**Independent University** **Bangladesh (IUB)**

**IUB Academic Repository**

Internship Reports Summer 2023

2023-10-18

# An Undergraduate Internship/Project on Topic “FamiPlasma Mobile App”

Morshed, Md.Yeard

Independent University, Bangladesh

https://ar.iub.edu.bd/handle/11348/702

*Downloaded from IUB Academic Repository*




# An Undergraduate Internship/Project on Topic "FamiPlasma Mobile App"

By

**Md.Yeard Morshed**

Student ID: **2022372**

**Summer, 2023**

Supervisor:

**Mr. Md. Mahmudul Kabir Peyal**

Research & Development Officer
Department of Computer Science and Engineering
Independent University, Bangladesh

**October 18, 2023**

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

Department of Computer Science & Engineering

**Independent University, Bangladesh**

# Attestation

I am Md. Yeard Morshed (ID: 2022372) at this moment certifies that this report titled "FamiPlasma Mobile App: A Family Blood Tree Management System" has been prepared and submitted in partial fulfilment of the requirements for the Degree of Computer Science and Engineering from Independent University, Bangladesh (IUB).
I sincerely thank my supervisor, Mr. Md. Mahmudul Kabir Peyal, for his guidance and support throughout the internship. His valuable insights and expertise have significantly contributed to the successful completion of this project. I also confirm that all the work presented in this report is original and reflects my understanding and knowledge gained during the internship. Any sources of information used in this project have been appropriately acknowledged and referenced. For further information or clarification regarding this project, I encourage contacting my internship supervisor, Mahmuda Islam, at TechTrioZ Solution, via email at mahmuda.islam@techtrioz.com.

Signature Date: 10-18-2023



Md. Yeard Morshed

# Acknowledgement

I want to express my deepest gratitude to God for granting me the opportunity to conclude my internship successfully.

I am incredibly grateful to my family, friends, and senior classmates for their unwavering support and encouragement throughout my academic journey and practicum. Their devotion and confidence in me have been an inexhaustible source of inspiration.

I am also indebted to the professionals and specialists in computer science and software development who generously shared their knowledge and resources via academic materials and online communities. Their contributions have substantially augmented my knowledge and abilities.

Mr. Md. Mahmudul Kabir Peyal, Research & Development Officer Department of Computer Science and Engineering Independent University, Bangladesh, provided me with invaluable support and direction throughout my practicum and report writing. I want to thank Bangladesh's Independent University for providing me with a well-rounded computer science and engineering education. The knowledge and abilities I gained during my time at university have provided a solid foundation for my professional development.

I am grateful to my industrial supervisor, Mahmuda Islam, Managing Partner at TechTrioZ Solution, for her compassion, assistance, and direction throughout my internship. Her encouraging words and instructions have motivated me to accomplish more than I anticipated. I am truly grateful to have had the opportunity to intern under her supervision.

I am grateful for all the assistance and direction I received during my practicum and dissertation. This experience will contribute substantially to my future computer science endeavours. I am extremely indebted to everyone.

# Letter of Transmittal

[10-18-2023]
Md. Mahmudul Kabir Peyal

Research & Development Officer
Department of Computer Science and Engineering,
Independent University

Subject: Submission of Internship Report

Dear Sir,

I am submitting my Internship Report, which is part of the Bachelor Program in Computer Science and Engineering curriculum. It is a tremendous accomplishment to work under your direct supervision. This report is based on "Internship at TechTrioZ Solutions". I could work for three months at TechTrioZ Solutions under the direction of Mahmuda Islam, Managing Partner at TechTrioZ Solutions. The internship gave me academic and practical experiences. My internship helped me to build a network within the corporate environment. I made this report as informative as possible using the knowledge I gained during my internship. To prepare a well-organized internship report, I followed the guidelines and provided sufficient detail for the required fields. However, this report will serve the objectives of my internship program. I would be extremely grateful if you could review this report and provide your valuable opinion. I would be delighted if you found this report informative and useful to understand the issue clearly.

