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# An Undergraduate Internship on Self-learning Application

Khan, Tahmid

Independent University, Bangladesh


An Undergraduate Internship on

# Self-learning Application

At

Office of Industrial Relationship (OIR)

By

Name: Tahmid Khan

Student ID: 1731396

Autumn, 2022

Supervisor:

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Professor,

Department of Computer Science & Engineering

Independent University, Bangladesh

January 24, 2023

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

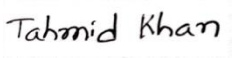
Department of Computer Science & Engineering

## Independent University, Bangladesh

# Attestation

I, Tahmid Khan attest that this report is my work, based on responsibilities that I have been assigned to me during my internship period. In addition to that, I have acknowledged all material and sources used in this report.

I also certify that this report has not been submitted previously for any assessment in any other unit and that I have not forged the work of other students or persons. However, following the internationally accepted academic guideline using others' written works are accurately cited if used in any part of this work.



…….. 19/01/2023

Signature …… Date

Tahmid Khan

……..

Name

# Acknowledgment

First and foremost, I desire to express my sincerest sense of gratitude to Almighty Allah because of His mercy and blessing that I have come so far. It has been a great privilege to work for OIR as an intern. I have received so much support and encouragement from the individuals of OIR who have years of experience. I also would like to thank the members of OIR for spending their valuable time and knowledge which was essential for the completion of this Report.

I express my gratitude to my internal supervisor, Prof. Yusuf Mahbubul Islam, Department of Computer Science and Engineering, Independent University, Bangladesh (IUB), for his invaluable instructions, continuous guidance, support, and motivation during my internship period and preparation of this report.

I also want to express my deepest gratitude to my external supervisor and my mentor Dr. Omar Faruk for his continuous support and guidance throughout the completion period of the project. His support and leading ability were the driving force of this project. I also want to thank my other project member BM Fahim Abrar for his work on the other part of the project.

Finally, I proudly acknowledge the great sacrifices, good wishes, moral support, fruitful advice, inspiration, and encouragement from my family members, relatives, and friends.

Tahmid Khan

January 22, 2023

# Letter of Transmittal

January 22, 2023

Yusuf Mahbubul Islam, PhD

Professor,

Department of Computer Science and Engineering

Independent University, Bangladesh

Subject: Letter of Transmittal for Internship Report, autumn 2022

Dear Sir,

This is to inform you that with due honor and respect, I, Tahmid Khan, ID -1731396 from the internship course of Autumn 2022 Semester, Section 1, would like to submit my Internship report. This report is based on my internship program and the project I have worked on. I have completed my internship at OIR which spanned from 13th October to 5th January.

This report is based on my experience and the work I did at OIR during my internship program. The primary goal for my internship was to gain knowledge by working in the software engineering industry and familiarize myself with all the different technology-related fields of the company, including research and development, documentation, and software development, and get acquainted with software development processes and practices. Throughout my internship at OIR, I had to learn and adapt to the evolving technologies being used in different situations and requirements and to be able to apply them in real-life projects.

I shall be grateful if you are to receive this report and deliver your valuable judgment on this. I will be honored if you find this report useful and informative to have an idea on the regarded issue.

Sincerely,

Tahmid Khan

ID - 1731396

Email: 1731396@iub.edu.bd

# Evaluation Committee

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Signature

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Name Subrata Kumar Dey

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Panel Member-1

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Signature

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Name Dr. Saadia Binte Alam

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Panel Member-2

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Signature

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Name YUSUF M ISLAM

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Supervisor

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Signature

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Name Dr. Mahady Hasan

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Head, Department of Computer Science & Engineering

# Abstract

Students are living in a digital era, with more students than ever having internet access and its new technologies. The internet has spread to every corner of the world, as well as the number of smartphone users is growing each day. Students are becoming more aware of the technologies that surround them, they have begun to embrace both old and new advanced ways of technologies. As a result, students can easily browse the internet and its platforms to their advantage.

Students' self-learning methods have been altered by the internet and its various platforms. Obtaining necessary assistance from home has never been simpler. OIR has taken advantage of this opportunity to raise awareness by developing a self-learning app for themselves on a regular basis. Through innovation, originality, and integrity, this self-learning app aspires to make a significant impact on the education industry.

The following report describes my internship work as well as my contributions to the development of this mobile application. The application was created from the ground up by myself and my group member.

The report is divided into eight major sections that explain the project and the development process. The first section, Introduction, provides a brief overview of the project and its objectives. The second and third chapters, respectively, contain the literature review and project management and financing. I have connected the project to my undergraduate work here, and I have also shown the breakdown of time and resources in the respective sections. Methodology depicts the methods and strategy used to create the project. The project's body is, in fact, the most important part of the report. The system analysis is discussed in depth here, with a focus on various techniques of analysis and diagrams. Result and analysis, which covers the outcome we obtained.

**Keywords —** Self learning app, Flutter, Assistance, Questions

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# Chapter 1 Introduction

## 1.1 Overview/Background of the Work

Learning plays a crucial role in a student's life. So, it is important to emphasize the process that they use for learning. Learning processes can cause huge differences since most of the students generally go for ineffective learning processes that can cause impact on their evaluation, understanding, proficiency and knowledge. Eventually they end up being in the wrong direction and lose their valuable time which diverts them from reaching their ultimate goal. It mainly happens when a student is deprived of proper guidance and exact sources to study. To increase the learning profitability, we were assigned to develop a mobile application for the engineering students in IUB under the Office of Industrial Relationships (OIR). Since we are living in a digital era, people are mostly dependent on electronic gadgets and the internet. Thus, we decided to develop a mobile application for their learning process.

## 1.2 Objectives

The prime objective of this project is to make learning processes fruitful for university students through a mobile application. Usually, students hesitate to ask questions due to lack of confidence, some students skip asking questions or some students do not know how to ask one. A simple solution for effective learning would be to learn how to ask questions as a student and clear any sorts of confusion. This app helps a student to learn how to ask questions regarding a specific course topic, just like others use Google or any other search engines. Students should know what to ask and learn, if they do not have any idea regarding it, then they would not be able to achieve any knowledge. This app is specifically built for engineering students. Students can choose a course and select a particular topic on the course. They can ask a question

associated with the topic and view previous questions which are asked by other students. By asking and viewing previous asked questions, it will correspondingly activate their thinking process and help to grow curiosity for learning. They will feel the eagerness to find the answers for their questions accordingly. Our focus is not on the answers but the questions. They will find the answers by themselves. There will be some guidelines for the students to ask questions properly. Hence, it can really motivate them to ask questions without causing them any hesitation. This is how our entire process will eventually make them asking grow interest, passion and curiosity to learn by questions.

## 1.3 Scopes

After the development of the" Self Learning App" Courses are easily viewable by students from the course list and select a specific topic. They can ask a question and view previous questions that are posted by other students on their chosen topics. It will assist them in learning any topic willingly because questions can always stimulate the mind to seek the answer. They can improve their learning process drastically by doing so. Ultimately, their development will be aided by the use of this application.

# Chapter 2 Literature Review

## 2.1 Relationship with Undergraduate Studies

The work that I have been doing at my internship is related to most of my CSE courses that I took during my time at IUB. But the courses that stand out, the courses that taught me the most to translate to my internship work are CSE213, Object Oriented Programming: My entire project is based on the programming language 'Dart' which is an object oriented, class-based language with C style syntax [1]. The fundamentals that I learned during that course helped throughout the project. CSE307, System Analysis and Design: The lesson learned in CSE307 was crucial to my everyday work as the course taught me about Software Development Life Cycle (SDLC). In my project, we used the Agile method for SDLC. The course also taught me to make a report quite similar to this one which is also a huge bonus. CSE303, Database Management: This course taught me all that I needed to know about the back-end part of a project. I learned about data coming and going to the back end which is something that I had to keep in my mind during the design and implementation part of my project.

## 2.2 Related works

The project that I am doing for my internship is a self-learning app, although there are other self- learning apps and sites on the internet. Here are some of them that are given below-

**Coursera:** Coursera is a global online learning platform that provides access to online courses and degrees from leading universities to anyone, anywhere. It is an online learning platform that comes up with self-paced guided projects and on-demand courses on an extensive range of topics. To provide courses, the platform collaborates with universities and corporations such as Amazon Web Services, Google, and IBM.

