Independent University **Bangladesh (IUB)**

IUB Academic Repository

Internship Reports Autumn 2022

2022-10-13

An Undergraduate Internship on Self Learning App

Abrar, BM Fahim

Independent University, Bangladesh

https://ar.iub.edu.bd/handle/11348/716

Downloaded from IUB Academic Repository



An Undergraduate Internship on Self Learning App

By

BM Fahim Abrar
Student ID: 1630263
autumn, 2022

Supervisor: Prof. Yusuf Mahbubul Islam
Dean

Department of Computer Science & Engineering
Independent University, Bangladesh

October 13, 2022

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, BM Fahim Abrar, hereby certify that none of the work that has been done in this report is plagiarized or copied from anywhere. No help was asked for during the completion of the report from a third party organization except the one that I have worked for in the last 3 months as an intern. It has been completed under the guidance of Prof. Yusuf Mahbubul Islam. I also certify that all my work is original which I have learned during my internship. All the sources of information used in this project and report have been duly acknowledged in it.

Signature: Fahim Date: 01-02-23

BM Fahim Abrar

Acknowledgement

I would like to start by thanking The Almighty Allah for giving me the strength, patience and the capability to endure hard work and pressure. I would also like to thank my father and my mother for supporting me every single day and for giving me the opportunity to be here. I would also like to thank the Office of Industrial Relations, SETS for giving me the opportunity to work for them.

I would also like to express my sincerest gratitude and appreciation to my internal supervisor Prof. Yusuf Mahbubul Islam, Dean, School of Engineering, Technology & Sciences, Independent University, Bangladesh (IUB), who gave me all support by taking his time out to guide and keep motivating me to complete the project patiently.

I express my deep gratitude to external supervisor Dr. Omar Faruk, for appointing me as an Intern. Without his extreme energetic support and guidance, I could not finish the project successfully. Last but not the least, I would like to thank my parents and other family members for their eternal support that they have always given to me.

Finally, I would like to thank Independent University Bangladesh, and all the respected faculties and staff who were a vital part of my bachelor's program in CSE. My respect and heartfelt gratitude go to my faculties and mentors who shared their knowledge with me to teach and prepare me to achieve success in my future.

Letter of Transmittal

Department of Computer Science and Engineering School of Engineering and Computer Science Independent University, Bangladesh

Subject: Submission of Internship Report.

Dear Sir,

I am hereby submitting my Internship Report, which is a part of the Bachelor Program in Computer Science and Engineering curriculum. It is a great achievement to work under your active supervision. This report is based on, “Internship at Office of Industrial Relations, SETS”. I have got the opportunity to work at the Office of Industrial Relations, SETS for three months, under the supervision of Prof. Yusuf Mahbubul Islam. This internship has given me both academic and practical exposures. The internship has given me the opportunity to develop a network with the corporate environment. I tried to make this report as much informative as possible with the experience I have gained during my internship period. To prepare a well-organized internship report, I have followed the guidelines and described the required fields with sufficient details. I, however, sincerely believe that this report will serve the purpose of my internship program.

I shall be highly obliged if you are kind enough to receive this report and provide your valuable judgment. It would be my immense pleasure if you find this report useful and informative to have an apparent perspective on the issue.

Sincerely,

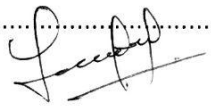
BM Fahim Abrar

Id: 1630263

Department of Computer Science and Engineering Independent University, Bangladesh

Evaluation Committee

.....

Signature 

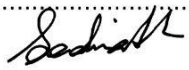
.....

Name Subrata Kumar Dey

.....

Panel Member-1

.....

Signature 

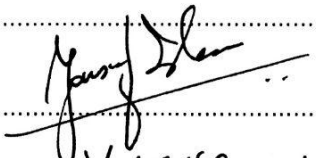
.....

Name Dr. Saadia Binte Alam

.....

Panel Member-2

.....

Signature 

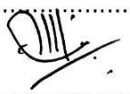
.....

Name YUSUF M ISLAM

.....

Supervisor

.....

Signature 

.....

Name

.....

Head, Department of Computer Science & Engineering

Abstract

Internship is defined as obtaining practical experience from various organizations, which helps in the formation of a connection between theoretical and practical knowledge. It is very important because it is the first time for a student to acquire a keen practical knowledge from the different organizations. This document contains the research, architectural design, user interface design, testing, debugging and future scope of work at the Office of Industrial Relations, SETS, IUB. This app will create a platform of opportunity for students to ask more questions regarding their topic. This will invite critical and analytic thinking of students about their lecture. Even they will be aware of questions asked by their fellow classmates.

Keywords— OIR, Project Management, SETS, self-learning app

Contents

Chapter – 1: Introduction 10

1.1 Background of the work 10

1.2 Objectives 10

1.3 Scope 11

Chapter – 2: Literature Review 11

2.1 Relationship with Undergraduate Studies 11

2.2 Related Works 13

Chapter – 3: Project Management & Financing 14

3.1 Work Breakdown Structure 14

3.2 Process/Activity Wise Time Distribution 16

3.3 Gantt Chart 18

3.4 Process wise resource allocation 19

Chapter – 4: Methodology 20

Chapter – 5: Body of the project 23

5.1 Work Description 23

5.2 System Analysis 23

5.2.1 Six Element Analysis 24

5.2.2 Feasibility Analysis 28

5.3.3 Problem Solution Analysis 29

5.3.4 Effect and Constraint Analysis 29

5.3 System Design 30

5.3.1 Rich Picture 30

5.3.2 UML Diagrams 31

5.3.2.1 Use Case Diagram 31

5.3.2.2 Data Model Diagram 32

5.4 Testing 33

5.4.1 Input 33

5.4.2 Output 35
Chapter – 6: Result and Analysis 39
Chapter – 7: Project as Engineering Problem Analysis 43
7.1 Sustainability of the Project/Work 43
7.2 Social and Environmental Effects and Analysis 44
7.3 Addressing Ethics and Ethical Issues 45
Chapter – 8: Lesson Learned 46
8.1 Problems Faced During this Period 46
8.2 Solution of those Problems 46
Chapter – 9: Future Work and Conclusion 47
9.1 Future Works 47
9.2 Conclusion 48
Bibliography 49

List of figures

Figure 1 *Work Breakdown Structure* 15
Figure 2 Critical Path 17
Figure 3 Gantt chart 18
Figure 4 Resource Allocation Histogram 19
Figure 5: Agile Methodology 21
Figure 6 Rich Picture 30
Figure 7 Use Case Diagram 31
Figure 8 ERD 32

List of tables

Table 1 Critical Path Table 16
Table 2 Resource Allocation Table 19
Table 3 Six Element Analysis (1) 24
Table 4 Six Element Analysis (2) 25
Table 5 Six Element Analysis (3) 26
Table 6 Six Element Analysis (4) 27

Chapter – 1: Introduction

1.1 Background of the work

Questions can review, restate, emphasize and summarize what is important. Asking questions simulates discussion and creative and analytical thinking. Our brain learns via asking questions about the unknown, which determines how we are learning. Asking the right questions helps a student to learn faster, it activates our brain neurons faster. Our brain has about 86 billion neurons which are stimulated during questioning. Any lecture is not complete without students asking questions. In recent times due to online classes the characteristic attitude of problems requiring resolution for a student has decreased. A teacher can deliver knowledge to a standard that is prescribed and only by asking questions can a student implement the ideas in their brain. Introvert students can find it very hard to raise a question in front of their classmates. A platform for asking questions easily is the key to learn faster and catch topics without doubt. Our internship is aimed at delivering a platform which will encourage students to explore and refine their understanding of their lecture topic.

1.2 Objectives

Our project has the intention of achieving a platform for all students to ask questions about their lecture. Faculties will solve the asked questions on the platform in their respective classes. With our self-learning app a student can ask questions more quickly or frequently than is usual. This will help all types of student, introvert and extrovert to ask questions in a relaxed manner. In child psychology 80% of dialogues are questions that is why kids learn faster. With this app, we are trying to simulate this idea. We want to create more questions. A student can access all the questions asked by classmates and seniors about their topic, which will create more questions and in turn more access to knowledge.

1.3 Scope

The scope of the project is a necessity to ensure the accomplishment of a project. As we are making a new system we were heavily dependent on user feedback and background of our project. In our app every question will be counted as a valid inquiry

1. Create an app where students can access all the inquiries asked by classmates and seniors.
2. Enrolled students with valid email can add as many questions as they want.
3. Feedback will be provided through respective faculties during lecture.
4. Faculties will encourage students to add inquiries via app.
5. A demo mind map will help students to ask questions with suggestions.
6. Login to the system.

