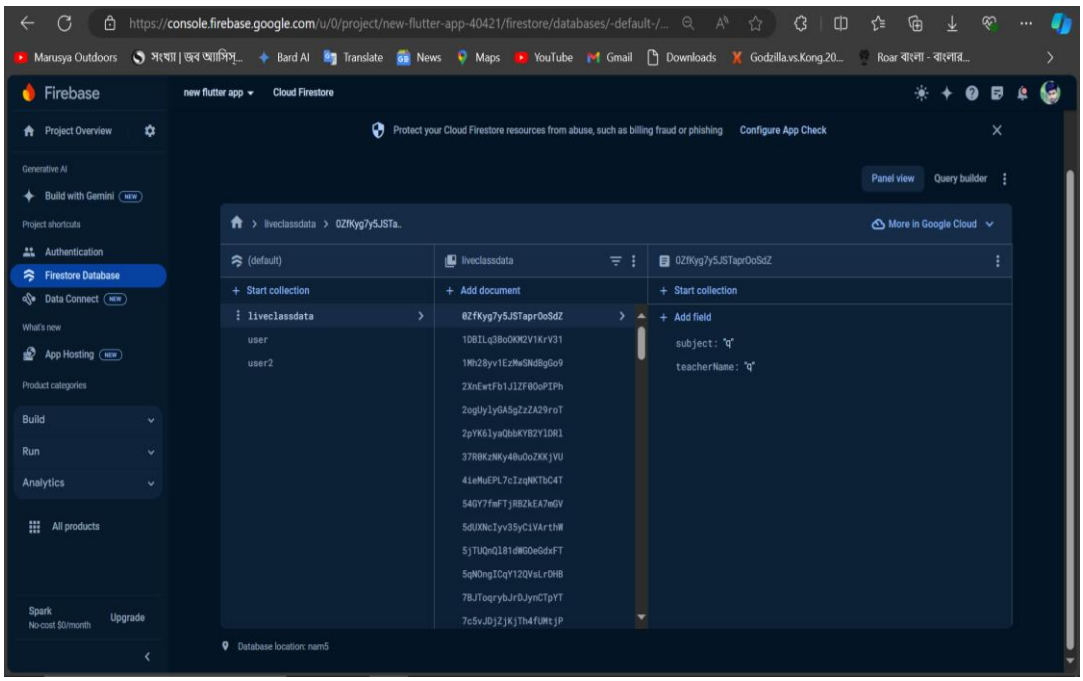

Figure 4.10: Firebase database

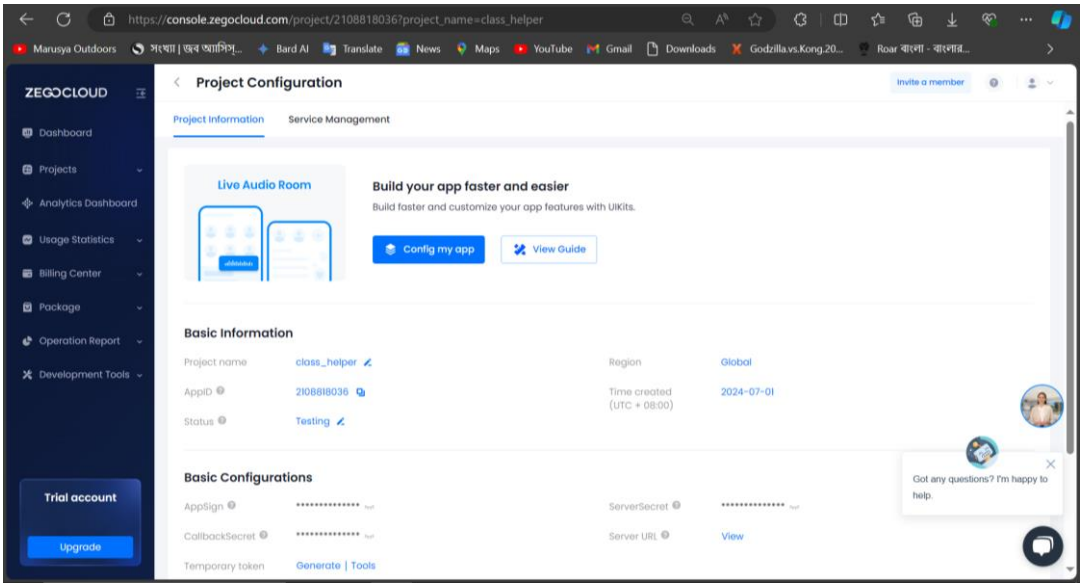

Figure 4.11: Zegocloud

4.3 Implementation and System Testing

This chapter will explain our development project and the end testing method for each module at the conclusion of the project.