**Khan Academy**: A customized learning asset for students of all ages. Khan Academy provides instructional videos, personalized learning dashboards, practice exercises allowing students to study at their own pace both inside and outside of the classroom.

**Codecademy:** Codecademy is an American online interactive platform that provides opportunities such as free coding classes in 12 different programming languages.

**10 minute school:** 10 Minute School is a Bangladeshi educational online platform that focuses on distributing quality educational and skill development contents all over Bangladesh.

# Chapter 3
# Project Management & Financing

## 3.1 Work Breakdown Structure

The Work Breakdown Structure (WBS) is a visual, hierarchical, and deliverable-oriented method that helps to complete complex, multi-step projects. It applies the divide-and-conquer paradigm to large projects, so tasks are completed faster and more efficiently. It is the hierarchical tree structure-property that outlines a project and breaks it down into more inadequate pieces. The goal of WBS is to make large projects more manageable by breaking down the complete project into smaller parts. Team members can work on different features at the same time, which ultimately leads to better productivity. We utilize the top-down approach to appear Work Breakdown Structure (WBS) to this extent. Using WBS will be effective for us to protect work quality and make it easy to synchronize the whole project. The WBS of “Self learning app ” project is given below:

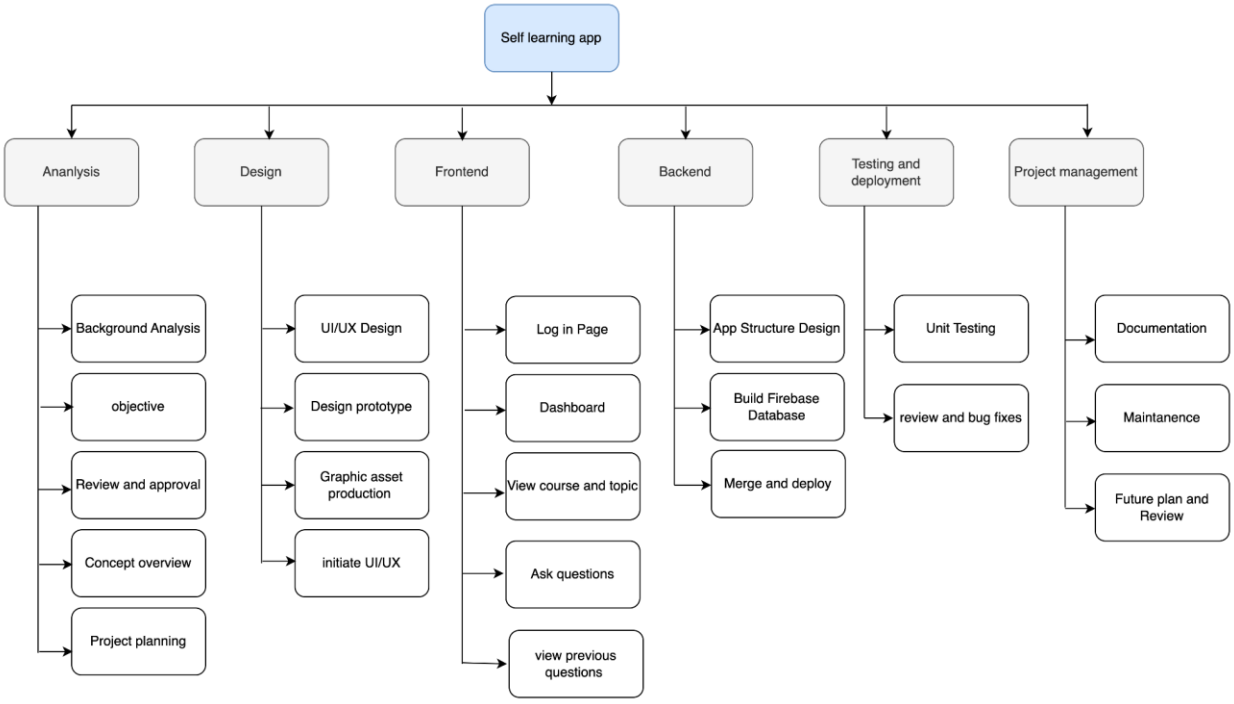



*Figure: Work breakdown structure of Self Learning App.*

## 3.2 Process/Activity wise Time Distribution

All the activities related to this project are listed in the WBS. We as a team attempted to Complete these tasks in a given time. The time for completing the project is estimated at 90 Days.

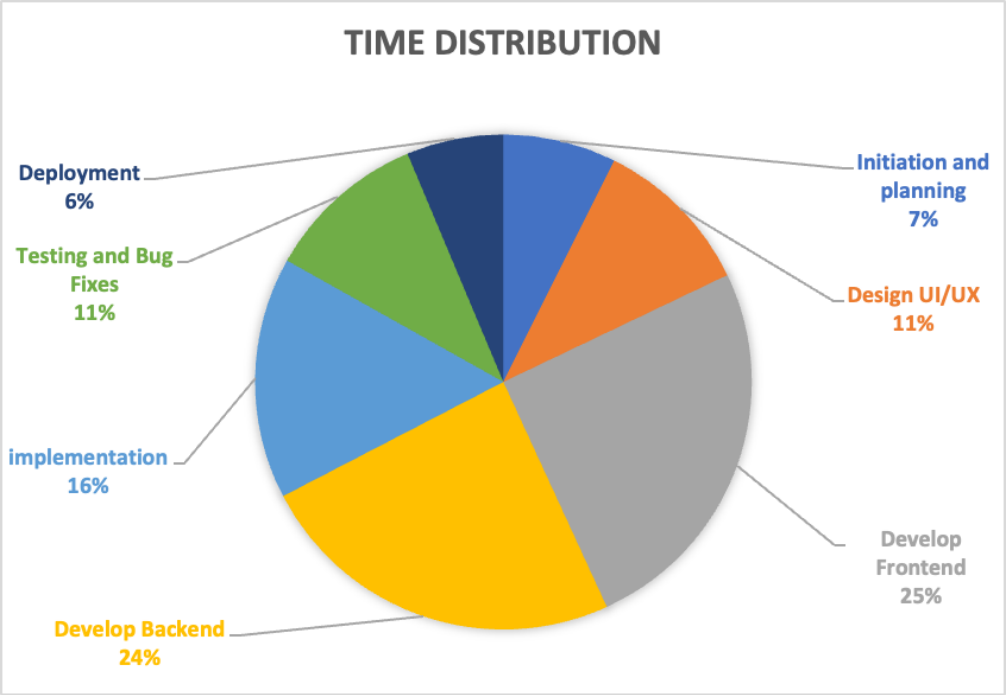



*Figure: time distribution of the project activities*

## 3.3 Gantt Chart

A Gantt Chart is a graphical presentation of a project schedule, commonly used in project management and is one of the most popular and beneficial techniques of showing activities (Tasks or events) displayed against time. It helps to estimate how long the project should take, determine the resources needed and plan in the order in which tasks will be completed. Work Breakdown structure appears as the sum of activities and to complete these activities a certain time is required which is portrayed within the Gantt Chart. It is also useful to monitor the project's advancement once it has begun. It helps to have a more precise vision of what should have been delivered by a certain time frame and when the project falls behind schedule; proper actions are taken to bring it back to track.