Chapter – 2: Literature Review

2.1 Relationship with Undergraduate Studies

Knowledge and skills gained from undergraduate courses have helped in the development of "Self-learning app" project. It would have been more difficult if these courses were not covered before working on this project.
Some of the courses are:

CSE 213 Object-Oriented Programming:
Object-oriented programming is based on the concept of objects. In object-oriented programming data structures, or objects are defined, each with its own properties or attributes. Each object can also contain its own procedures or methods. Software is designed by using objects that interact with one another. OOP can also be used in manufacturing and design applications, as it allows people to reduce the effort involved. For instance, it can be used while designing blueprints and flowcharts. It helped to write the real time system design that are used to develop the" Self-learning app"

CSE 303 Database Management:
A database management system (DBMS) is a software package designed to de ne, manipulate, retrieve, and manage data in a database. A DBMS generally manipulates the data itself, the data format, field names, record structure and le structure. It also defines rules to validate and manipulate this data.

Database management systems are set up on specific data handling concepts, as the practice of administering a database evolves. The earliest databases only handled individual single pieces of specially formatted data. Today's more evolved systems can handle different kinds of less formatted data and tie them together in more elaborate ways. This was the first course that taught me how to design and plan a project. In the database management course, I have got the basic knowledge of popular planning and strategy practices such as System development life cycle, Six Element Analysis, Rich Picture, Requirement Analysis, Entity Relationship Diagram, and Business Process Model, and many more. These techniques helped in the development planning and strategy of" Self-learning app" and they helped in writing this report.

CSE 307: System Analysis and Design:

Systems development is a systematic process which includes phases such as planning, analysis, design, deployment, and maintenance. Here, in this tutorial, we will primarily focus on System Analysis and System Design. This course examines the tools and techniques used for the design and analysis of information systems. Topics covered include Systems and models; Project management; Tools for determining system requirements; data flow diagrams; decision table and decision trees; Systems analysis: systems development life cycle models. Object oriented analysis: use-case modeling, Unified Modeling Language. Feasibility analysis, structured analysis; systems prototyping; system design and implementation: application architecture, user interface design. Front-end and back-end design; database design; software management and hardware selection. Case studies of Information Systems. These techniques helped in the development planning and strategy of" Self-learning app" and they helped in writing this report also.

2.2 Related Works

Learning begins with asking questions from toddler to the last moment of our life. Everyone has to ask questions to gain knowledge. Collecting all sorts of questions and categorizing them perfectly is a challenge for human society. Many great thinkers did work on that and achieved a platform. We have found some works that are somewhat related to us. There is still a long way to go in order to find an ideal solution that can efficiently serve the purpose of gathering all questions for everyone to see. This is what we are developing

A few known websites and services are providing a similar platform like us but most of them are by-product of their intended works. Most of them are free but the more refined ones are paid and not viable for general purposes.

i. **Google:** Google is the most common and well known go to place for any type of questions. You can literally find every answer on google. Cons are you find every possible answer for a question which can be confusing.
ii. **Reddit:** Reddit is the second most common place to ask any type of question and get resolved. Cons are that reddit is also an entertaining website where a student can easily get distracted.
iii. **Quora:** Quora is a popular place to get answers by asking questions. Cons are that Quora has a lot of bots that want to boost unnecessary posts.
iv. **Yahoo Answers:** Yahoo answer was the most popular place to ask theoretical and academic questions which had the best answer. Cons are that Yahoo answers has been retired since 2021.

Although the original idea behind the Self-learning app, the project that I have been working on, along with its platform can be considered brand new, these companies can be considered the closest alternatives of Self-learning app and can be in the same category. The Reddit, Quora and Yahoo answers can be the most relatable platform.

Chapter – 3: Project Management & Financing

3.1 Work Breakdown Structure

Work can be made more manageable and approachable by using a common productivity technique called Work Breakdown Structure (WBS). It provides a hierarchical structure for organizing and defining the total scope of the project. It is a crucial planning tool that logically connects objectives, resources, and activities. In order for everyone to have a better understanding of the project's scope and the goals that need to be established, the figure below depicts our WBS using a top-down approach. The phases in our level 1 are given below.

i. **Research:** This phase basically is systematic studies into and examination of sources and methods with the objective of establishing facts and drawing new conclusions
ii. **Design:** Here, a variety of methods and resources are used to create the design layout. Everything is revised and streamlined with the senior members' approval and direction, respectively. This is followed by a technical review process to ensure accuracy and completeness of the design.
iii. **Implementation:** In this phase the approved approaches and techniques are used to bring the designs to life. Various implementation tasks are given to each team member during this phase, and optimization is also done.
iv. **Testing:** In this phase the platform will be in its beta version and will be presented to a control group. Developers will check whether the actual platform matches expected requirements. Feedback will be assessed.
v. **Debugging:** The debugging team puts the project through numerous testing stages to ensure that everything implemented is free of bugs; if a bug is discovered, it will be assessed and fixed.

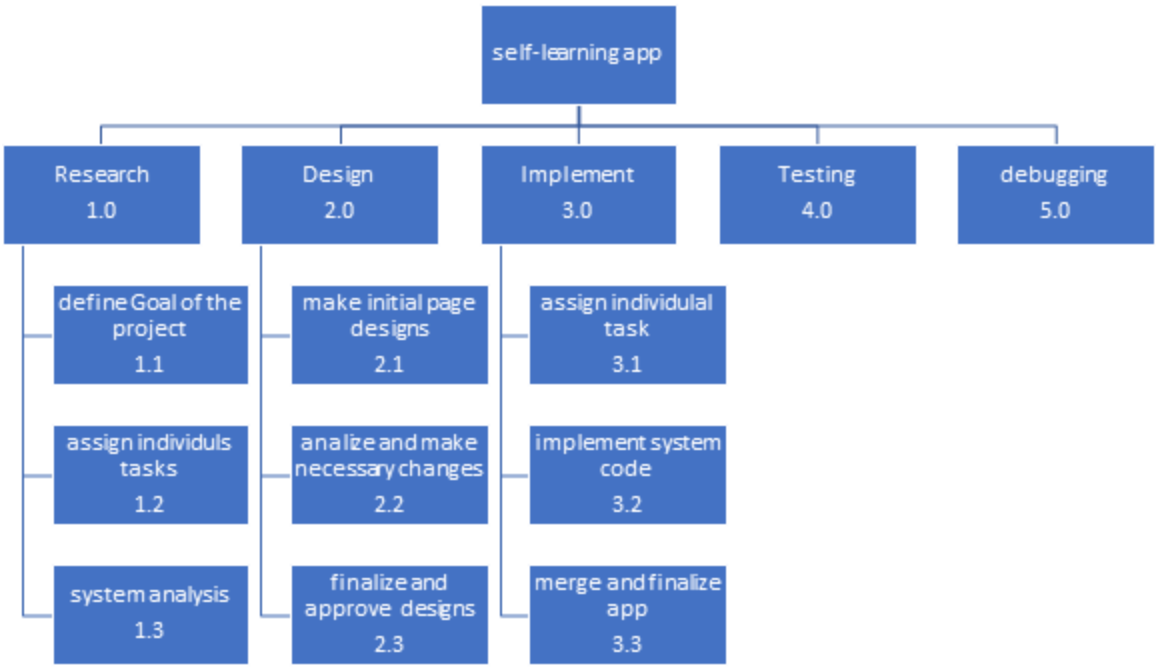


Figure 1 Work Breakdown Structure

3.2 Process/Activity Wise Time Distribution

According to our WBS, the process wise time distribution will show us how long each major process will take and assist us in creating the project's critical path. The critical path table below shows the duration allotted for each process. The estimated total time for the project is 100 days, excluding holidays and breaks. The critical path for the project is determined by adding up the duration for each process along the longest path from start to finish. Each process is given a code (e.g., A, B, D1, D2 etc.) so that we can identify each task in our future diagrams easily.

	Activity	Predecessor	Duration (days)
A	Initialtion	x	5
B	Design	Initiation	9
C	Implementation	Design	28
D1	Unit Testing	Implementation	5
D2	End-to_end testing	Implementation	5
D3	Quality Assurance	Unit testing, End-to-end testing	5
E1	Alpha reslease	QA	14
E2	Beta release	Alpha release	14
E3	Final release	Beta release	14