At the conclusion of each module development, it is first run in the android emulator and at the end we build the APK file of the project. Install the APK file on the real Android device. We have conducted various studies to assess whether the user can effectively log in and log out of the software. As a bypass with this, we build the Google authentication function, it attempts to verify whether the live classroom can be formed correctly, once the live class is produced, it is tested whether it can go to the classroom correctly, if the class room When the host or teacher exits, the function of changing the host is done in real time, apart from attendance, quizzes, content tests are done offline. I tested the project in a very simple manner to make it easier and more understandable for the user. We strive to test whether the generated product or project is user-friendly. We conduct usability testing without understanding the internal workings of the system under test. Our usability testing evaluates users' comfort level with our application and user interface across a variety of factors, including data flow, navigation, dark mode, light mode, application speed, authentication, room critique, attendance, quiz, and record.

Usability Testing checks the following features of the App.

-How user-friendly the software is.

- The software is easy for the user and approximately to learn.

- How practical is the software to end users.

- There is not an issue executing the software for the user who was intended.

So, at the end we receive the advantage of the user or the consequence of the learner's use.

-Best quality software

-Very simple to use.

-Software is more quickly accepted by users

- Speech delay is quite minimal.

- Can deliver high performance on a poor network. - Simple and appealing UI

Innovative notion for persons with absence and hearing impairments

4.3.1 Testing Implementation

Black Box Testing includes evaluating an application basically based on what it inputs and the resulting outputs, without any knowledge of the foundational structures or access to the source code. This type of tester focuses entirely on whether the application operates as expected under various scenarios, as indicated by the test cases. The primary purpose is to verify that the software runs successfully and matches the defined requirements, which dictate the intended outcomes for the Black Box Testing entails evaluating a program entirely based on its inputs and the consequent outputs, without a knowledge of the internal workings or access to the source code. This type of tester focuses totally on whether the application operates as expected under various scenarios, according to the test cases. The primary purpose is to make sure that the software functions correctly and meets the defined requirements, which dictate the expected outcomes for the tests.

4.3.2 Test Results & Report:

The project was evaluated using a black box testing methodology. This test has been conducted by a group of users and testers. The response received after testing is both negative and favorable.

Positive Feedback:

- The developing application interface is simple and easy to learn.
- A notification system so that the student does not miss any event
- Friendly to use.
- Low latency issue for live class.

Negative Feedback:

- 1.It cannot be controlled offline.
- 2. Should add more services.

4.4 Summary

The Class Helper program aims to enhance educational accessibility by utilizing an easy front-end design and a robust back-end architecture. The user interface of the platform includes essential functionalities such as real-time class attendance, academic progress monitoring, quizzes, class recording, and dark mode options. The registration and login procedures have been simplified to meet both security and convenience requirements. The app's back-end, powered by Firebase, ensures secure data storage, authentication, and real-time updates. Black box testing, together with other comprehensive tests, ensures the functionality and user satisfaction. The software effectively fulfills the user's needs, yet improvements such as offline functionality and other services would increase its capabilities and make it a more comprehensive educational tool.

CHAPTER 5

RESULT AND ANALYSIS

5.1 Overview

This chapter focuses on the results and analysis of the Class Helper application. Its functionality, user feedback and potential areas for improvement are discussed. The primary objective of this section is to show how effective the application is in increasing educational accessibility and engagement and digitizing education. Various testing methods including black box testing were used to evaluate the functionality, usability and overall user experience of the application. Positive feedback highlights the intuitive interface, low latency in live classes, and effective notification system, while constructive criticism points to the need for offline functionality and additional features. The goal of the analysis is to provide a broader understanding of the impact of the application and to guide future development for improved educational support.

5.2 Simulation Result

The Class Helper application has been put through rigorous testing to ensure its effectiveness in real-world educational environments. Focusing on key features like user registration, live class participation, attendance tracking, quizzes, academic results and real-time notifications, it is seen whether it is working properly or not.

i. **User Registration and Login:** The system successfully navigates the user through the new user registration process to their profile, secure account creation and easy access. Validation checks effectively prevent errors, making the user onboarding experience much smoother and easier.

ii. **Live Class Participation:** The application has performed well in allowing students to join live classes from anywhere. Real-time audio streaming is smooth and has noise cancellation functions, with minimal latency, providing users with an engaging and interactive classroom experience. The host switching function works seamlessly when teachers leave the session, ensuring uninterrupted class flow.

iii. **Attendance Tracking:** User can save attendance of students in less time.

iv. **Class Recording:** The application has successfully recorded all live sessions, making them accessible for later review.

v. **User Feedback:** Positive feedback highlighted the app's intuitive interface, ease of use and low latency in live classes. Users appreciate the timely notification and recorded session functions for offline access.

vi. **Areas for improvement:** Constructive criticism indicates the need for additional services to further enhance offline control of the application and its functionality.