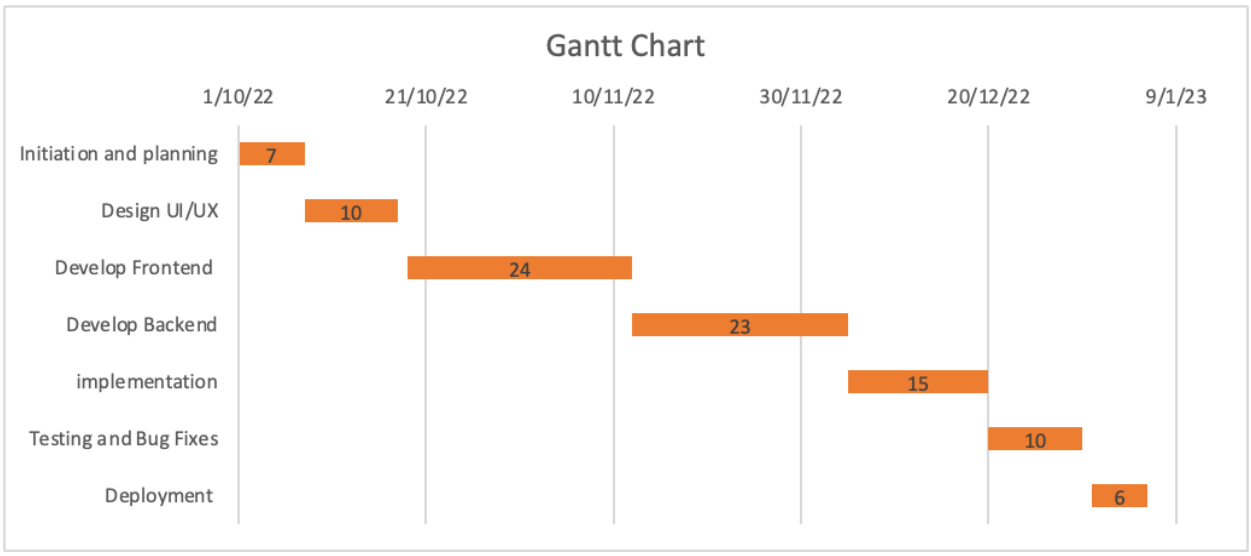



*Figure: Gantt chart of Self Learning App.*

## 3.4 Estimated Costing

The cost is an estimate based on the company's requirements for the system.

| **Sector** | **Cost** |
|---|---|
| Deployment | 30000Taka |
| Design UI/UX | 30000 Taka |
| Developed App | 30000 Taka |
| Testing | 30000 Taka |
| Result and Analysis | 30000 Taka |

Table: Cost Estimation

# Chapter 4 Methodology

## Agile methodology:

Agile methodology is a practice that promotes continue interaction of development and testing during the SDLC process of any project. Agile is the ability to create and respond to change. It is a way of dealing with, and ultimately succeeding in, an uncertain and turbulent environment. Agile is an iterative approach to project management and software development that helps teams deliver value to their customers faster and with fewer headaches. Instead of betting everything on a “big bang” launch, an agile team delivers work in small, but consumable, increments. Requirements, plans, and results are evaluated continuously so teams have a natural mechanism for responding to change quickly. All of these builds are provided in iterations, and each iteration lasts from one to three weeks. The Agile SDLC model separates the product into cycles and delivers a working product very quickly. This methodology produces a succession of releases. Teams use the agile development methodology to minimize risk (such as bugs, cost overruns, and changing requirements) when adding new functionality. In all agile methods, teams develop the software in iterations that contain mini-increments of the new functionality. Agile is an umbrella term for several methods and practices.

# Chapter 5 Body of the Project

## 5.1 Work Description

During the initial stages of the project, I was asked to create mockups of all the pages that will be designed for the mobile application using Figma. After some changes the designs were finalized, and I was asked to implement the pages using Android Studio and the Flutter framework. I was constantly reminded that my code had to follow convention, must be efficient and optimized for performance. I had to do a lot of research in order to achieve this. My code was run regularly and was checked and monitored by one of the senior developers. The primary goal of my work and my team was to create a jag free application with no compromise in the user experience. Many pages were initially rejected due poor UX design but eventually I developed a pattern in the design that could be persistently used and met industry standards. I also used multiple flutter libraries to help me develop my project better and faster.

## 5.2 System Analysis

Systems development is a systematic process that includes phases such as planning, analysis,

design, deployment, and maintenance. System analysis is a process of collecting and interpreting facts, identifying the problems, and decomposition of a system into its components. System analysis is conducted to study a system or its parts to identify its objectives. It is a problem solving technique that improves the system and ensures that all the components of the system work efficiently to accomplish their purpose. Analysis specifies what the system should do. This chapter contains parts of System Analysis that will help understand the project better. System analysis is important because it provides an avenue for solutions in the system through various tasks involved in doing the analysis.

### 5.2.1 Six Element Analysis

| **Process** | **Human** | **Non Computing Hardware** | **Computing Hardware** | **Software** | **Database** | **Network & Communication** |
|---|---|---|---|---|---|---|
| Can view previous questions | Student, admin | N/A | PC, Laptop, Mobile | Self-learning app | Firebase | WAN, LAN and Internet |
| Can select course and choose a topic | student, admin | N/A | PC, Laptop, Mobile | Self-learning app. | Firebase | WAN, LAN and Internet |
| can ask questions | student | N/A | PC, Laptop, Mobile | Self-learning app. | Firebase | WAN, LAN and Internet |
| Can edit / update | admin | N/A | PC, Laptop, Mobile | Self-learning app. | Firebase | WAN, LAN and Internet |

Table: Six Elements Analysis

## 5.2.2 Feasibility Analysis

Feasibility analysis is a study to assess the feasibility of a proposed project or system. It is an introductory survey for the system's examination. It intends to provide information to help a later in-depth inquiry. It is a measurement process of the software product in terms of how useful the developed product will be for the business from a functional point of view. A feasibility study is conducted based on many purposes to examine whether software features will be right in terms of development, implantation, the contribution of the project to the organization, etc. The report produced at the end of the feasibility analysis includes suggestions and reasonable arguments. The report will be helpful for the management to decide whether they should commit further resources to the proposed project. There are various measures of feasibility that help to decide whether a particular project is feasible or not. Main parts of feasibility study:

- **Technical Feasibility:**
  In technical feasibility, present resources both hardware and software along with required technology are analyzed to develop the project. The technical feasibility analysis gives a report on whether there exist correct required resources and technologies which will be used for the project development. It also evaluates the

  technical skills and capabilities of the technical team and it also analyzes whether current technology can be used or not. Self-learning app is built using flutter**.** Flutter is very popular in the modern software industry because the nature of User friendly platform is "highly scalable" and everyone involved in the making of this project had the skills to work. 'OIR' has skilled technical experts to complete and maintain this project and also has the resources to deploy the application to the cloud. 'OIR' also trained and guided me to complete this project with accuracy. Hence, it can be concluded that the project is technically feasible.

- **Operational Feasibility:** In operational feasibility degree of providing service to requirements is analyzed along with how easy the product will be to operate and maintain after development. An application must be user-friendly as well as it must work with no difficulties. Along with these, other operational scopes are determining the usability of the product and determining whether a suggested solution by the software development team is acceptable or not.

- **Economic Feasibility:** "Self learning app" is a simple mobile app built with complex technology. Users can easily navigate through the whole app as it is self-explanatory. Our project is developed from scratch using modern web development technologies, frameworks and it is highly scalable no matter how the user load is. It will also allow us to customize our project to our perception. As a result, the project can be called operationally feasible.

- **Feasibility analysis matrix:** In economic feasibility analysis, the cost and benefit of the project are analyzed. It is a detailed study where the cost of the project from all of the

different spaces are combined. For example, the cost for required software resources, UI/UX design and development cost, operational cost, etc. And then it is calculated whether the project will be financially beneficial for the company or not. The only service that is needed for the development of a “Self learning app” is just a mobile application. Flutter is an open-source UI software development kit created by Google. It is used to develop cross platform applications for Android, iOS and the web from a single codebase. Flutter is arguably the best tool for creating an application, at the moment. Its open-source libraries and the huge community support is driving the framework forward and has gained huge popularity recently. In terms of performance, it is only second to the native frameworks, though it makes up for the ease of learning and use. So the proposed application is justifiable in terms of cost and benefit and it ensures that the investment in this system provides a reasonable return. In conclusion, the project can be called economically feasible.

### 5.2.3 Problem Solution Analysis

| **Problem** | **Analysis** | **Solution** | **Constraints** |
|---|---|---|---|
| Data loss | Any time data can be lost for various reasons (Virus attack, attack by hackers, unfortunate system crash) | Database system is more secure and deleted, lost data easily can be restored | Internet Connectivity |
| Time Complexity | accessing a specific information requires a lot of time to find and compute | Database system is easily accessible and need less time | |
| Human Error | Invalid user inputs | Form validation from both client side and server side | Internet Connectivity |
| Analysis the data | Some problem occurs due to fetching manually different information | Database system can collect all the data and it is very easy to analyses the data | Internet Connectivity |
| Steal Data | Data can be stolen | Authentication | Internet Connectivity |

Table: Problem Solution Analysis

## 5.3 System Design

System design is the process of designing the elements of a system such as the architecture, modules, and components, the different interfaces of those components, and the data that goes through that system. System design is deriving a solution which satisfies software or system's requirement. We can define software design as translating requirements into software components and interactions among them. Any design may be modeled as a directed graph made up of entities with attributes that participate in relationships. A design represents the system, how it will work, and how it can be assessed for quality. Design is the way to translate a client's requirements into a system or software product accurately. Software architecture provides an abstract representation of the overall structure of software. This chapter contains numerous design-level diagrams to have a clearer understanding of the system and flow of data.