Sincerely yours,

Md. Yeard Morshed
ID: 2022372
Department of Computer Science and Engineering
Independent University Bangladesh

# Evaluation Committee

Supervision Panel

| | |
|---|---|
| Academic Supervisor<br>Name: Md. Mahmudul Peyal | Industry Supervisor<br>Name: Mahmuda Islam |

Panel Members

| | |
|---|---|
| Panel Member-1<br>Name: Sanzar Adnan Alam | Panel Member-2<br>Name: Mohammad Motiur Rahman |

Panel Members

| | |
|---|---|
| Panel Member-3<br>Name: Mahir Al Kamal | Panel Member-4<br>Name: Marzan Binte Hasan |

Office Use

| | |
|---|---|
| Program Coordinator<br>Name: Subrata Kumar Dey | Head of Department<br>Computer Science & Engineering<br>Name: Mahady Hasan |

# Abstract

The FamiPlasma Mobile Application is an all-inclusive platform that revolutionizes blood donation within families. This innovative app intends to simplify organizing blood donation events among family members, ensuring the timely availability of blood and fostering a sense of unity and support among family members. Essential features of the FamiPlasma Mobile Application include user registration, a QR code scanner, and the capacity to invite family members via email or QR code scanning. Once registered, users can quickly search for compatible blood groups within their family network, providing an essential resource during emergencies. Additionally, the app offers insights into any diseases or medical conditions within the family, facilitating determining eligibility for blood donation. Only authorized family members can access individual data to uphold privacy and confidentiality, ensuring that personal information remains secure and accessible only to those who genuinely need it. Additionally, the app encourages regular blood donation by taking account of each user's contributions and recognizing their altruistic efforts. In addition, FamiPlasma provides users with essential information about nearby blood banks, including their locations and contact information. This feature facilitates communication with blood banks, fostering a strong relationship between families and donation centers. The FamiPlasma Mobile Application is poised to have a significant impact by increasing the efficacy and accessibility of blood donation within families. Utilizing technology, it seeks to save lives, promote health awareness, and strengthen familial bonds by fostering a sense of shared responsibility.

# Table of Contents

**Attestation** ..... **2**
**Acknowledgement** ..... **3**
**Letter of Transmittal** ..... **4**
**Evaluation Committee** ..... **5**
**Abstract** ..... **6**
**Introduction** ..... **11**
1.1. Overview/Background of the Work ..... 11
1.1.1. Organization ..... 12
1.1.2. Company Profile: ..... 12
1.1.3. Products and services: ..... 12
1.2. Objectives ..... 12
1.3. Scopes ..... 13
**Literature Review** ..... **14**
2.1 Relationship with Undergraduate Studies ..... 14
2.2 Related works ..... 14
**Project Management & Financing** ..... **15**
3.1 Work Breakdown Structure ..... 15
3.2 Process/Activity wise Time Distribution ..... 16
3.3 Gantt Chart ..... 17
3.4 Process/Activity wise Resource Allocation ..... 18
3.5 Estimated Costing ..... 19
**Methodology** ..... **20**
**Body of the Project** ..... **21**
5.1 Work Description ..... 21
5.2 Requirement Analysis ..... 22
5.2.1 Rich Picture ..... 22
5.2.2 Functional Requirements: ..... 22
5.2.3 Non-Functional Requirements: ..... 23
5.3 System Analysis ..... 24
5.3.1 Six Element Analysis ..... 24
5.3.2 Feasibility Analysis ..... 25
5.3.3 Problem Solution Analysis ..... 26
5.3.4 Effect and Constraints Analysis ..... 26
5.4 System Design ..... 28
5.4.1 UML Diagrams ..... 28
5.5.2 Use Case Diagram: ..... 29
5.4.3 Activity Diagrams: ..... 30
5.5 Implementation ..... 34
5.5 Testing ..... 36

5.6.1 FamiPlasma System Input Table ..... 36
5.6.2 FamiPlasma System Output ..... 36
5.6.3 Designing Test Cases ..... 37
5.6.4 Test Results ..... 38
**Results & Analysis ..... 39**
System Achievement: ..... 40
Analysis of Challenges Faced during the FamiPlasma Project: ..... 40
**Project as Engineering Problem Analysis ..... 40**
7.1 Sustainability of the Project/Work ..... 40
7.2 Social and Environmental Effects and Analysis ..... 41
7.3 Addressing Ethics and Ethical Issues ..... 41
**Lesson Learned ..... 42**
8.1 Problems Faced During this Period ..... 43
8.2 Solution of those Problems ..... 43
**Future Work & Conclusion ..... 43**
9.1 Future Works ..... 43
9.2 Conclusion ..... 44
**Bibliography ..... 44**
**Consent From ..... 45**