5.3 Comparative Analysis

The Class Helper app offers several advantages over other educational applications such as Google's Socratic, Khan Academy, Chegg Study, and the Classmate App. Class Helper stands out due to its user-friendly quiz creation system, live audio streaming for real-time classes, and straightforward registration process. Unlike its competitors, Class Helper offers unique features for organizing lessons and sending push notifications, allowing students to quickly attend classes if they forget or keep updated on their calendar. Even with intermittent Internet access, Class Helper gives offline access to recorded sessions. Class Helper distinguishes itself from other applications by placing a high importance on inclusivity and accessibility, specifically for students who have hearing impairments and attendance challenges. Other apps concentrate on video lectures, homework, and quizzes. Class Helper was created to establish an inclusive and accessible learning environment that helps students achieve better results and more effectively fulfill the diverse requirements of students than its alternatives. Features like academic performance tracking and quiz evaluation are also included.

5.3.1 Related applications comparative analysis

Table 5.1 shown comparative analysis of some related applications.

Table 5.1: Comparative analysis

Features	Classmate App	Socratic by google	Khan Academy	Chegg Study	Class Helper
1. User registration	YES	Yes	Yes	Yes	Yes
2. Live audio streaming	No	No	No	No	Yes
3. Attendance system	Yes	No	Yes	No	Yes
3. Class routine and push notification	No	No	No	No	Yes
4. Class recording	No	No	Yes	No	Yes
5. Show academic exam result (CGPA)	Yes	No	No	No	Yes
6. Quick quiz.	Yes	No	Yes	No	Yes
7. User enrollment	Yes	No	Yes	No	Yes
8. Offline content storage	No	Yes	Yes	No	Yes

5.4 Summary

The Class Helper program passed detailed testing and assessment to ensure its functionality and efficacy. Positive comments were received for the app's user-friendly UI, dependable alerting system, and reduced latency in live classes, which were demonstrated during black box testing. A few limitations were identified, such as the demand for external services and the difficulty to utilize the app offline. The analysis brings out the app's advantages in terms of boosting educational efficiency and accessibility and pinpoints areas that still require work to fully satisfy user needs.

CHAPTER 6

IMPACT ON SOCIETY, ENVIRONMENT AND SUSTAINABILITY

6.1 Impact on Society

The Class Helper application completely promotes educational accessibility and engagement by enabling remote participation in live sessions, hence bypassing physical constraints. It serves students with physical limitations, especially those with hearing impairments, by incorporating features like real-time captioning and visual aids. Its planned routine and real-time updates stimulate punctuality and prevent absenteeism, enhancing academic performance. By automating administrative procedures, it frees educators to focus on effective teaching, enhancing classroom dynamics. Overall, the app contributes to developing an inclusive, equitable, and efficient educational environment, positively influencing students, teachers, and the greater educational community.

6.2 Impact on Environment

The Class Helper application promotes environmental sustainability by eliminating the demand for tangible resources such as paper and transportation. By facilitating remote learning, it minimizes the carbon footprint associated with commuting to and from educational institutions. Digital record-keeping and automated administrative operations limit paper usage, contributing to lower deforestation rates and garbage creation. Additionally, the software fosters the adoption of eco-friendly practices in educational settings by harnessing digital technologies. Overall, Class Helper supports a greener approach to education, coinciding with global efforts to reduce environmental impact and promote sustainable development.

6.3 Ethical Aspects

The Class Helper application follows ethical standards by assuring data privacy and security for students and educators. It encourages different perspectives by providing accessible learning opportunities for students with disabilities. The software also

supports academic integrity by transparent and fair tracking of attendance and performance, providing an equitable educational environment for all users.

6.4 Sustainability Plan

I am strongly committed to bringing the Class Helper app to the next level. It would be a remarkable achievement to better the educational experience and maybe save lives using my software. Over time, new possibilities and features will arise, allowing broader integration into the system. I truly believe that with my tireless efforts, I can continually enhance this software to fulfill the different needs of every user. My passion for this initiative is inspired by the desire to create a more inclusive and supportive educational environment for every student.