Table 1 Critical Path Table

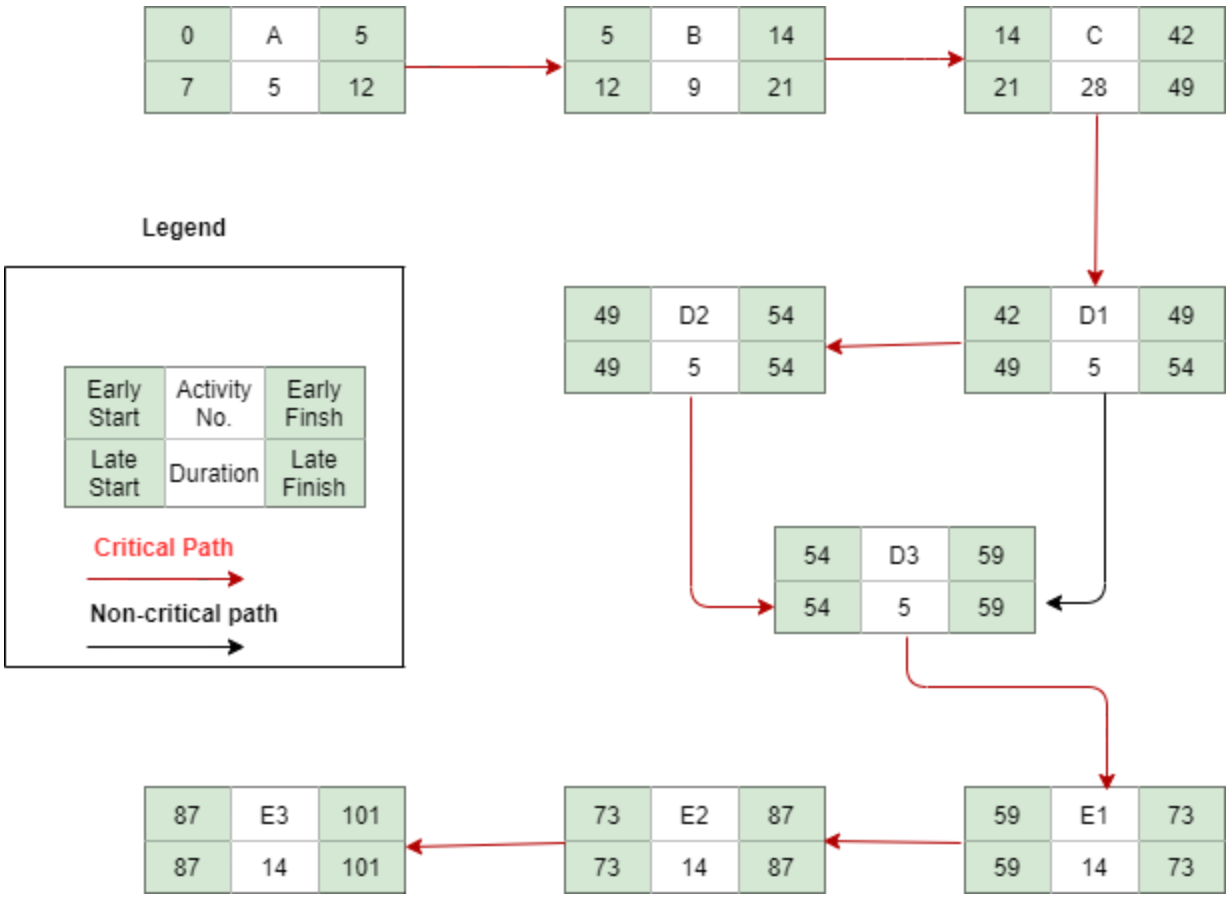


Figure 2 Critical Path

The critical path, denoted by the color red, and the approximate activity distribution of each major process are shown in the above figure. As can be seen, it will take almost three months to complete the project.

3.3 Gantt Chart

A popular graphical representation of a project schedule is a Gantt chart. The start and end dates of project components, such as resources, planning, and dependencies, are shown in this type of bar chart. Gantt charts provide visualization of each phase, as well as the overall timeline of a project. Our project also has a Gantt chart which helps us keep ourselves on schedule and is provided below.

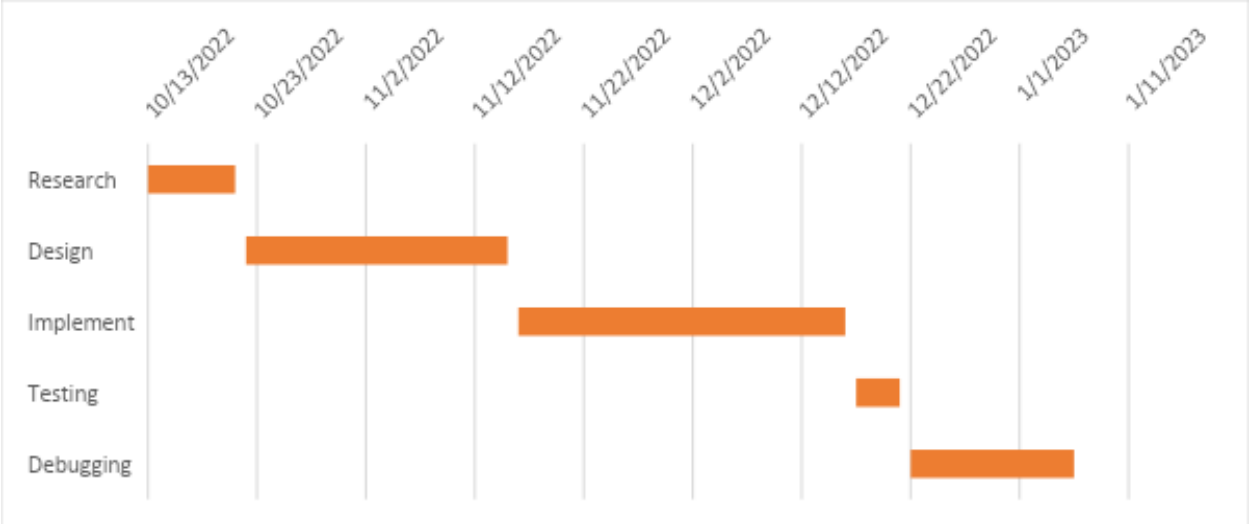


Figure 3 Gantt chart

3.4 Process wise resource allocation

Process wise resource allocation shows the resources that will be required for each process of the project. In our case, the only entity identifiable as a resource is the labor and the resource allocation histogram shows that the company will require a maximum of 5 labor (developer + stakeholders) during the project, however in most of the processes we will require just 3 personnel (me and two other developers).

Task	Days	Labor
Research	1-8	5
Design	9-29	2
Implement	30-60	3
Testing	61-70	2
Debugging	70-90	2

Table 2 Resource Allocation Table

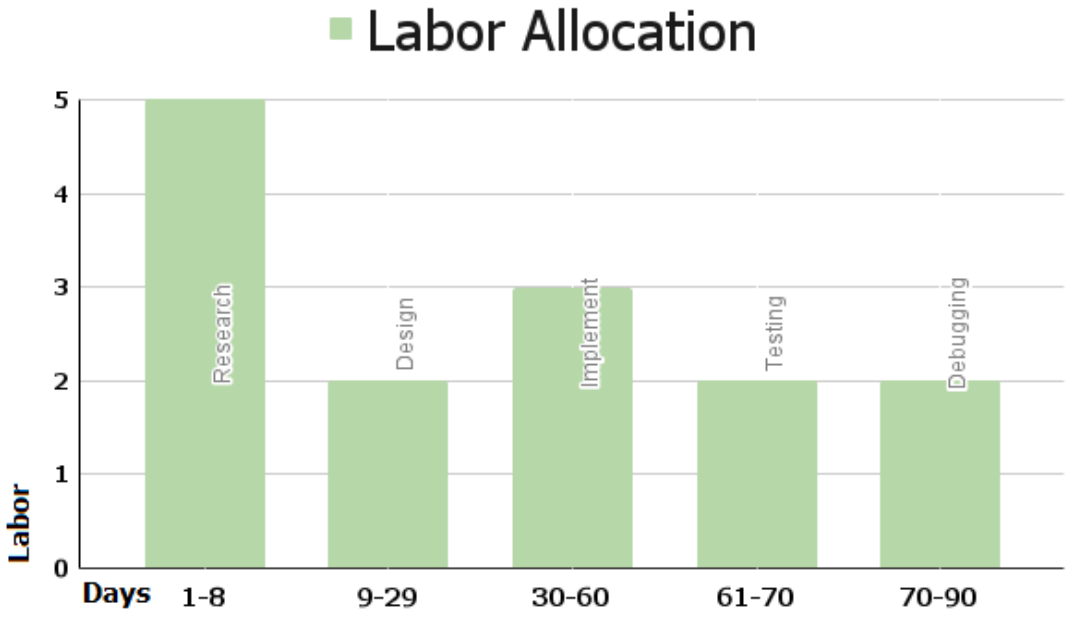


Figure 4 Resource Allocation Histogram

Chapter – 4: Methodology

Software development life cycle or SDLC for short is a methodology for designing, building, and maintaining information and industrial systems [4]. SDLC defines the development, enhancement, maintenance and replacement plan in detail along with other functionalities. There are many types of SDLCs. Some of the most popular SDLC model are: -

- Agile
- Waterfall
- Lean
- Spiral
- Iterative

Each SDLC model is different from one another and is chosen according to the project specification. However, they all serve the same function of organizing a project and assisting the project team in operating more successfully and efficiently.

We have worked in an agile environment. To choose the agile framework to adopt, we apply the Extreme Programming (XP) technique. It helps teams produce high-quality software quickly while also adjusting to changing demands. Extreme Programming is built on five ideas, and we choose to use it for those reasons, as well as other advantages:

1. We needed to make sure that the crew and management were on the same page. Nothing was to be misconstrued or misrepresented in any way. XP stresses the need for effective team communication, which may be accomplished through team meetings and debates.
2. Things must be kept as simple as possible. Therefore, we were able to make quick modifications. We were also able to keep our meetings short, concise, and to-the- point because of it. The system's designs should also be basic, neat, and comprehensive, suggesting that just the bare minimum should be accomplished and that it should be clean and simple to maintain, support, and alter.