# List of Figures

Figure 1 FamiPlasma WBS ..... 15
Figure 2 Time Distribution ..... 16
Figure 3 Gantt Chart ..... 17
Figure 4 Process/Activity wise Resource Allocation ..... 18
Figure 5 Rich Picture ..... 22
Figure 6 FamiPlasma Entity Relationship Diagram (ERD) ..... 28
Figure 7 Use Case Diagram for FamiPlasma ..... 29
Figure 8 Register and Authenticate Activity Diagram. ..... 30
Figure 9 Send Blood Request Activity Diagram. ..... 31
Figure 10 Edit User Profile Activity Diagram. ..... 32
Figure 11 Send Invitation Activity Diagram. ..... 33
Figure 12 Coding screenshot ..... 34
Figure 13 Database screenshot ..... 34
Figure 14 UI screenshot ..... 35
Figure 15 This API is used for user Signup, login, and user management ..... 39
Figure 16 This API is used for user/member invitation ..... 39
Figure 17 This API is used for get family data, get user from family, create new family, update user family group. ..... 39
Figure 18 This API is used for blood request to get blood request, send blood request, delete blood request. ..... 39

# List of Tables

Table 1 Estimated Costing ..... 19
Table 2 Six Element Analysis ..... 25
Table 3 FamiPlasma Input table with Field ..... 36
Table 4 FamiPlasma Output table ..... 37
Table 5 FamiPlasma Designing Test case pass or fail ..... 38

# Chapter 1

# Introduction

Internships provide students with valuable real-world experience enabling them to concentrate on their career interests and discover their potential. These programs would allow students to connect their theoretical understanding with real application and develop their extant skills.
The "Computer Science and Engineering" program at Independent University, Bangladesh, which is a requirement for graduation, provides Internship opportunities. As an undergraduate, I accomplished a three month internship at "TechTrioZ Solutions," a reputable company.
This report details my apprenticeship experience with "TechTrioZ Solutions." It provides an overview of the work I have done. What I have learned and how it has contributed to my professional development.

## 1.1. Overview/Background of the Work

During my internship at TechTrioZ Solutions, which concluded on September 10, 2023, I was an integral part of the mobile application development team. My focus was on the creation of the FamiPlasma mobile application, a platform designed to revolutionize family-based blood donation efforts.

The FamiPlasma Mobile App application's frontend was developed using the Flutter framework, and its backends powered by a NoSQL database and Firebase services. This tech platform enabled us to create a versatile and efficient application capable of real-time data processing.

The FamiPlasma Mobile App primary objective is to simplify and expedite the blood donation organization process within families. Having access to compatible blood from family members during medical emergencies can be a matter of life and death. Nevertheless, manually coordinating such donations can be difficult. FamiPlasma solves this problem by offering user-friendly registration, a secure and user-specific database, and the ability to invite family members to join the network. Once registered, users can rapidly locate compatible blood donors within their family, allowing for rapid and effective responses in emergency situations. The incorporation of Firebase services ensures secure data storage and enables real-time communication between family members while maintaining the privacy of sensitive health records.

My internship entailed active participation in the creation and improvement of the FamiPlasma mobile application. Using Flutter, NoSQL databases, and Firebase, our team fervently developed an application that promotes health awareness and

strengthens familial connections by encouraging shared sense of responsibility for one another's well-being.

### 1.1.1. Organization

TechTrioZ Solutions is a provider of IT solutions that is deeply committed to and passionate about offering top-notch IT services. Our team of passionate ICT experts specializes in a variety of services, including software development, data analysis, artificial intelligence, web, and mobile app development, and more, all of which are intended to accelerate the growth of digital businesses. We at TechTrioZ act as a comprehensive solution for all your ICT needs, ensuring your success online.

### 1.1.2. Company Profile:

TechTrioZ is a prominent IT solution company that specializes in providing clients with innovative strategies and high-quality services. They are committed to elevating enterprises in the digital world with a passionate and dynamic team. TechTrioZ surpasses in multiple areas of IT, including the development of fully responsive websites to improve online presence. the creation of fully customized mobile applications to enhance service delivery, and the construction of e-commerce stores to increase revenue. Their capabilities include CRM integration. SEO and user-friendly app designs for the best possible user experience. Using digital marketing to connect with a large customer base. TechTrioZ comprehends the monetary value of their services and customizes solutions to meet client needs. They endeavor to provide the greatest benefit and value to their clients, thereby assisting them in achieving their business objectives.