### 5.3.1 Rich Picture

A rich picture is a way to explore, acknowledge and define a situation and express it through diagrams to create a preliminary mental model. A rich picture helps to open discussion and come to a broad, shared understanding of a situation. It comprises pictures, content, images, and symbols, which are all utilized to graphically demonstrate the circumstance. A rich picture illustrates how the application works.


*Figure: Rich picture of Self Learning App.*

## 5.3.2 UML Diagrams

UML, which stands for Unified Modeling Language, is a way to visually represent the architecture, design, and implementation of complex software systems. When we are writing code, there are thousands of lines in an application, and it is difficult to keep track of the relationships and hierarchies within a software system. UML diagrams divide that software system into components and subcomponents. Use case diagram model shows how users, displayed as stick figures called “actors,” interact with the system.

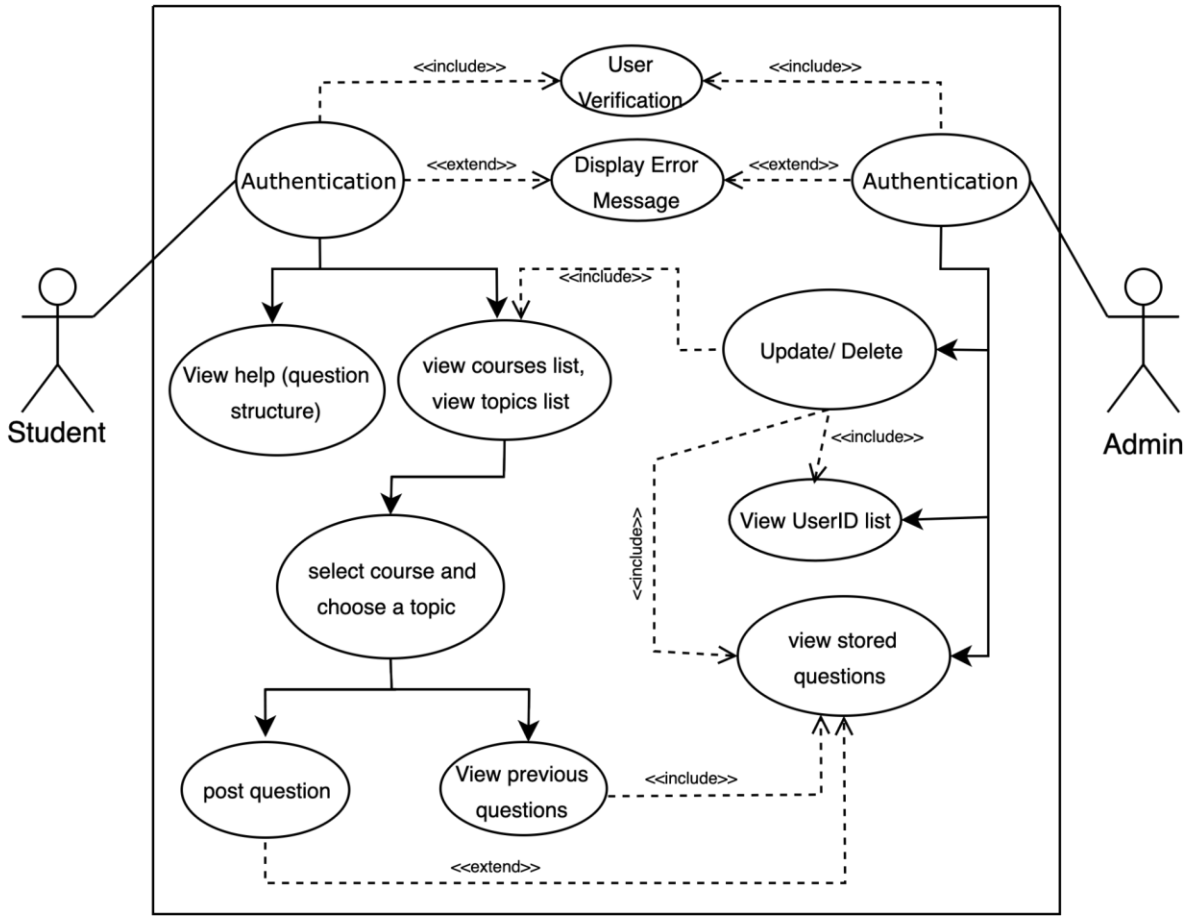



*Figure: Use case diagram of Self Learning App.*

## Process Flow Diagram

A process flow diagram shows us the overall overview and state of a process from its start to finish. It helps us to visualize the different state and decision points of a process and how the underlying logic of our process will be based on.