3. Feedback was heavily appreciated during the development process. The relevance of client feedback was crucial. Prototypes provided fantastic feedback, allowing us to improve us



Figure 5: Agile Methodology

work. Feedback on completed efforts and activities helps the team find areas for growth while also bolstering the simple ideas.

4. Everyone in the firm held each other with high respect. Every decision and suggestion were given the utmost consideration and, if required, constructive criticism. Team members must respect one another to communicate with one another, express and accept criticism, and collaborate on basic thoughts and solutions.

5. We were constantly told that we should be brave. To think outside the box and try out new implementation methods to improve the speed and efficiency of activities.

6. Because of the usage of XP, we were able to accomplish our Assignment quickly while still satisfying the demands of the user at each level.

We had a better grasp on the project because of the regular meet

work. Feedback on completed efforts and activities helps the team find areas for growth while also bolstering the simple ideas.

7. Everyone in the firm held each other with high respect. Every decision and suggestion were given the utmost consideration and, if required, constructive criticism. Team members must respect one another to communicate with one another, express and accept criticism, and collaborate on basic thoughts and solutions.
8. We were constantly told that we should be brave. To think outside the box and try out new implementation methods to improve the speed and efficiency of activities.
9. Because of the usage of XP, we were able to accomplish our Assignment quickly while still satisfying the demands of the user at each level.

We had a better grasp on the project because of the regular meet

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. I then had to get the supervisor to approve the designs. The designs were finalized after a few revisions, and I was asked to put the pages into initiative. I was repeatedly reminded that my code needed to comply with convention, be effective, and be performance-optimized. To help me build my project more quickly and effectively, I also used Android Studio and Flutter Framework. I had to conduct extensive research. My progress was regularly checked by my supervisor. My principal objective was to develop a lag-free application without sacrificing the user experience.I eventually created a template in the design that could be dependably used and adhered to industry standards after much progress were initially rejected due to poor UX design.

5.2 System Analysis

Systems analysis is "the process of studying a procedure or business to identify its goal and purposes and create systems and procedures that will efficiently achieve them". Another view sees system analysis as a problem-solving technique that breaks down a system into its component pieces, and how well those parts work and interact to accomplish their purpose .

5.2.1 Six Element Analysis

Process	System Report					
	Human	**Non-computing Hardware**	**Computing Hardware**	**Software**	**Database**	**Internet & Communication**
Add student	**Register office:** 1) Log in to SLA DB. 3) Generate new student accounts from stored information. 4) Log out from SLA DB.	**Pen, Paper and Stationeries:** 1)Used by registrar's office to note-down any corrupted information	**Computer:** 1) Used by registrar's office to generate new Students accounts **Database Server:** 1) SLA DB in which new students account will be stored	**Operating System:** Used by registrar's office to operate their computer **Office Suite:** used to store information locally in Excel format	**RDBMS:** 1) Used by Registrar's office to stored information **Excel Software:** used to store information locally in Excel format	**Internet:** 1) Used to access and modify SLA database

Table 3 Six Element Analysis (1)

Process	System Report					
	Human	**Non-computing Hardware**	**Computing Hardware**	**Software**	**Database**	**Internet & Communication**
Store question	**Student:** 1) Log in to SLA DB. 2) student choose course name than topic name. 3)ask question. 4) Log out from SLA DB.	**Pen, Paper and Stationeries:** 1)Used by student to note-down some question	**Mobile:** 1)Used by student to ask question **Database Server:** 1)SLA DB in which new question will be stored	**Operating System:** Used by student to operate their mobile phone	**RDBMS:** 1) Used by SLA DB to stored information	**Internet:** 1) Used to ask question in SLA

Table 4 Six Element Analysis (2)

Process	System Report					
	Human	**Non-computing Hardware**	**Computing Hardware**	**Software**	**Database**	**Internet & Communication**
View question	**Student:** 1) Log in to SLA DB. 2) student choose course name than topic name. 3)choose help. 4)view precious question 5) Log out from SLA DB. **Faculty:** 1) Log in to SLA DB. 2)choose course name and topic name 3)view question 4) logout from SLA DB.	**Pen, Paper and Stationeries:** 1)Used by faculty and student to note-down some important question	**Mobile phone:** 1)Used by student and faculty to view question **Database Server:** 1)SLA DB in which students question will be stored	**Operating System:** Used by student and faculty to operate their mobile phone	**RDBMS:** 1) Used by SLA DB to stored information	**Internet:** 1) Used to view question.

Table 5 Six Element Analysis (3)

Process	System Report					
	Human	**Non-computing Hardware**	**Computing Hardware**	**Software**	**Database**	**Internet & Communication**
View Demo Mind Map	**Student:** 1) Log in to SLA DB. 2) Choose course name than topic name. 3) Choose help. 4) View demo mind map 5) Log out from SLA DB.	**Pen, Paper and Stationeries:** 1) Used by student to note-down question using mind map	**Mobile phone:** 1) Used by student to view demo mind map **Database Server:** 1)SLA DB in which demo mind map will be stored	**Operating System:** Used by student to operate their mobile phone	**RDBMS:** Used by SLA DB to stored information	**Internet:** Used to view demo mind map.

Table 6 Six Element Analysis (4)

5.2.2 Feasibility Analysis

A feasibility study is simply an assessment of the practicality of a proposed project plan or method. This is done by analyzing technical, economic, legal, operational and time feasibility factors.Project managers carry out feasibility studies to evaluate the project's potential advantages and disadvantages before dedicating a significant amount of time and money to it. A feasibility study determines whether an idea, a project, or even a new business is viable. The goal of a feasibility study is to concentrate on potential issues that might occur if a project is pursued and to determine whether the project should be pursued after all significant variables have been looked at. Feasibility studies also give a project the chance to think about its operating environment, potential competitors, and the capital needed to launch the business. The next step, if management approves the proposed system, is to evaluate the system's viability. In short, following decisions are taken in different feasibility study:

1. **Technical Feasibility:** This project is backed up by a team of very skilled developers and supervisors who have experience working in both the international and local markets. Developers are highly motivated and dedicated to providing the best solutions to potential barriers, ensuring every needs and expectations are met.

2. **Economic Feasibility:** For startups, determining the project's economic viability is a constant challenge, but fortunately, the team has access to enough funding for the project's development phase. Self-learning app is anticipated to earn enough money after the project is implemented to support itself and even turn a profit.

3. **Operational feasibility:** There is currently no platform that allows a student to ask a question about their lecture for free, but university students have a great demand for it. The project is therefore technically feasible.

4. **Schedule Feasibility:** The length of time required for solution design and implementation is referred to as schedule feasibility. It makes an estimation regarding how quickly the project will be completed. The deadline for this project's delivery to the business must be met. Therefore, this project has scheduled feasibility, according to estimation.

5.2.3 Problem Solution Analysis

The development of Self-learning apps is still in its infancy. The last thing a self-learning app needs is a buggy application that crashes frequently, like the many other kickstarter mobile applications. As a UI/UX developer, I'm doing everything in my power to ensure that the designs adhere to industry standards, the code is effective and optimized for performance, but I'm also careful not to sacrifice the application's user experience or aesthetic. I had to do a lot of research to figure out how to do this, but in the end, everything I needed could be found online, so I didn't have to wait long to get started. Another problem we might face is that many apps are downloaded, though far fewer are ever used again. It’s shocking how few will even be used once. In a climate like this, it is important to communicate with faculty to encourage students to use our platform. Solving the question quickly can keep the platform from dying out. A targeted audience would maintain engagement longer.

5.2.4 Effect and Constraint Analysis

The application is meant to serve its users with a reddit-like experience, where you get to ask questions regarding a topic. However, since the platform’s user base is still very small, there will be an issue of not being able to meet the demand when the application first rolls out into the market. The lack of questions solved when they are being demanded will lead to poor user experience and feedback, leaving a negative effect whereas lack of contributions from the faculty will drive the company out of business as a whole. However, we have plans and more importantly contributions from faculty to tackle those problems.

5.3 System Design

Systems design is the process of defining the architecture, product design, modules, interfaces, and data for a system to satisfy specified requirements. Below is a list of figures, roughly showing the system design of Self learning apps.

5.3.1 Rich Picture

A Rich Picture is a method of exploring, acknowledging, and defining a situation, and then expressing it using diagrams to form a rough mental model. A rich picture helps to open discussion and come to a broad, shared understanding of a situation. The figure below shows the rich picture of our project at Self learning apps.