### 1.1.3. Products and services:

TechTrioZ offers a wide range of high-quality products and services. The company offers services in the development of web and mobile applications. The utilization of interactive software for simulating a three-dimensional environment in the field of software development. TechTrioZ specializes in the extraction of substantial quantities of data from websites through its comprehensive suite of services, including Data Scraping and Data Analysis. Additionally, it offers Chat Assistant (Chat-bot) services for Business Pages Robotic Process Automation.

## 1.2. Objectives

This system's development commenced with the execution of predetermined objectives.
They are listed below:

- Must satisfy the functional and non-functional needs of the client.
- The ultimate delivery deadline and development costs must be acceptable to the client.
- Digitizing the sales process to make it simpler and more effective.

- Designing a system that enables clients to make decisions quickly using visually appealing reports.
- Business flow can change at any time and immediate action can be taken within the app.
- Delivering a simple easy for use application for the public; and Innovative native Ui and UX for Android, iOS, and Windows.

## 1.3. Scopes

**User Registration and Profiles:** Develop a streamlined user registration procedure that enables users to construct and manage profiles containing vital information.

**QR Code Implementation:** Implement a QR code scanning feature for rapid access to app features and to facilitate the addition of family members.

**Family Member Administration:** Create a system for adding and managing family members via email invitations, QR code scanning, or any other method.

**Blood Group Lookup:** Design a comprehensive search function that allows users to efficiently locate specific blood groups within their family network.

**Integration of Medical Information:** Develop a module that allows users to enter and update information about any maladies or medical conditions that may affect their blood donation eligibility.

**Donor Eligibility Evaluation:** Before participating in donation events, implement a comprehensive eligibility check to ensure that potential donors meet certain health requirements.

**Privacy and Protection:** Establish stringent privacy controls to restrict access to information about family members to authorized individuals only, while maintaining confidentiality.

**Database Administration:** Develop a secure and scalable database for storing user profiles, donation histories, and medical data, ensuring the application's functionality.

**User Interaction:** Create elements to actively engage users, such as gamification elements or incentives for consistent blood donation.

**Analytics and Reporting:** Incorporate reporting and data analysis tools pertaining to blood donation trends and user engagement.

**Community Development:** Encourage a sense of community among family members by facilitating interactions and providing a forum for sharing experiences and news.

# Chapter 2

# Literature Review

## 2.1 Relationship with Undergraduate Studies

The information and abilities gained during undergraduate coursework at IUB have been helpful for the "FamiPlasma Mobile Application" responsibility. If these classes hadn't been finished before beginning this assignment, it would have been difficult. Some of the courses include:

In CSE451: Software Engineering, I learned numerous software development methodologies. Here, I used an agile method to construct the software.

CSE213: OOP concepts were taught to me in Java courses on object-oriented programming. I'm now working on object-oriented programming with a Java assignment.

CSE309: The web application course, I learned a some new coding languages, but this was for educational purposes and has no direct bearing on my internship assignment. However, this was my first step in learning web development.

In CSE307, System Analysis and Design, I learned how to analyze requirements and create diagrams. It allows me to comprehend the client's needs and design the program accordingly.

In CSE304: Database Management, I learned a few charts, such as ER, and the design of databases. In my application, I create the project's database using.

CSE 211& 203: Data Structures and Algorithms assist me comprehend the architecture of a new programming language.

## 2.2 Related works

During my first part of the internship, a thorough literature review was conducted to assess the status of mobile application research and blood donation system technology. Numerous papers, articles, and case studies were reviewed to gain insight into the challenges faced by blood donation programs and the potential benefits of mobile applications for overcoming those challenges. The literature review highlighted the importance of promoting regular blood donation, prompt access to blood donors, and effective communication among potential donors.

# Chapter 3

# Project Management & Financing

## 3.1 Work Breakdown Structure

The Work Breakdown Structure (WBS) organizes project activities by visually representing project duties and their relationships. It assists project administrators in organizing and managing the development by dividing it into smaller, more manageable parts. The WBS makes it easier to allocate resources effectively, assign tasks, and track project progress. The WBS can be subdivided further using a Gantt chart, ensuring defined responsibilities, and facilitating team coordination. The WBS is a fundamental instrument in project management, assisting with project planning, execution, and control.