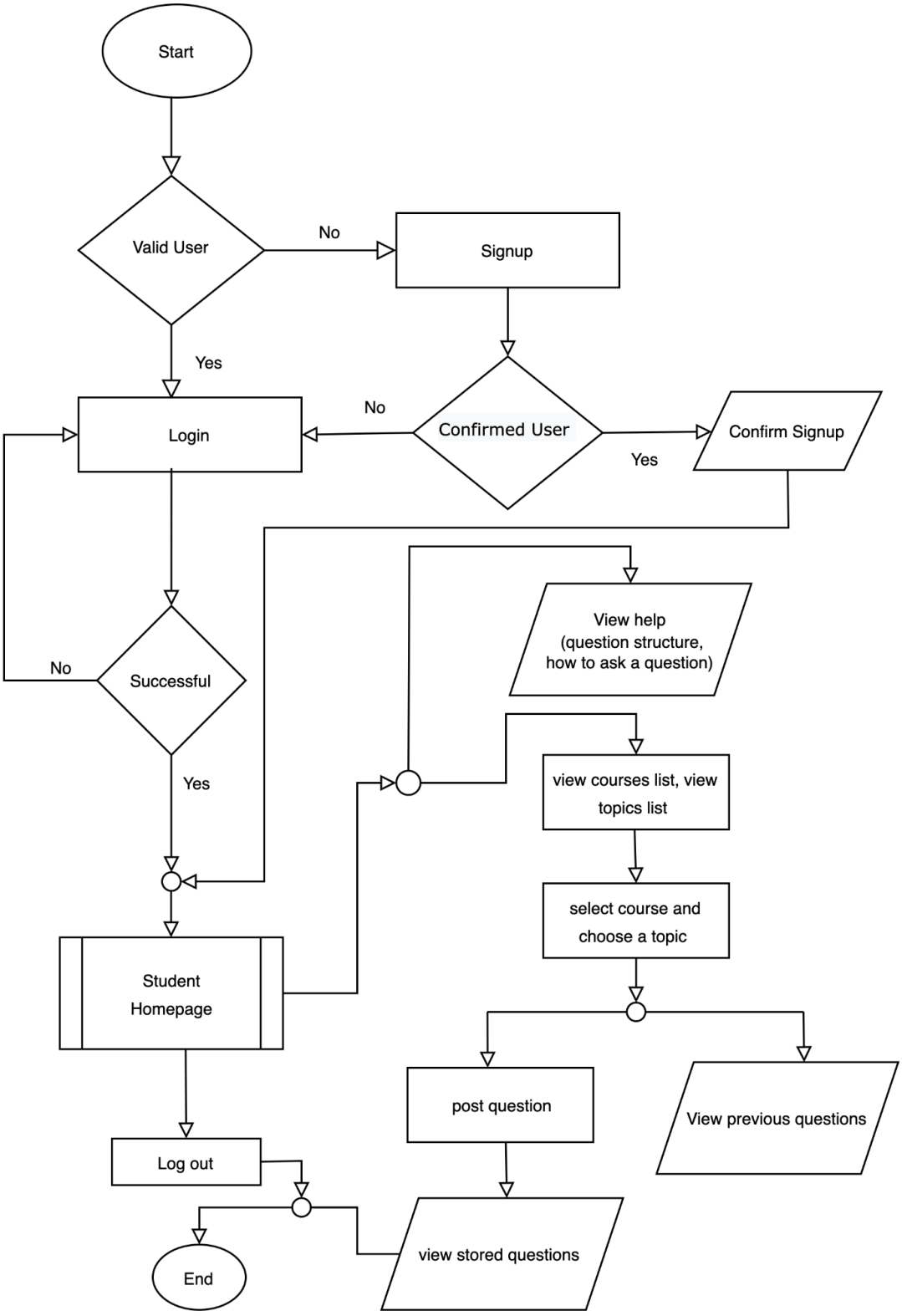



*Figure: Process flow diagram for Student user.*

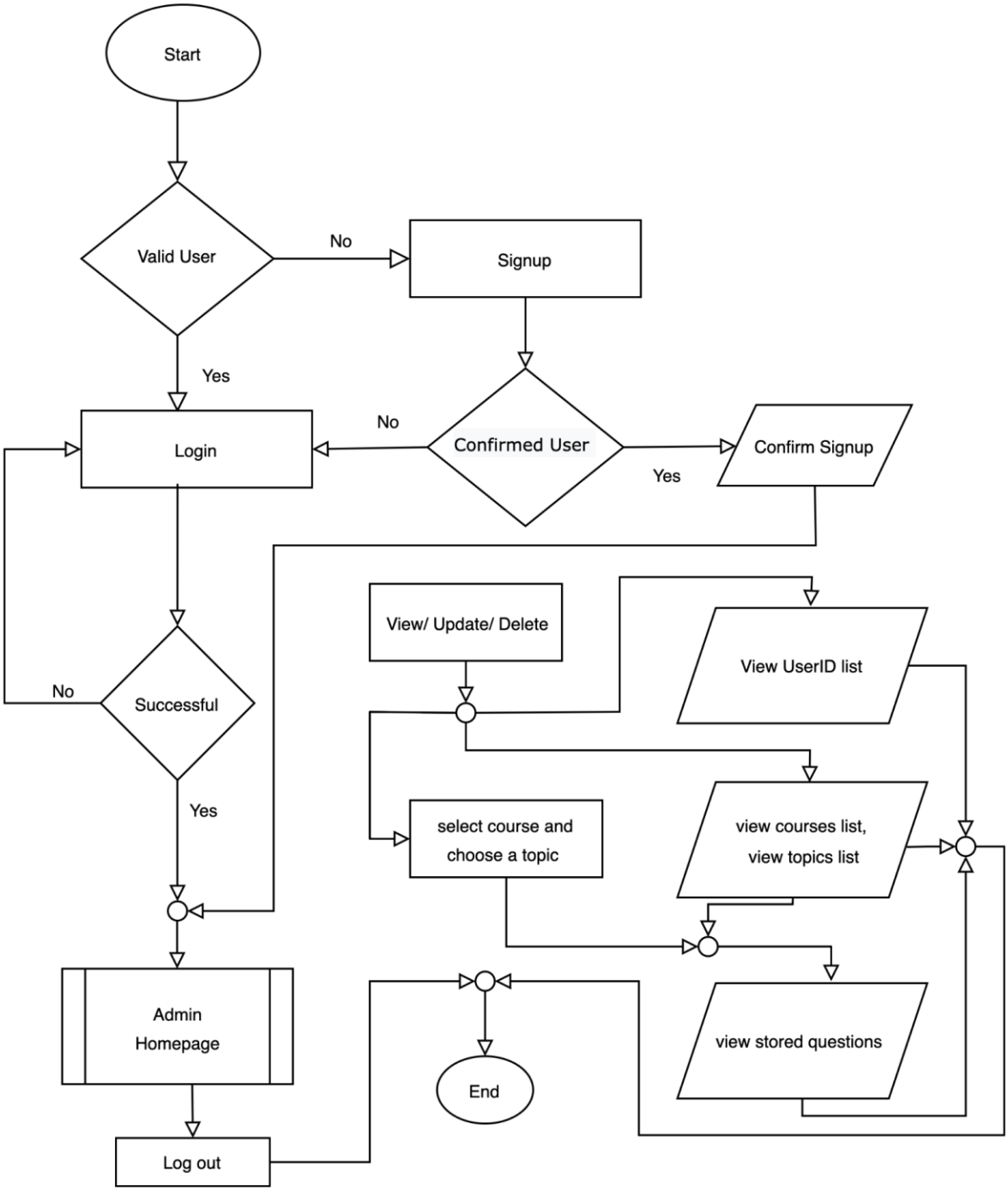



*Figure: Process flow diagram for Admin user.*

## 5.3.3 Functional and Non-Functional Requirements

### Requirement Analysis

Requirement analysis involves all the tasks that are conducted to identify the needs of different stakeholders. Therefore, requirement analysis means analyzing, documenting, validating and managing software or system requirements. Great quality requirements are documented, actionable, measurable, testable, and traceable, helps to identify business opportunities, and are defined to facilitate system design as well.

The software requirements are descriptions of features and functionalities of the target system. Requirements convey the expectations of users from the software product. The requirements can be obvious or hidden, known or unknown, expected or unexpected from the client's point of view. Requirements can be divided into two types; functional and non-functional requirements.

### Functional Requirements

The functional requirement typically specifies something a system should do. Functional requirements are features that must be included in an information system. Functional requirements help to satisfy the business requirement and it needs to be acceptable to the users. Functional requirements are the operations and activities that a system must be able to perform. Functional requirement defines applications nature and components as well as what these components are supposed to accomplish. The following functional requirements are assembled using requirements gathering methods. The inputs, process, output, precondition and post condition for functional requirements are discussed below:

| **Name of the Function:** User can post a question | | |
|---|---|---|
| **Input:** | **Process:** | **Output:** |
| Enter user ID and password. | Verify user ID and password. | Successfully logged in. |
| Select the course and choose the topic. | Load courses and topic list. | Display course and topic list. |

| | | |
|---|---|---|
| Post a question on the topic. | Find selected course and topic list.<br><br>Store questions in the database. | The question has been successfully posted. |
| **Precondition:**<br>Users should be familiar with this system**.**<br>Users must have a valid account in the system.<br>Users must have an android device. | | |
| **Post condition:**<br>Proper database connection.<br>All details are recorded in the system.<br>The system should be able to extract the data in a logical or physical container [memory of the user, printing format].<br>The system should return to the main option. | | |
| **Alternate Options:**<br>If the user ID is not valid the system gives a response to the user.<br>If the password is not valid the system generates an error message.<br>If the user forgets the password, the user system gives a new set up password option.<br>If there is no information and data then the system returns a message. | | |
| **Side Effects:** N/A | | |

Table: Functional Requirement 1

| |
|---|
| **Name of the Function:** User can view previous questions |

| Input: | Process: | Output: |
|---|---|---|
| Enter user ID and password. | Verify user ID and password | Successfully logged in. |
| Select the course and choose the topic. | Load courses and topic list. | |
| | Find selected course and topic list. | Display course and topic list. |
| View previous question. | Load previous questions from the database. | System will display previous posted questions list on selective topic |

**Precondition:**

Users should be familiar with this system**.**

Users must have a valid account in the system.

Users must have an android device.

**Post condition:**

Proper database connection.

All details are recorded in the system.

The system should be able to extract the data in a logical or physical container [memory of the user, printing format].

The system should return to the main option.

**Alternate Options:**

If the user ID is not valid the system gives a response to the user.

If the password is not valid the system generates an error message.

If the user forgets the password, the user system gives a new set up password option.

If there is no information and data then the system returns a message.

**Side Effects:** N/A

Table: Functional Requirement 2

## Non-Functional Requirements

A non-functional requirement is a qualitative requirement for a project. It judges the software system based on responsiveness, usability, security, portability, etc. Non-functional requirements are described below:

- **Reliability:** The system is well trusted. Admin and users can use this software very easily. The software is made so simple that users can understand the interface and procedure very clearly. The system is built with the latest web technologies, well maintained and scalable, so the application is reliable.

- **Performance:** The main purpose of building this simple website with complex frameworks is to gain extra performance. It is required to exhibit and to meet the user's needs. It describes the acceptable throughput rate and a satisfactory response time. Users tend to spend more time on the website when it loads faster, and this website should provide a smooth experience to all kinds of users.