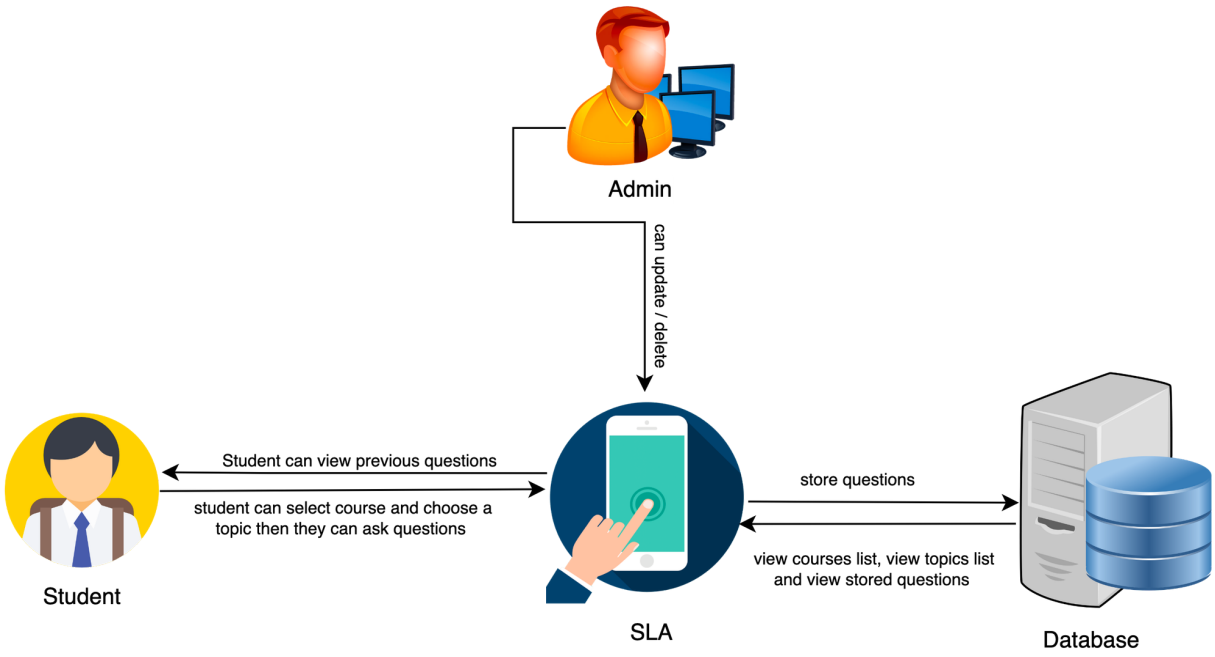


Figure 6 Rich Picture

5.3.2 UML Diagrams

In the realm of software engineering, the Unified Modeling Language (UML) is a general-purpose, developmental modeling language that is designed to provide a common way to depict a system's architecture .

5.3.2.1 Use Case Diagram

A use case diagram is a visual representation of the details of a system and its users. It is typically depicted as a graphic representation of interactions between various parts in a system. Use case diagrams describe the events that occur in a system and how they flow, but they do not define how those events are implemented . The figure below shows the Use case of diagram of the system that we are developing. There are 3 actors to the system and their roles are highlighted with individual colors on the diagram.

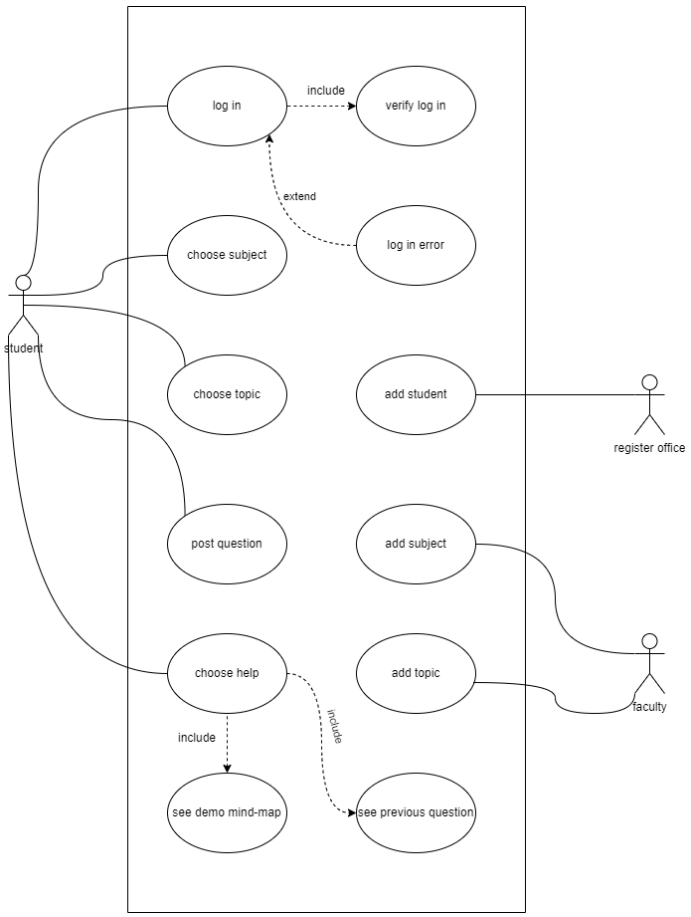


Figure 7 Use Case Diagram

5.3.2.2 Data Model Diagram

An Entity Relationship (ER) Diagram is a sort of flowchart that shows how "entities" in a system, such as people, objects, or concepts, interact with one another. ER Diagrams are most often used to design or debug relational databases in the fields of software engineering, business information systems, education and research .