Figure 1: FamiPlasma WBS

## 3.2 Process/Activity wise Time Distribution

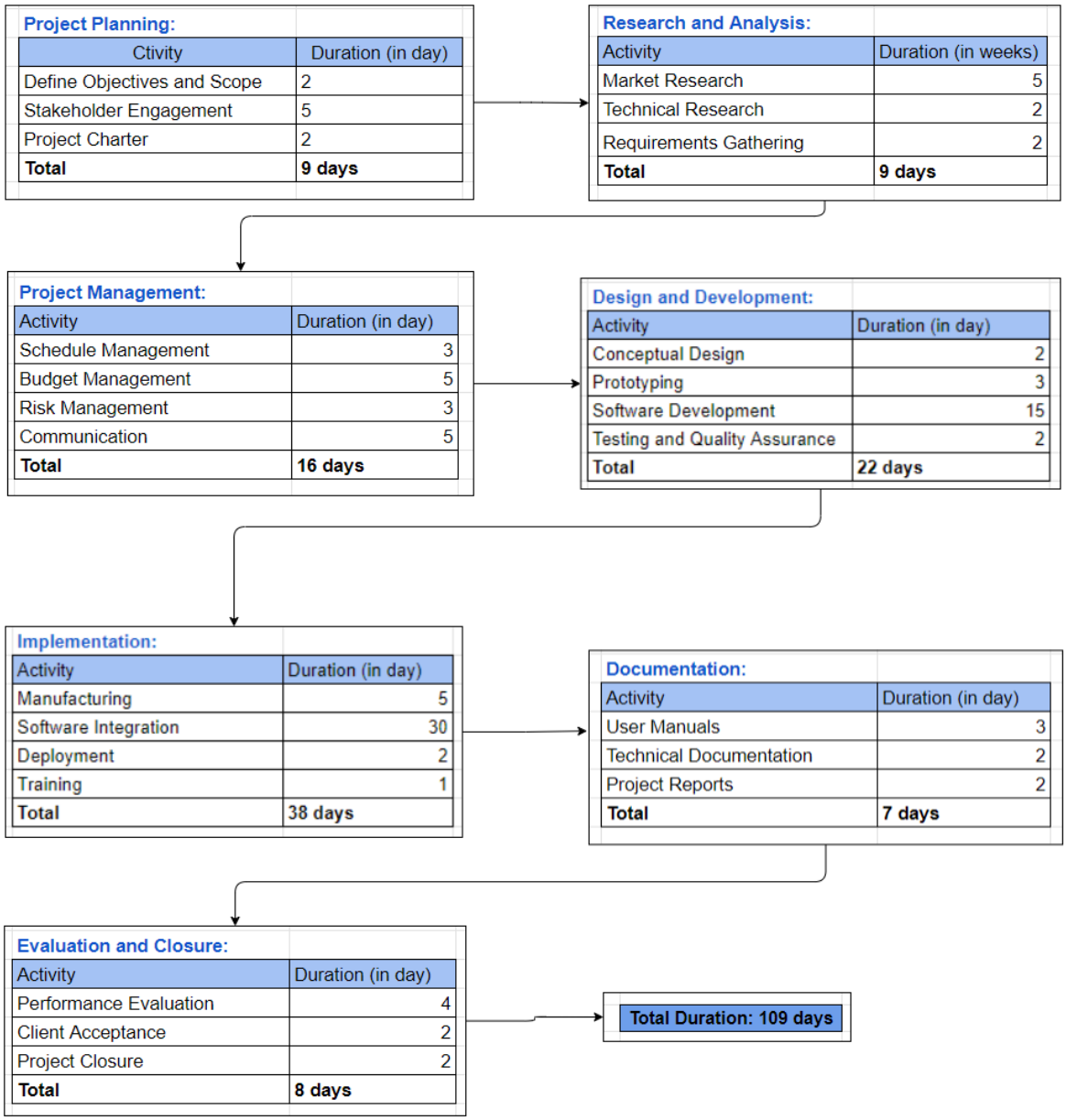
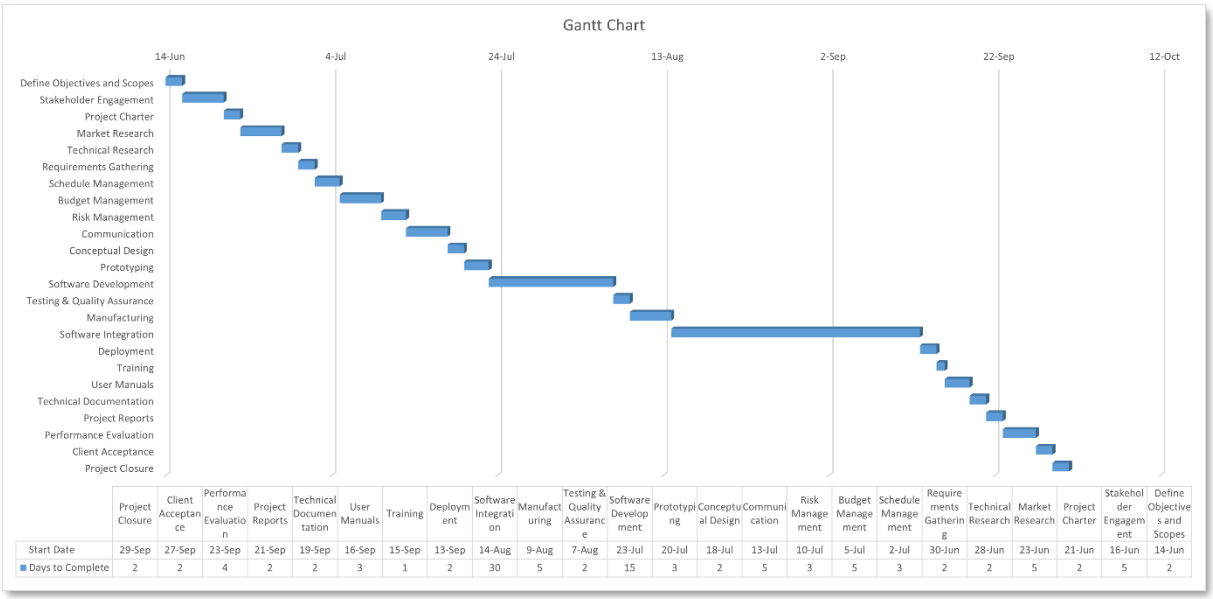