- **Security:** Security requirements are another leading type of non-functional requirement. The system must assure that all data inside the system or its part will be protected against malware attacks or unauthorized access. All the information from is secured. The website deals with a limited number of data but the architecture follows all the latest security measurements. Only admins can perform administrative tasks and appointed developers have access to the core code. So the system is well secured.

- **Scalability:** The system will meet the performance requirements under the highest workload.
- **Portability:** Our system will support all operating systems Windows, Linux, Mac OS, Android, iOS. Users can access the system from any web browser.
- **Compatibility**: We will also design applications for mobile users. Application must support on android devices running on OS version > 5.0 and iPhone devices running on OS version > 7.0.
- **Availability:** The system must be accessible for a user at any given point in time.

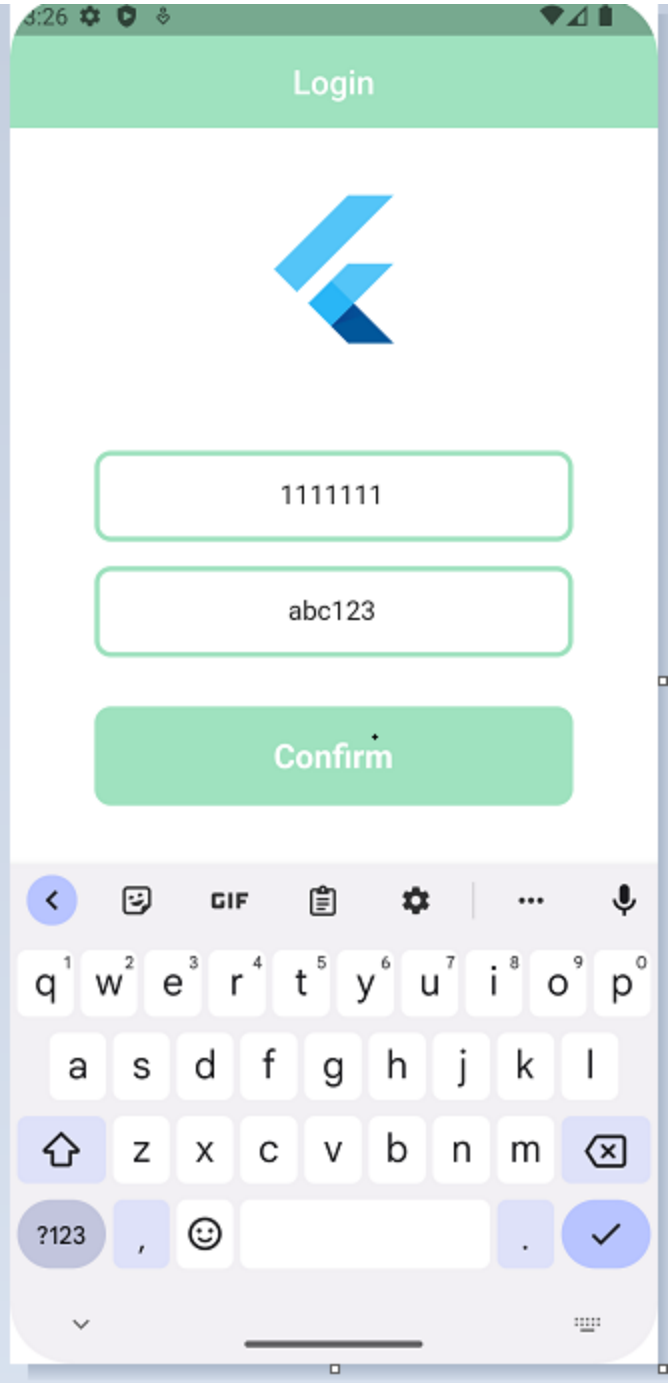
- **Maintainability:** The system must define the time required for a solution or its component to be fixed, changed to increase performance or other qualities, or adapted to a changing environment.
- **Usability:** Users should be able to complete the main functions once they see the interface. The user interface must be user-friendly and exhibit conceptual integrity.
- **Localization:** The system or its element must fall well in line with the context of the local market-to-be. The context includes local languages, laws, currencies, cultures, spellings, and other aspects.

## 5.4 Product Features

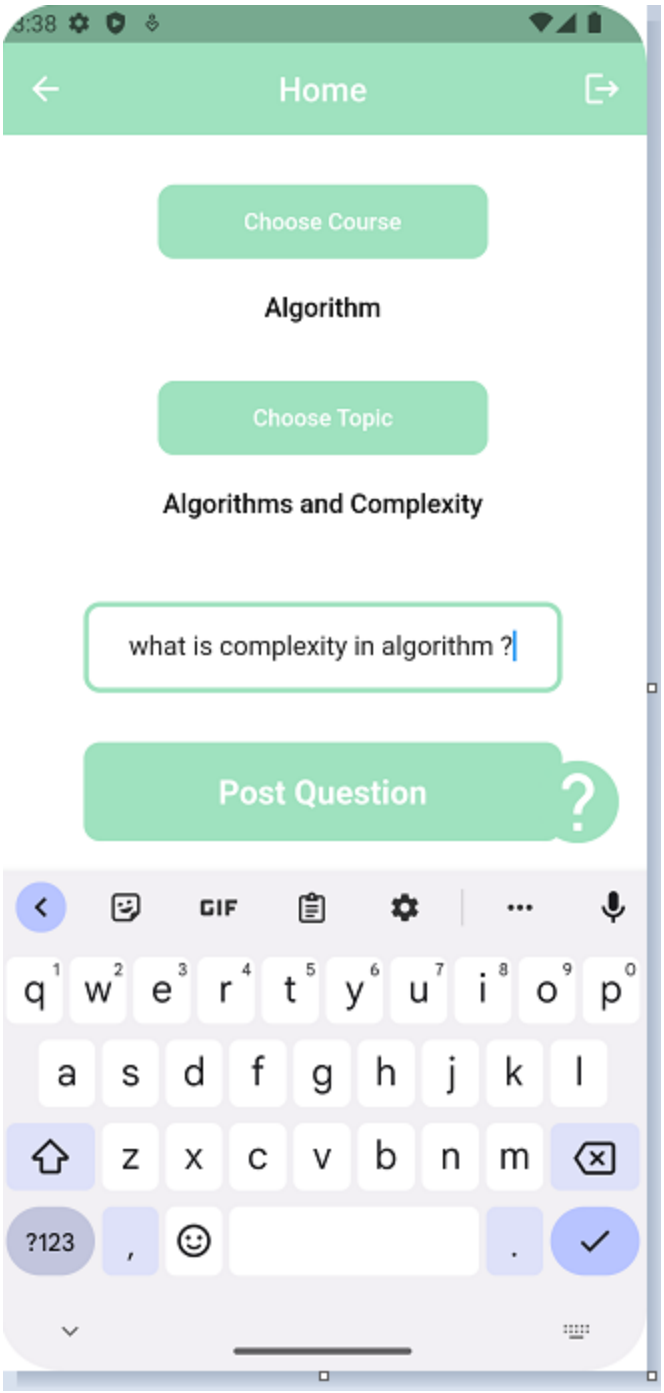
Product features defines the functionality of the product and how it will benefit the users, and everyone involved with the system. The features of our mobile application are discussed below.

### 5.4.1 Input

The Self learning application's input will be the student login and it will be automatically created before. Here the student will have to input ID and password in order to login.