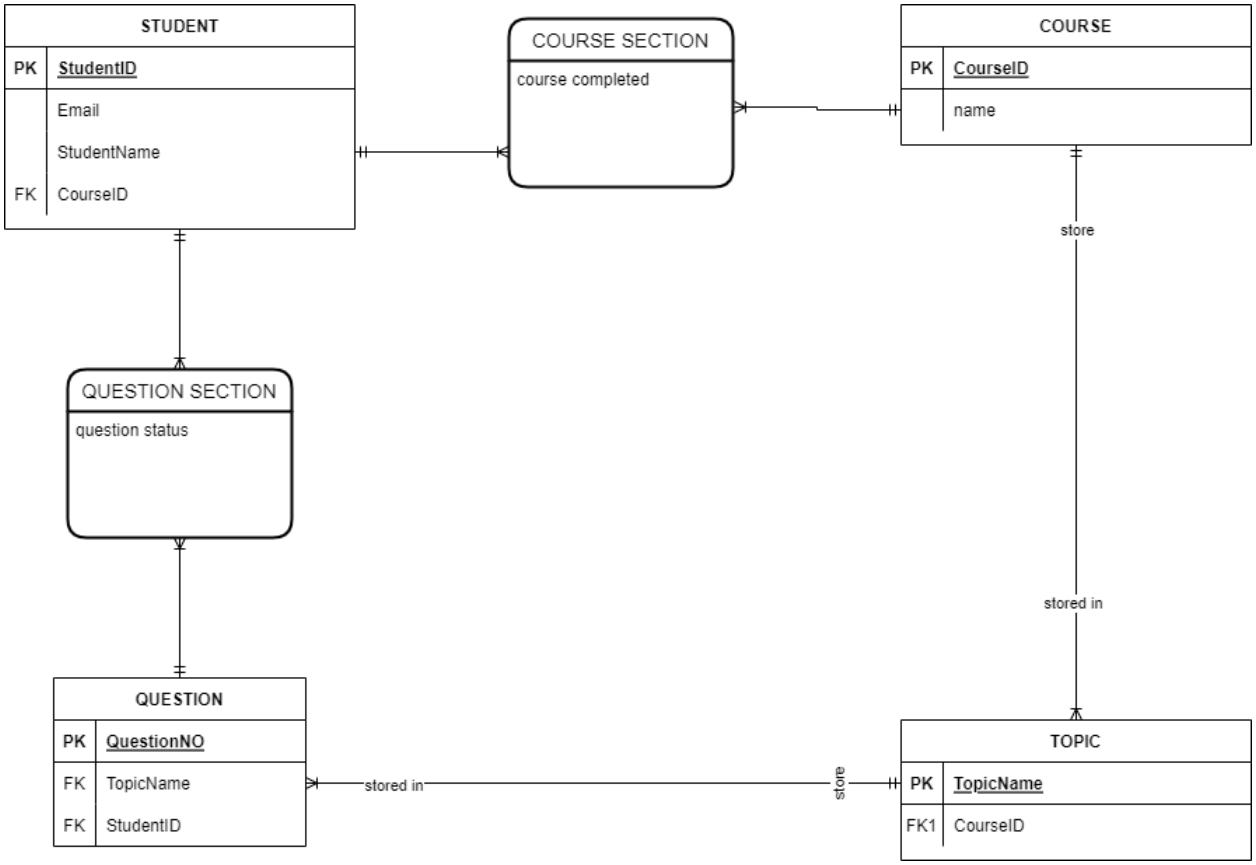


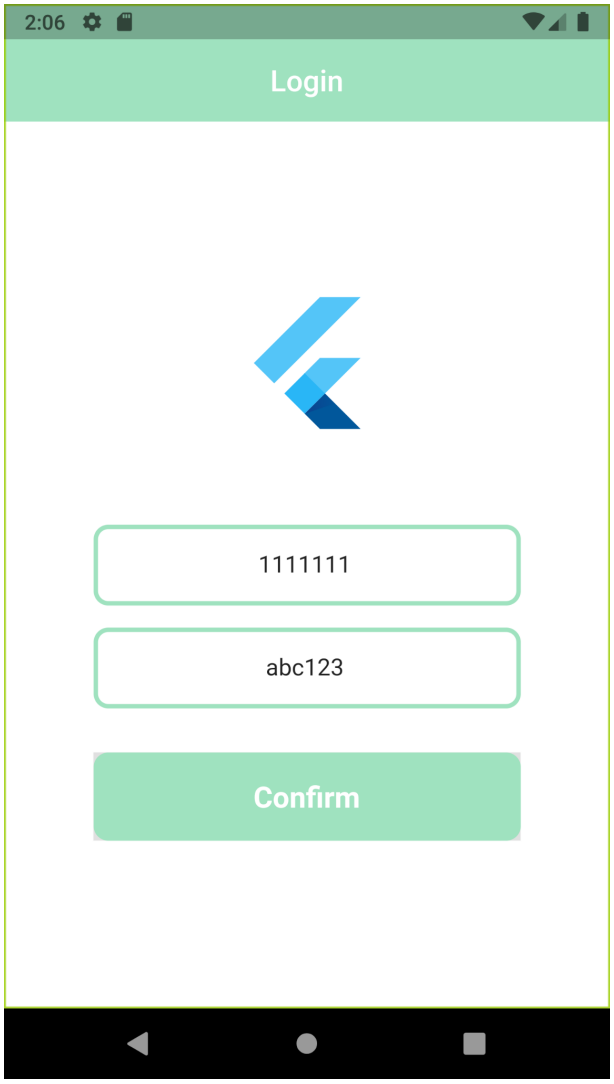
Figure 8 ERD

5.4 Testing

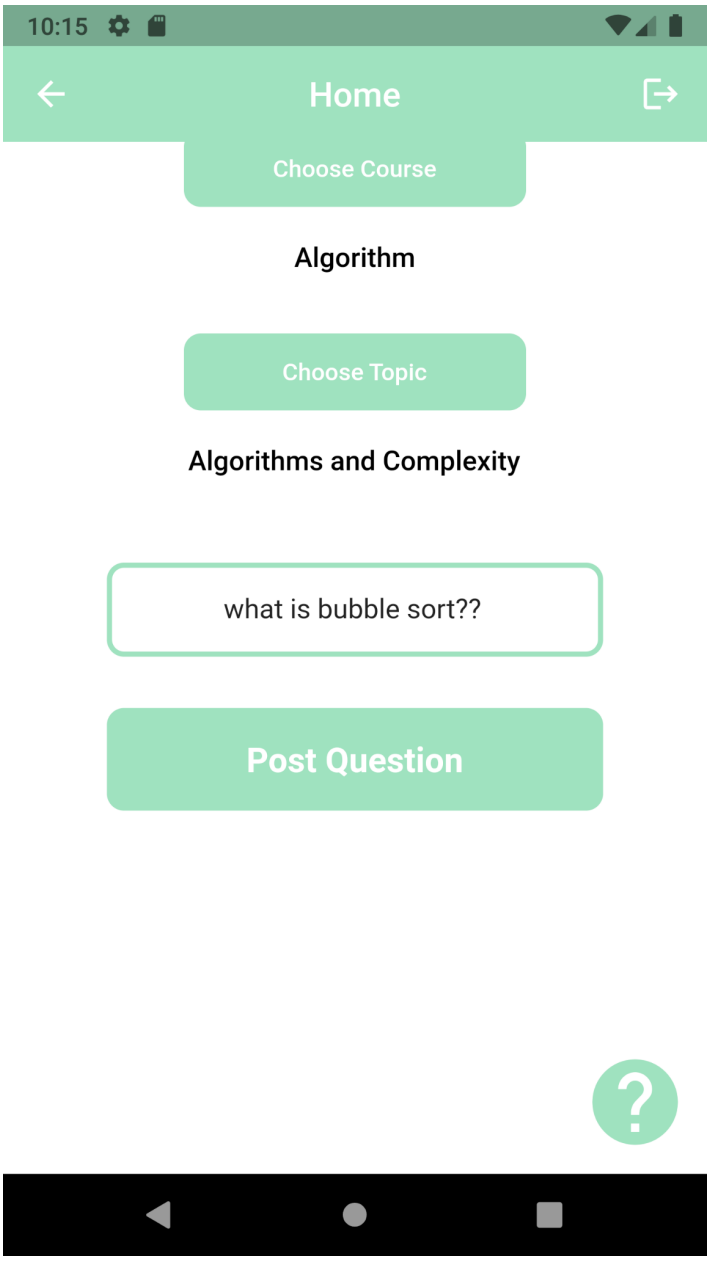
5.4.1 Input

An input could be a user providing a unique identifier or information on predefined position on the screen. With this action, it can give access to our platform for users to carry out his/her intended purpose.

This page is used to ensure that only those who are authorized may access our platform.



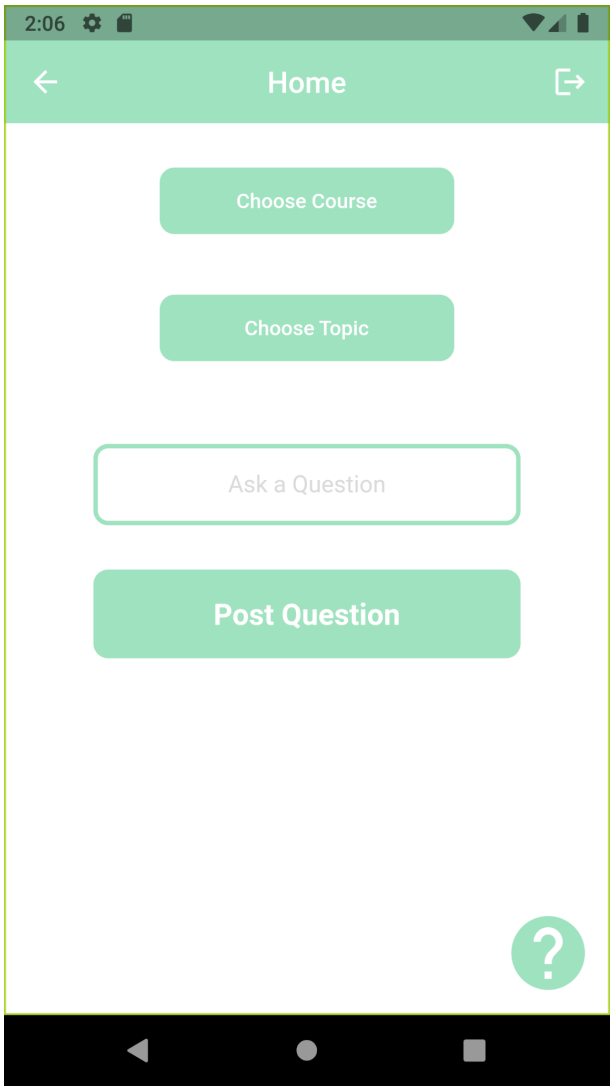
This page is where the user can post their question regarding the course.



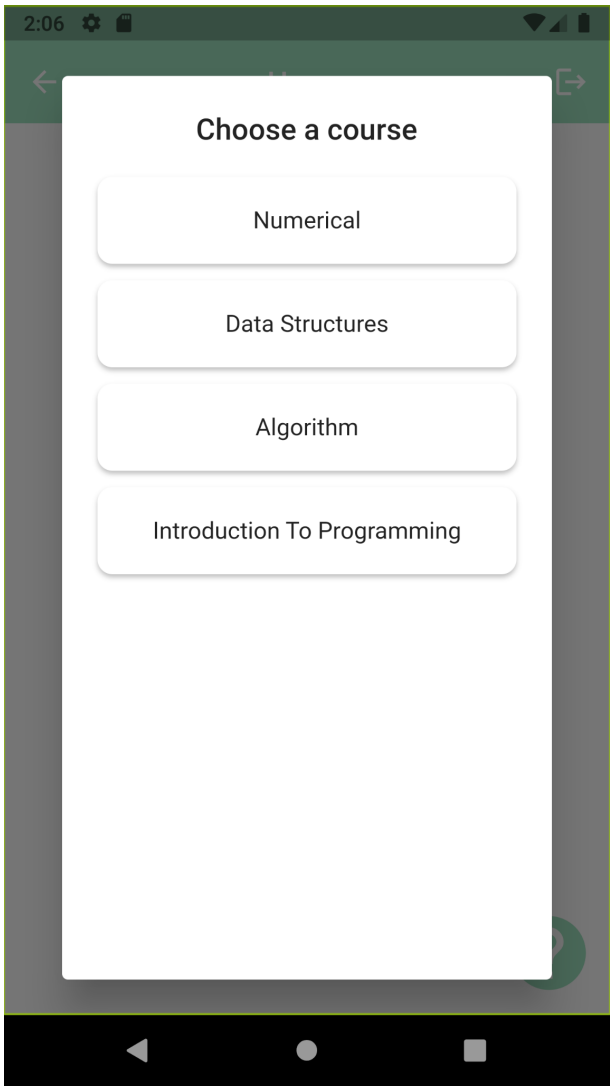
5.4.2 Output

An output is the result of processed input. In our Self-learning apps the first output the user will experience is right after logging in.