Figure 2: Time Distribution

## 3.3 Gantt Chart




| | Project Closure | Client Acceptance | Performance Evaluation | Project Reports | Technical Documentation | User Manuals | Training | Deployment | Software Integration | Manufacturing | Testing & Quality Assurance | Software Development | Prototyping | Conceptual Design | Communication | Risk Management | Budget Management | Schedule Management | Requirements Gathering | Technical Research | Market Research | Project Charter | Stakeholder Engagement | Define Objectives and Scopes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Date | 29-Sep | 27-Sep | 23-Sep | 21-Sep | 19-Sep | 16-Sep | 15-Sep | 13-Sep | 14-Aug | 9-Aug | 7-Aug | 23-Jul | 20-Jul | 18-Jul | 13-Jul | 10-Jul | 5-Jul | 2-Jul | 30-Jun | 28-Jun | 23-Jun | 21-Jun | 16-Jun | 14-Jun |
| Days to Complete | 2 | 2 | 4 | 2 | 2 | 3 | 1 | 2 | 30 | 5 | 2 | 15 | 3 | 2 | 5 | 3 | 5 | 3 | 2 | 2 | 5 | 2 | 5 | 2 |

Figure 3: Gantt Chart

## 3.4 Process/Activity wise Resource Allocation

The tables highlight the resource allocation and duration of the "FamiPlasma" project. The first table includes project activities, their associated resources, and their estimated completion times in weeks. This table helps project managers designate the appropriate individuals for tasks and establish a schedule. In the second table, the duration of the endeavor is the sum of the duration of each activity. The "FamiPlasma" initiative will take 96 weeks to complete. These tables help project administrators, team members, and stakeholders. They aid in resource and schedule planning and project coordination. With the independent format, it is simpler to represent progress in a clear manner, manage resources, and communicate project timelines.