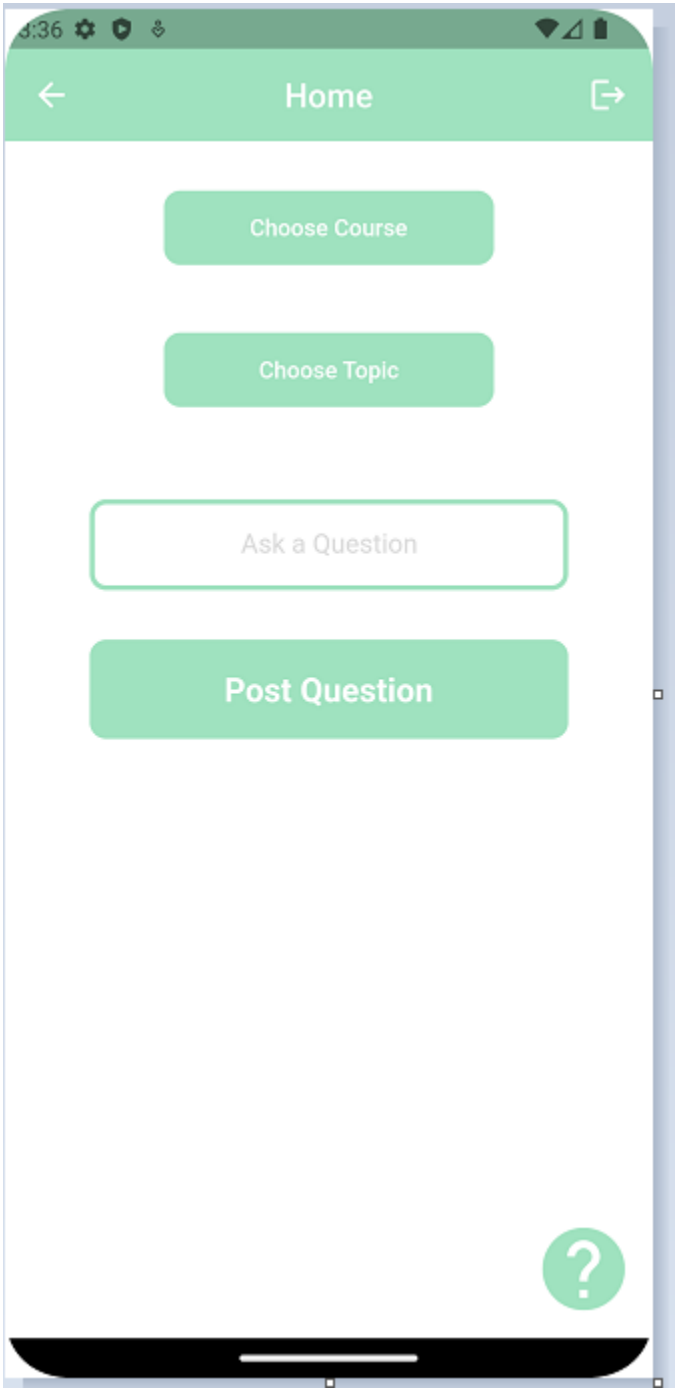


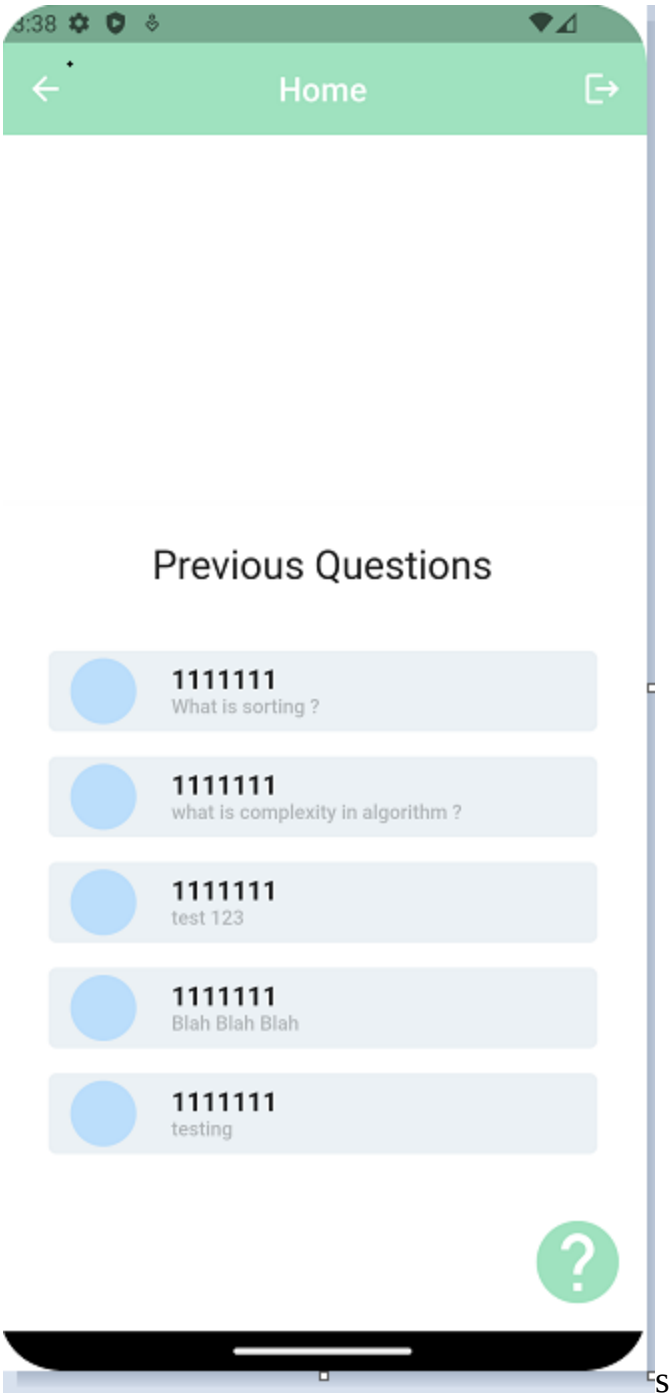

Students can post questions in the blank question bar option from the chosen topics by themselves. After selecting the post button, questions will be posted.


Home
Choose Course
Algorithm
Choose Topic
Algorithms and Complexity
what is complexity in algorithm ?
Post Question

## 5.4.2 Output

Two of the main output of the system will be the homepage after they log in successfully and the other one, students can also view questions which are posted by other students from specific course and topic.





S

### 5.4.3 Architecture

Three-tier architecture is one of the specially used architectures for developing applications. This architecture is also defined as a multi architecture or N-tier architecture.

Developers use this approach to preserve the processing, data management, and presentation features physically and logically separated. in order that those specific functions may be stored in separated host servers. That is very beneficial when scaling the application. In the early days we needed to reproduce the entire application in each host device to scale it up. But with this architecture specific tiers can be hosted in separate devices to scale up the application. Presentation tier: User Interface is implemented right here. It's far from the top most layer. The feature of this layer is to translate responsibilities and outcomes right into a shape that the user can apprehend.

Logic tier: Additionally known as the domain layer. This tier includes all of the business logic of the application. Algorithms, data manipulations are implemented right here.

Data tier: This tier saves and retrieves data from a database or file system. The data from this tier are sent to the logic layer for processing. API calls also are implemented in this tier.

The main benefit of this architecture is, if we do a change in a tier then it isn't always affecting other tiers.

# Chapter 6 Results & Analysis

While working on a project, we always try to do our best to get the best possible outcome. If we don't get the desired result, all the hard work will go in vain. To get the best result, at First, we figured out the bugs and fixed them. Because without fixing it, we can't move on. This application was built to satisfy the users, to save their time as well as solve their problem. The UI part was designed in a way so that people from all classes can use this software easily. They don't need much technical knowledge to use it. The aim was to create a modern looking and modern feeling mobile application that would attract any user using the app for the first time.

Students here can easily view courses from the course list and choose a particular topic. They can post a question and see previous questions which are posted by the other students on their interesting topic. It will help them to learn any topic willingly because questions always trigger the mind to find out the answer. By doing this they can make a huge change in their learning process. Ultimately their improvement will be getting better using this application.

So far, the application has been implemented and the views have been tested on different devices. The code has been optimized for performance and thoroughly inspected on a daily basis.