6.5 Summary

The Class Helper app, which wants to digitizing the outdated educational system while improving accessibility and student engagement, will signal a major advance in educational technology. Through the integration of real-time communication features and the opportunity to engage remotely, this application supports students with physical limitations, particularly those who have hearing impairment. Because of the app's automated routines and updates, teachers are able to focus on academic performance and administrative obligations, which enhances classroom dynamics and streamlines monitoring. Through alternatives for remote learning, Class Helper lowers paper use and carbon emissions, hence supporting sustainability from an environmental aspect. Ethically, it offers inclusiveness and data privacy top priority, assuring an equitable learning environment for all users. The app seeks to suit a variety of educational needs and provide a positive learning environment worldwide with a strong commitment to constant growth.

CHAPTER 07

CONCLUSION AND FUTURE SCOPE

7.1 Conclusion

The Class Helper application represents a significant step forward in educational technology, providing solutions to common difficulties faced by both students and educators. By integrating features such as live streaming, full class routines, and automated tasks, the application promotes student engagement and academic achievement. Its user-friendly interface and real-time updates ensure that students remain organized and focused on their studies. Importantly, the application also considers the needs of those with hearing impairments, trying to provide an inclusive learning environment. Ultimately, the Class Helper app has the ability to alter traditional educational processes by harnessing technology to provide a more interesting and accessible learning experience. The continued development and future innovations, driven by user feedback, will further reinforce its role in modern education. This research underlines the need of adaptable and inclusive technologies in establishing a supportive educational landscape, eventually seeking to benefit all students.

7.2 Scope for Further Developments

The Class Helper application has substantial potential for future advancements and expansions, enabling options for academic exploration and technological advancement. The integration of enhanced accessibility features to better accommodate students with various requirements, particularly those with visual impairments, represents a promising approach. Additionally, the use of machine learning algorithms has potential for personalizing the learning experience through tailored recommendations and adaptive content delivery.

Furthermore, enhancing the application's capabilities to include collaborative learning tools and interactive activities could strengthen the educational experience and create deeper involvement among users. Continuous improvement based on user feedback and technical advancements will be vital for ensuring the Class Helper app remains at the

forefront of educational innovation. By adopting these opportunities for improvement, the application may continue to evolve and adapt to meet the evolving requirements of students and instructors, ultimately contributing to the advancement of educational technology.

7.3 Limitations

The Class Helper application, despite its innovative approach to enhancing educational accessibility and engagement, faces several limitations that may affect its effectiveness and widespread adoption. First, it relies heavily on Internet connectivity for real-time features such as streaming and updates, and poses challenges in the case of poor network coverage or limited access to stable Internet connections. Ensuring consistent performance across different Android devices with different hardware capabilities and software versions is a significant concern. The app aims to support students with disabilities, especially those with hearing impairments, to ensure that there is no learning curve even when absent, and its functionality needs continuous validation and improvement to ensure wide accessibility to users in various situations. Data security also presents a critical issue, as unethical access to the app's backend infrastructure is common. So introducing a new app requires adequate user training and support to facilitate adoption and maximize its benefits for both students and educators. As the app evolves with new features and updates, maintaining stability and usability across versions while addressing user feedback will be more work for long-term success.

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[3] "Microsoft Teams - Apps on Google Play," available: https://play.google.com/store/apps/details?id=com.microsoft.teams, last accessed on May 9, 2024, at 1:40 pm.

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[6] "Khan Academy - Android Apps on Google Play," available https://play.google.com/store/apps/details?id=org.khankids.android, last accessed on May 10, 2024, at 11:07 pm.

Appendix A

Course Outcomes, Complex Engineering Problems (EP) and Complex Engineering Activities (EA) Addressing

Title: CLASS HELPER– AN EDUCATIONAL HYBRID APPLICATION

Student ID: 201-15-14141

CO	CO Descriptions	PO
Phase -I		
CO1	Utilize both newly acquired and previously obtained knowledge to identify an accessibility issue in educational environments for the Final Year Design Project (FYDP).	PO1
CO2	Analyze several parts of the aims in building a solution for this FYDP	PO2
CO3	Explore multiple problem domains through a literature analysis, identify issues, and establish FYDP goals.	PO4
CO4	Perform economic assessments and cost estimation and implement relevant project management processes throughout the development life cycle of the FYDP	PO11
Phase -II		
CO5	Design and develop technological solutions and system components or processes that satisfy stated requirements, ensuring compliance with public health and safety regulations, as well as addressing cultural, socioeconomic, and environmental variables in this FYDP	PO3
CO6	Choose and apply applicable approaches, resources, and modern engineering and IT technology to address complex engineering processes, comprising prediction and modeling, while adhering to key restrictions in this FYDP	PO5
CO7	Analyze societal, health, safety, legal, and cultural factors, along with associated obligations, in the context of professional engineering practice and the resolution of this challenge, applying logical reasoning guided by contextual understanding.	PO6