| Activity | Resources Assigned | Time Duration (Days) |
|---|---|---|
| **Project Planning** | **Project Manager, Business Analyst** | |
| Define Objectives and Scope | Business Analyst | 2 |
| Stakeholder Engagement | Project Manager, Communication Specialist | 5 |
| Project Charter | Project Manager | 2 |
| **Research and Analysis** | **Research Team, Analysts** | |
| Market Research | Market Research Team | **5** |
| Technical Research | Technical Experts | 2 |
| Requirements Gathering | Business Analyst, Subject Matter Experts | 2 |
| **Project Management** | **Project Manager, Project Coordinator** | |
| Schedule Management | Project Manager, Scheduler | 3 |
| Budget Management | Project Manager, Finance Team | 5 |
| Risk Management | Project Manager, Risk Analysts | 3 |
| Communication | Project Manager, Communication Specialist | 5 |
| **Design and Development** | **Designers, Developers, QA Team** | |
| Conceptual Design | Designers | 2 |
| Prototyping | Designers, Prototyping Team | 3 |
| Software Development | Developers, QA Team | 15 |
| Testing and Quality Assurance | QA Team | 2 |
| **Implementation** | **Manufacturing Team, IT Team** | |
| Manufacturing | Manufacturing Team | 5 |
| Software Integration | IT Team | 30 |
| Deployment | IT Team | 2 |
| Training | Training Specialists | 1 |
| **Documentation** | **Technical Writers** | |
| User Manuals | Technical Writers | 3 |
| Technical Documentation | Technical Writers | 2 |
| Project Reports | Analysts, Report Writers | 2 |
| **Evaluation and Closure** | **Project Manager, QA Team** | |
| Performance Evaluation | QA Team, Analysts | 4 |
| Client Acceptance | Project Manager, Client | 2 |
| Project Closure | Project Manager | 2 |
| **Total** | | **109 days** |

Figure 4: Process/Activity wise Resource Allocation

## 3.5 Estimated Costing

Development cost is (10,0000 taka), infrastructure cost (56,000 taka), and maintenance cost (30,000 taka) represent most of the a software project's overall cost. The cost of development includes hourly wages for team members. Depending on the size and intricacy of an application, infrastructure costs can include servers and hosting. Ongoing problem fixes and updates are reflected in maintenance costs. Depending on factors such as project complexity, infrastructure requirements, and the need for post-development support and enhancements, the project's total cost can vacillate substantially. Controlling and optimizing these costs throughout the lifecycle of the software project requires meticulous budgeting and administration.

| **Task** | **Cost Amount in BDT** |
|---|---|
| Development Cost | 100000 Tk |
| Infrastructure Cost | 56,000 Tk |
| Maintenance Cost | 30,000 Tk |
| Total | 186000 Tk |

Table 1: Estimated Costing

# Chapter 4

# Methodology

The FamiPlasma mobile application was developed using an approach that includes the following key steps:

1. Collect Requirements: The initial step involved gathering requirements through questionnaires, interviews, and user input. Designing a user-friendly and efficient program requires a thorough understanding of user requirements.

2. Application Design: The architecture and user interface of the program were created based on the requirements gathered. User experience received special consideration, and the application was made simple to use.

3. Development: The mobile application was developed utilising contemporary software development techniques and technology. To provide a flexible and iterative development approach, agile methodologies were used.

4. Testing: thorough testing was done to find and correct any weaknesses or issues with the program. The development team conducted manual and beta testing with a small group of users.

5. Security & Privacy: Strict security controls were put in place to protect data confidentiality and privacy. Approved family members could only access information about their individual family members.

6. Integration: The application was merged with external databases to give users information on nearby blood banks, including their locations and contact information.

# Chapter 5

# Body of the Project

## 5.1 Work Description

The FamiPlasma Mobile Application is a dynamic and user-friendly platform designed to transform the coordination of blood donation efforts within families. At its foundation, FamiPlasma prioritizes user registration, allowing individuals to create accounts and join a dedicated network focused on saving lives through blood donation. Incorporating a QR code scanner simplifies access to essential features, while family member administration enables seamless additions to the network, fostering a sense of unity and support. A robust blood group search function enables users to quickly locate compatible donors within their family network, especially in emergency situations. In addition, the app provides a comprehensive summary of potential donors' medical conditions, ensuring their eligibility and the safety of the donation process. Only authorized family members will have access to sensitive health information protected by privacy controls. Users can keep note of their blood donation history, which encourages regular donations, and gain access to vital information about nearby blood banks. By integrating these features and utilizing a central database, FamiPlasma emerges as a vital tool not only for efficient blood donation but also for promoting health awareness and strengthening familial support bonds, ultimately saving lives and fostering a culture of unity and responsibility within families.