# Chapter 7 Project as Engineering Problem Analysis

## 7.1 Sustainability of the Project/Work

The sustainability of the product refers to its ability to be managed and refreshed. In this modern world, new applications are released every day, and these applications need to be maintained and continuously updated for their user base. The use of smartphones and the internet have dramatically increased among all classes of people in Bangladesh. The growth suggests that it would increase even further in the future. Community sustainability means how much and how actively the users will support the project. Support comes in many forms, such as visiting the app, giving feedback, referring to other people, etc. In another way, Community Sustainability is how the product is carried on with-in the community over time. The project being developed at OIR can achieve community sustainability, with regular and incremental patches and updates. Listening to the community feedback and demand is essential here and over time a strong brand image can be formed to thumbtack the application within the community. "SELF LEARNING APP" is an application component that currently only has a mobile app version so the application is just an intelligent implementation such work can provide ultimate cost resource savings, increasing the success of the project. Financial stability is a characteristic of a financial system that dissipates financial imbalances that occur naturally in financial markets or as a result of substantial adverse effects. The project models in OIR were shaped with financial sustainability in mind. Self-learning app is built using a flutter framework with a dart programming language. Firebase database is used here and for the mobile application we have used other library functions. So no matter the user load, the application is able to scale at any point. As the user of the app grows, all of them will be able to experience a smooth, effortless interaction with the app which will draw attraction. As the users will grow, it can be said that it is sustainable in terms of community. A project is financially sustainable when the project's running costs are maintained by the revenue generated. An application's running cost includes a few things. As "Self learning app" is built using these tools and frameworks. Thus, the project can be determined as financially sustainable. Organizational sustainability is related to how the organization will continue to operate the release of the application. Organizational sustainability entails having the leadership, talent, global knowledge, and change strategies required to meet the particular problems that digital learning face today .OIR has plans to expand beyond app. The main goal of this project is to evaluate a proper and efficient learning support system to make sure the students can be benefited mainly.

## 7.2 Social and Environmental Effects and Analysis

Web Application and Mobile Application are popular among people for the characteristics they offer to the users. They make interaction with people quite more straightforward. People experience a lot of advantages of using several IT digital tools in different forms of their everyday work. "Self-learning app" is simple to reach more users, get them to know about the application.

**Social effect:** One of the key components is the scale, it is about understanding how many students this solution is reaching. The social effect of OIR, given that it was established recently, is very low now. But

all this can be changed drastically as soon as the app launches, with proper marketing and campaigning. The positive social impact of the app, given the project model, is anticipated to be very high, changing the way of learning process for students.

**Environmental effect:** The environmental impact of the application being developed at OIR is very low. There are no possible scenarios where the result of the application could harm the environment. Once the application gets up and running, the only interaction will be between the student and the mobile device and since the location is virtual, Therefore, arguably the only environmental effect may be ones due to the usage of electricity.

## 7.3 Addressing Ethics and Ethical Issues

In today's world, there is an immense amount of data generated every day, which sometimes ends up with data collection, hacking, cybercrimes, etc. And some rules and ethics are needed to be followed when working on an application. Since the "Self learning app" is currently the only informative mobile app, we believe that the application does not breach any code of conduct of application release and development since they all have been taken into serious concern. At the "Self learning app", there is only a collection of limited and relevant user data. It collects the data strictly related to queries. It only collects limited amounts of data if the user interacts. it does not let any service, any application, or any third party have access to the collected data.

# Chapter 8 Lesson Learned

## 8.1 Problems Faced During this Period

Since this platform was completely new to me, I faced a lot of problems learning and practicing during the tasks that were assigned to me. Also, I had to learn many new libraries, APIs, and file formats to complete the project. While working on my routing feature of the project, I faced some problems because I had no prior knowledge of the flutter framework. For the most part, I used dart as the programming language to implement the functionality of my project. The biggest limitation of my internship was adapting to the work environment and getting along with the people with whom I work. Being an introvert myself, it was difficult for me to open up to everyone, thus creating a communication gap. This led to a slow start to my work at the beginning, especially when it came to making changes and finalizing the designs. Overall, there were quite a few interruptions of my workflow for which I had to compensate and work overtime so that i don't fall behind on schedule.

## 8.2 Solution of those Problems

The problems that I faced during my internship were more of personal problems than anything. I learned that I have to be more open and communicative when starting work in a new environment. This includes having confidence in the work that I'll be doing. Once I opened up and started communicating freely, I saw that work was being done faster and everybody was willing to lend a helping hand, especially to an intern. To overcome the difficulties I spent more and more time on research and fact-finding. Also, most of my

time was spent reading the documentation of different libraries and blog posts published on the internet for different errors I have encountered. Doing my internship I am taught that when dealing with a huge volume of work, I should not procrastinate or slack off. When the workload especially piled up.

# Chapter 9 Future Work & Conclusion

## 9.1 Future Works

Though the tasks I have been assigned to have been completed, the project at OIR, it will be still at the development phase with testing and the deployment still needed to be done. As all modern-day software and applications, our app will also go through regular patch updates upon release which will improve the performance of the off, UI and UX. To the best of my knowledge, more new courses as well as new topics will be added to the next work of the project. The application will be updated at a later time regarding users experience and feedback after they start to use it. Though Icon Animation, which is planned for the distant future, has big impact on the performance of an app and must go through rigorous testing, this will be a feature of the app in the future. This self-learning app is just the beginning and there are other necessary features that are to be added in the imminent future. In future development. The whole idea of making this application with the latest technologies is to implement a highly scalable system.

## 9.2 Conclusion

With the front-end part of the project almost finished and my part of the internship project coming to an end, I can confidently say that both me and my superiors are satisfied with my contributions.

The time spent and the experience gathered at OIR was beyond amazing. I learnt so much in the 3 months of working at OIR. I had the privilege of working with an office of industrial relationships. I was able to get a peek at the world of mobile application development and the culture surrounding it. There were many hurdles, but the positives weigh more than the negatives. Some of the most positive things that I got out of it was being able to learn about responsiveness, industry standards and the workflow of app development. The job taught me to work independently, be patient and always ask for help when needed. Throughout this internship program, I discovered a developer's working life. Besides, the project obliquely assisted me to discover individually, lead a more managed lifestyle and make the mindset to solve problems. My programming skills and googling skills have increased multiple folds, and I am thankful to have been a part of such a wonderful experience that helped me with all kinds of problems, a community that I fell in love with during my internship.

# Bibliography


[1] W. contributors, "Dart (programming language)," 31 August 2021 . [Online]. Available: https://en.wikipedia.org/wiki/Dart_(programming_language)#Usage.

[2] S. Brotherton, R. Fried and E. Norman, "Applying the work breakdown structure to the project management lifecycle," *PMI Global Congress Proceedings,* p. 1, 19 October 2008.

[3] M. GRANT, "Investopedia," 26 August 2021. [Online]. Available: https://www.investopedia.com/terms/g/gantt-chart.asp.

[4] A. Alshamrani and A. Bahattab , "A comparison between three SDLC models waterfall model, spiral model, and Incremental/Iterative model," *International Journal of Computer Science Issues (IJCSI),* vol. 12, no. 1, p. 106, 2015.

[5] N. Peterheria, "producttribe," 30 January 2018. [Online]. Available: https://producttribe.com/project-management/agile-sdlc-guide.

[6] "tutorialspoint," [Online]. Available: https://www.tutorialspoint.com/sdlc/sdlc_agile_model.htm. [Accessed 1 August 2021].

[7] W. contributors, "Systems analysis," 7 August 2021. [Online]. Available: https://en.wikipedia.org/w/index.php?title=Systems_analysis&oldid=1037578565. [Accessed 1 September 2021].

[8] W. contributors, "Systems design," 18 June 2021. [Online]. Available: https://en.wikipedia.org/w/index.php?title=Systems_design&oldid=1029151409. [Accessed 2 September 2021].

[9] . G. Booch, J. Rumbaugh and I. Jacobson, Unified Modeling Language User Guide, The, 2nd Edition, Addison-Wesley Professional, May 19, 2005 .

[10] T. Contributor, "TechTarget," July 2020. [Online]. Available: https://whatis.techtarget.com/definition/use-case-diagram. [Accessed 1 Septemmber 2021].

[11] W. contributors, "Entity–relationship model," 17 August 2021. [Online]. Available: https://en.wikipedia.org/w/index.php?title=Entity%E2%80%93relationship_model&oldid=1039292306. [Accessed 2 September 2021].

[12] "Financial stability," 11 October 2020. [Online]. Available: https://en.wikipedia.org/w/index.php?title=Financial_stability&oldid=983045097. [Accessed 2 September 2021].

[13] "actioninclusion," [Online]. Available: https://actioninclusion.org/leadership-diversity-change/what-is-organizational-sustainability/. [Accessed 1 August 2021].

# An Undergraduate Project on the Self Learning App

By

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**Student ID: 1731396**

**Autumn, 2022**

## Consent from Supervisor

The student modified the internship final report as per the recommendations made by his/her academic supervisor and/or panel members during and/or before final viva, and the department can use this version for archiving as well as the OBE course material for CSE499.

Signature

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Professor

Department of Computer Science & Engineering