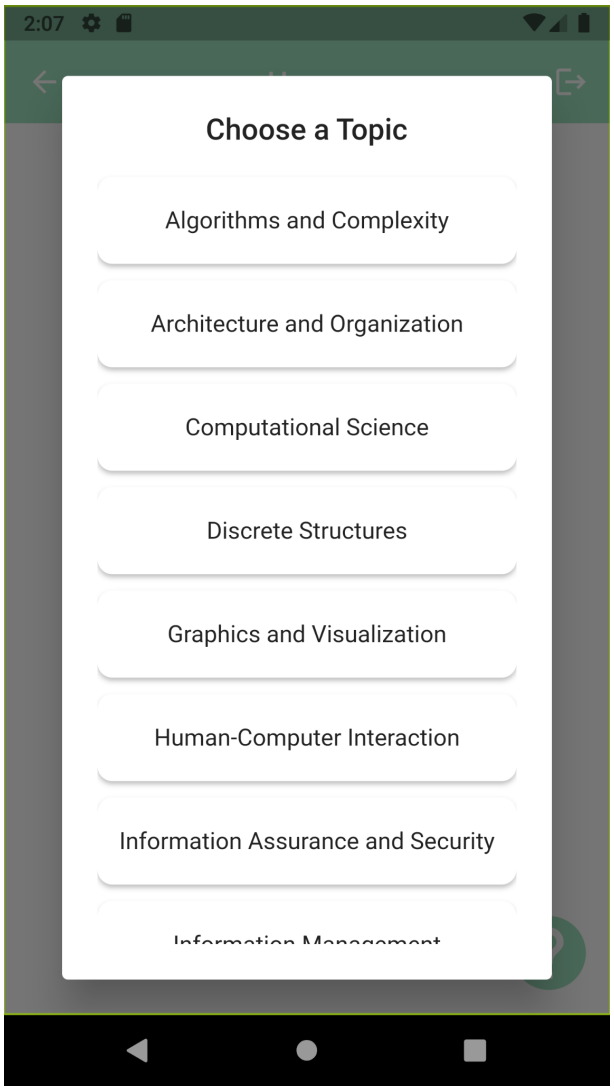
In this page, the user after logging in will be shown the option to choose course, topic and post question. A help button will also be shown to the user for additional information.



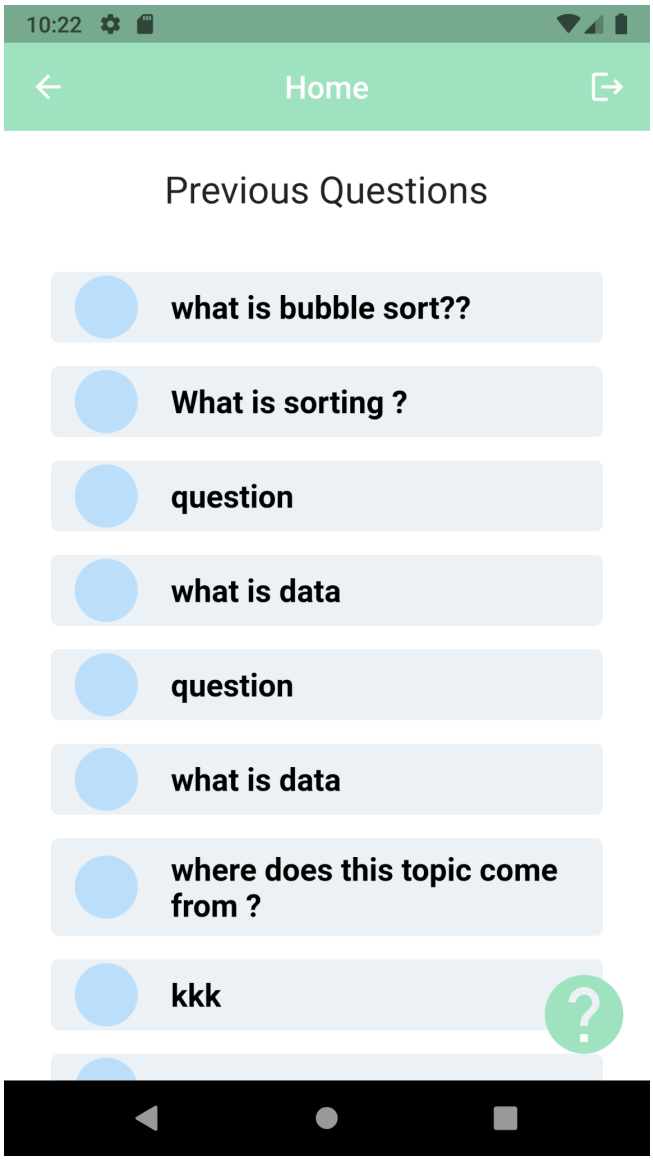
After selecting “Choose course” the user will be shown a predefined option to select his or her related course.



After selecting “Choose Topic” the user will be shown a predefined option to select his or her related topic.



Users when selecting the “help button” will be shown all the previous questions about the selected course and topic.



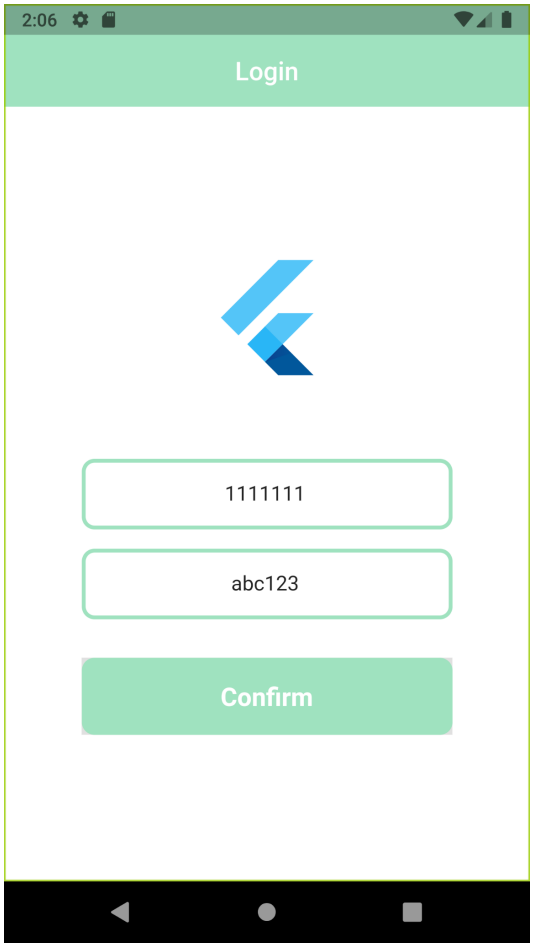
Chapter – 6: Result and Analysis

The project that self-learning apps undertook was to increase the ability of our brain to seek knowledge more efficiently. This project had a simple design goal and it is asking questions should never be a problem. The design of the self-learning app had to be simple, straightforward and intuitive so that a user could quickly become familiar with it. The aim was that even a student who had no previous experience on using a Q/A platform should have no trouble navigating through the functions and features that it provided.

The system at Self learning apps was developed using the flutter framework in Android Studio, using the language Dart. Flutter is an open-source UI software development kit created by Google. It is used to develop cross platform applications for Android, iOS, Linux, Mac, Windows, Google Fuchsia, 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. Since we develop Self learning apps, the initiation, design and implementation phase has been completed and the only thing left are the testing and deployment phase. So far, all the pages have been implemented and the views have been tested on different devices, both by using .apk files and google, responsive UI panel. The pages have been approved and are ready for integration. In the coming weeks, our moderator of Self Learning Apps will begin the integration procedure and continue working with future scope of this project.

The list below shows what has been achieved on the project, by me since the beginning of the project.