CO8	Comprehend how to assess the ongoing sustainability and effect of qualified engineering endeavors in addressing sophisticated engineering difficulties within social and environmental frameworks.	PO7
CO9	Implement ethical principles and follow to professional standards and norms in this FYDP	PO8
CO10	Capable of performing efficiently both individually and as a team member or leader across varied teams and transdisciplinary situations in this FYDP.	PO9
CO11	Proficiently communicate with the engineering community and broader society on complicated engineering activities, including the capacity to interpret and write complete reports and design documentation, as well as deliver and receive clear instructions throughout this FYDP.	PO10
CO12	Acknowledge the necessity of self-directed and life-long learning within the dynamic environment of technology, and possess the preparedness and competence to engage in lifelong learning activities.	PO12

Addressing CO (1 to 8), Knowledge Profile (K), Attainment of Complex Engineering Problems (EP), and Attainment of Complex Engineering Activities (EA)

Addressing CO (1 to 8), Knowledge Profile (K), Attainment of Complex Engineering Problems (EP):

SN	EP Definition	Attainment	CO	Justification	References
1	EP1: Depth Knowledge required	Yes	CO1, CO2, CO3, CO5, CO6, CO7, CO8	In this project demonstrates fundamental engineering (K3) principles by employing modern software development techniques, user experience design, and accessibility standards. The project applies specialist knowledge (K4) by integrating assistive technologies for	Page no: [8-28], Section: [3-5]

				hearing-impaired students. The project also incorporates extensive research (K8) on accessibility and educational technology.	
2	EP2: Range of Conflicting Requirements	Yes	CO2, CO7	In this project addresses EP2 by identifying and balancing the needs of students with and without disabilities, teachers, and administrative staff, ensuring the app is useful and accessible to all.	Page no: [8-10], Section: [3]
3	EP3: Depth of Analysis required	Yes	CO2, CO6	In this project addresses EP3 by analyzing user feedback, accessibility guidelines, and technical constraints to optimize the app for classroom use.	Page no: [27-29], Section: [4-5]
4	EP4: Familiarity of Issues	Yes	CO8	In this project impacts both education and accessibility fields, contributing to societal and educational advancements, and promoting inclusivity in classrooms.	Page no: [28], Section: [5]
5	EP5: Extent of Application Codes	No	CO5	N|A	N|A

6	EP6: Extent of Stakeholders Involved	No	CO8	N|A	N|A
7	EP7: Interdependence	Yes	CO5	In this project integrates various components like real-time transcription, attendance tracking, and user feedback mechanisms, ensuring a comprehensive solution that addresses complex classroom management and accessibility challenges.	Page no: [1-5], Section: [1]

Addressing CO11 with Complex Engineering Activities (EA):

SN	EA Definition	Attainment	CO	Justification	References
1	EA1: Range of Resources	Yes	CO11	In the project utilizes diverse resources such as mobile development platforms, cloud services, and accessibility tools to ensure comprehensive app functionality and inclusivity.	Page no: [6-7], Section: [2]
2	EA2: Level of Interaction	No	N|A	N|A	N|A
3	EA3: Innovation	No	N|A	N|A	N|A
4	EA4: Consequences for Society and the Environment	Yes	CO11	In the project improves educational accessibility, enhancing learning for students with	Page no: [30-31], Section: [5-6]

				hearing impairments, and promoting societal inclusivity.	
5	EA5: Familiarity	Yes	CO11	In the project builds on existing educational and accessibility technologies, integrating novel solutions to enhance classroom engagement and inclusivity.	Page no: [28-29], Section: [5]

Addressing CO (4, 9, 10, and 12):

SN	CO	Attainment	Justification	References
1	CO4	Yes	The work integrates good project management and financial planning, enabling optimal resource usage.	Page no: [12-13], Section: [3]
2	CO9	Yes	The initiative adheres to ethical standards by prioritizing student data protection and diversity in design.	Page no: [8-12], Section: [3]
3	CO10	No	N|A	N|A
4	CO12	Yes	The project demonstrates a commitment to continuous learning and adaptation to emerging technologies and educational needs.	Page no: [32-33], Section: [7]

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