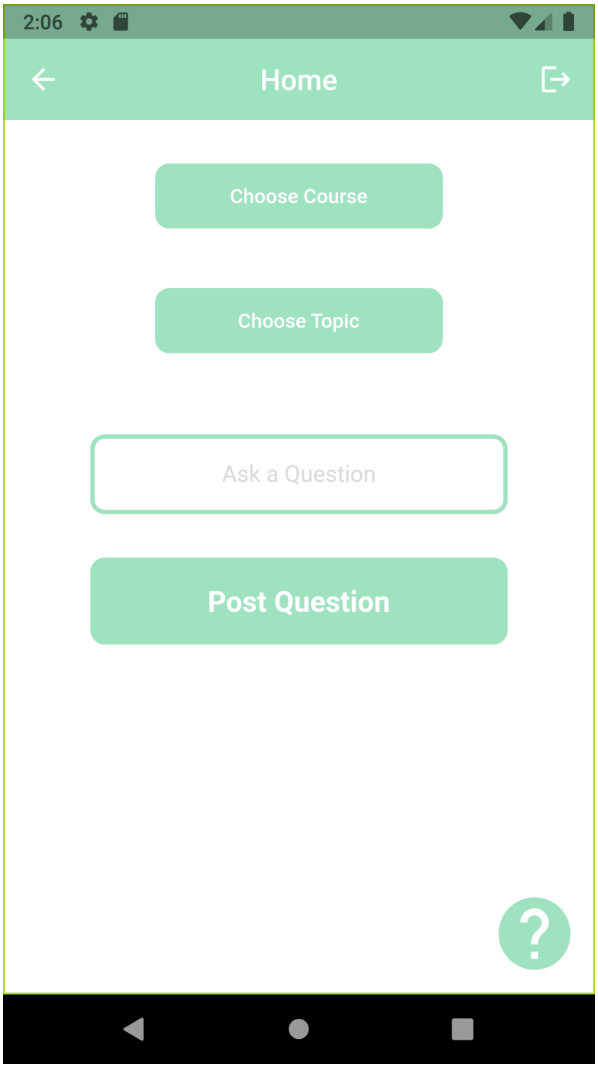
Login page: The login page allows a user to gain access to an application by entering their username or ID and password. It is the main process of authenticating a user to our platform. Our login page consists of our logo with two tabs for ID and password. There is also a confirm button which will start validating the user trying to gain access to our platform. We tried to keep our login page as simple as possible, also keeping it elegant and sleek. For the logo we have to go through thousands of references to create something that would bear what we are doing with in this project.



Home page: This is an introductory page to our platform, usually serving as a table of contents. We've designed a simpler and easier to use homepage. We choose vibrant color for the button because vibrant is always used on any Knowledge-pedia. The vibrant color refers to the Gateway of Knowledge. As the homepage is the first page our user will see after logging in, we have tried to showcase all content here, but we also need to keep an eye out for clutter. Throughout our design phase, we tried to design just as simple. If we try to describe our homepage we can say that it consists of four main functions as button and tab.

Firstly, a student can choose the course by clicking the “Choose Course” button which will let them select their preferred course from a predefined list. Secondly they can choose any topic related to that course by clicking the “Choose Topic” button. Thirdly they can ask their question from inputting the question on the “Ask a Question” tab. After writing the questions they can confirm by pressing the “Post Question” button. Fourth, a student can press the “Question” button at the bottom on the screen which will let them see all the questions asked by their fellow classmate regarding the topic. It should also be mentioned that if a student chooses a course and presses the “Question” button they can see all the questions previously asked regardless of topic. Only after selecting a topic they can filtered it out more.

On the top panel of our website we have added three things: a “back” button and title page and a “logout” button. For the logout button icon we have selected a universal icon which will be familiar with anyone. Title of the page that a user is in will be shown on top and the back button will take the user to the previous page that they were viewing. It should also be noted that if a user presses the back button on homepage it will pop a window asking if the user wants to exit the apps.


2:06
Home
Choose Course
Choose Topic
Ask a Question
Post Question

Chapter – 7: Project as Engineering Problem Analysis

7.1 Sustainability of the Project/Work

All projects and workforce must come to an end at some point, but the implications of the final result must endure, ideally indefinitely or at least for the time period for which it was intended. The three categories of organizational, financial, and community sustainability that we have divided up in this article represent the sustainability of our work.

Community sustainability: Community Sustainability is how the product is carried on with-in the community over time. The project being developed at Self learning apps can achieve community sustainability, much like any other Q&A platform. Listening to the user feedback and demand will be essential to build a strong platform with interactive users. Enthusiasm from the faculty can jumpstart the sustainability

Financial sustainability: Self-learning apps have been designed with financial sustainability in mind. This ability to dissipate financial imbalances that can occur naturally and unforeseen events can be handled easily. As a nonprofit entity, supervisors need to know how much it costs to deliver the programs and services. Budget can be set accordingly. Similar to wikipedia it can almost sustain on donations by reader and moderator and also a tiny bit of branding.

Organization Sustainability: Organizational sustainability involves having the leadership, talent, global knowledge, and strategies for change needed to address the particular issues facing businesses today. This succession plan should be focused on setting parameters and guidelines to handle traffic during the app's full release. Moderators also need to maintain the quality of questions asked on this channel.

7.2 Social and Environmental Effects and Analysis

Much like any other digital invention, an application will always influence the environment and society. An Ed-Tech company without doubt is expected to leave a big and positive footprint.

Social effect: One of the key components of our project is the scale, it is about understanding how many people this platform is reaching. The social effect of Self learning apps, given that it is a knowledge-pedia, is very low at the moment. But all this can be changed drastically as soon as the app launches, with introduction in the classroom and responsive faculty. The positive social impact of the app, given the nonprofit model, is anticipated to be very high, changing the way a course and classroom activities are conducted.

Environmental effect: The environmental impact of the application being developed at Self learning apps 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 teacher in the classroom. Therefore, arguably the only environmental effect may be ones due to the usage of electricity.

7.3 Addressing Ethics and Ethical Issues

Ethics and ethical issues are addressed through doctrine which consists of a step-by-step procedure. Identify the problem as a moderator sees it and also identify what is in control and what is not. The main ethical issues we may face are internet trolls and disrespectful questions to teachers. Moderators can issue warnings to the student. Banning a student is ethically wrong because they are subject to learning. The seriousness of wrongdoing that can lead to a student being banned from the platform will always be ethically challenged.

Also, consumers put a lot of trust in system developers as they are sharing their data to the system. That is why security is always a priority. Luckily, Google security services for the flutter framework takes care of almost all security issues. JWT authentication process is used to exchange information between the users in the system. JSON Web Token (JWT) is an open standard (RFC 7519) that defines a compact and self-contained way for securely transmitting information between parties as a JSON object. This information can be verified and trusted because it is digitally signed. JWTs can be signed using a secret (with the HMAC algorithm) or a public/private key pair using RSA or ECDSA.

Chapter – 8: Lesson Learned

8.1 Problems Faced During this Period

My internship at Self Learning Apps was nothing short of amazing; I had the opportunity to learn so much from industry professionals in such a short period of time. I also got to learn a lot about the marketplace of mobile app development. It was truly eye-opening to see first-hand how all the moving parts of the mobile app industry come together, from development to marketing.

The biggest challenge I encountered during my internship was adjusting to the workplace and getting along with the staff. Being an introvert myself, it was difficult for me to communicate with everyone and open up. 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 disruptions to my workflow, which I had to make up for by working extra hours to keep us on schedule. The Gantt chart's design also left very little room for error, which was another significant challenge.

8.2 Solution of those Problems

The difficulties I ran into during my internship were more personal than anything else. When beginning a job though the location was in our university but it was completely a different atmosphere, I've managed to learn that I need to be more outgoing and talkative, as well as confident in the work I'll be doing. I noticed that work was being completed more quickly and that everyone was eager to lend a helping hand, especially to an intern, once I let communication flow freely.
During my internship a valuable lesson that I learned was that when dealing with a huge volume of work any disruption hampers the entire routine. When the workload piled up I had to stop doing all forms of hobbies and sports events. This is coming from someone who is heavily invested in esports and online tournaments amongst many other extracurriculars.

Also Maintaining good health is crucial when working for a company because being unwell not only affects your ability to do your job but also puts the team behind.

Chapter – 9: Future Work and Conclusion

9.1 Future Works

Despite the fact that we have finished the tasks that we were given, the project of Self Learning Apps is still in development as a developer's term in its alpha version. With stages requiring testing and implementation. Like all other contemporary apps, our apps have to go through routine patch updates after initial release in order to enhance its functionality, efficiency, UI and UX. To the highest of my knowledge, the following step should be applied for the future work of the project besides patch updates.

- **New Logo Design –** Self learning apps will feature a new logo during its full release which will be selected from reference and designed with the intent to display this project's aim.

- **Transition Animation –** Self learning apps hope to add a custom animation during page transitions, something like when a student posts a question our logo will be animated on a popup page while we wait for data to be fetched from the backend. This custom animation will add a sense of branding for the project.

- **Icon Animation –** Though this is planned for the distant future, Every button will have an icon and icon animation has a big impact on the performance of an app and must go through rigorous testing, but this will be a feature of the app in the future.

- **API integration(s) –** Self learning apps will be using a custom rest API in order to collect data, Self learning apps will use the firebase authentication API to authenticate its users, both of which will be developed at a later time.

- **New Theme –** Self learning apps also hope to add a dynamic theme which will resemble the asking question as the gateway to knowledge vibe.

9.2 Conclusion

The time spent there and the knowledge gained were beyond incredible. In the three months I spent working with Self Learning Apps, I learned a ton. I had the privilege of working with flutter, a technology that leads the industry, and industry experts who have made significant contributions to the community. I was able to get a glimpse of the mobile application development industry and its culture. There were many obstacles, but the advantages outweigh the disadvantages. Being able to learn about responsiveness, industry standards, and the process of app development were some of the best things I took away from it. My project has taught me to be independent, patient, and to always ask questions.

References

[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 Internship/Project on The Self Learning App

By

BM Fahim Abrar

Student ID: **1630263**

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)

Yusuf Mahbubul Islam, PhD
Professor
Department of Computer Science & Engineering
Independent University, Bangladesh

-End-