## 5.2 Requirement Analysis

### 5.2.1 Rich Picture

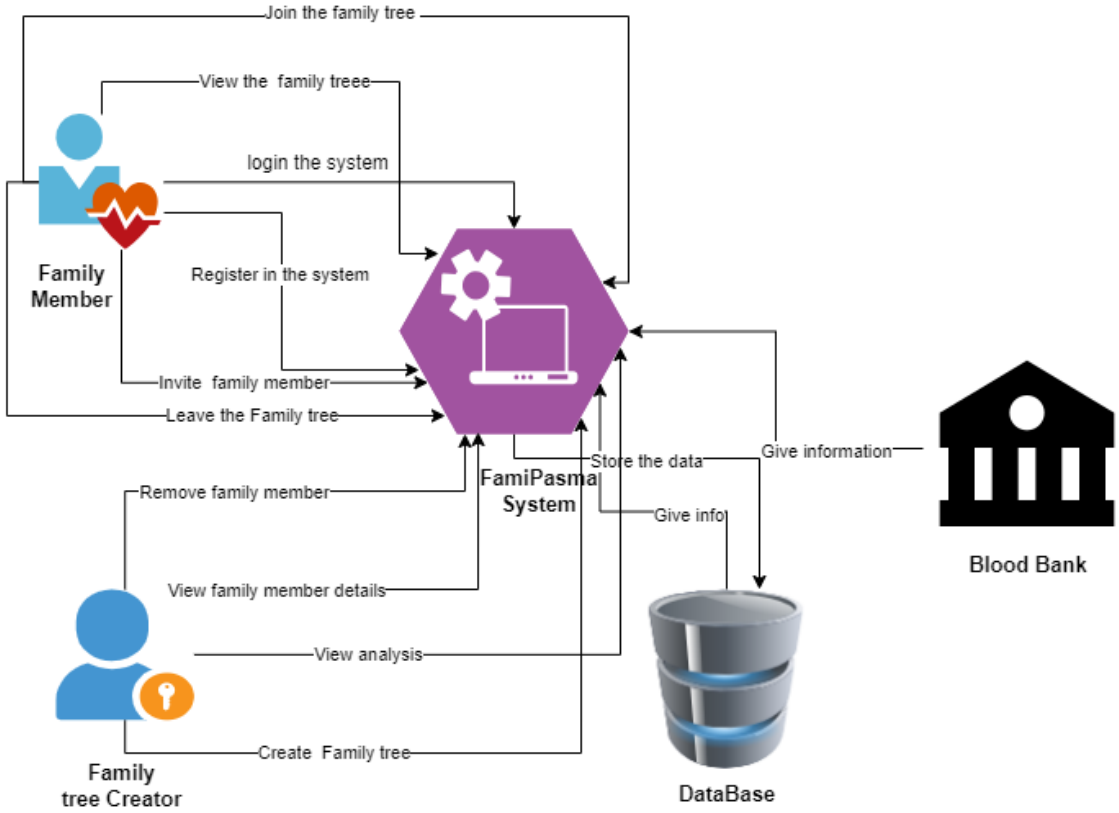



Figure 5: Rich Picture

### 5.2.2 Functional Requirements:

1. User Signup and Authentication:
    - Users must be able to sign up and create accounts using their personal information.
    - The system must securely authenticate users, ensuring that only registered users can access the application.

2. QR Code Scanner:
    - The application must incorporate a QR code scanner for fast access to features and family member additions.

3. Invite Member by Mail:
    - This application must send member invitation by mail. This invitation was sent by a family member.

4. Member Actions:
    - Members can leave the family tree.
    - Family creators can remove any member from this family tree.

5. Send Blood Request:
    - Member can send blood Request specific Family.
    - All members can see this blood request who are in this family.

6. Blood Group Analysis:
    - Application can generate family wise blood group analysis Pie Chart.

7. Blood Group Search:
    - Users must be able to search for relatives based on blood groups.

8. Donor Information:
    - Users should be able to input and examine medical information and diseases for family members. The system should evaluate donor eligibility based on their health condition.
9. Privacy Controls:
    - Only authorized family members should have access to particular family member information. User information and medical information must be secured.

10. Blood Donation History:
    - The app must allow users to look over their own blood donation history.

11. Blood Bank Information:
    - The application should integrate with external databases to provide location and contact information for adjacent blood banks.

12. Donor Contact Information:
    - Users should have access to the contact information of family network donors.

13. Database Integration:
    - The system should maintain a central database for storing user profiles, donation histories, and medical information.

### 5.2.3 Non-Functional Requirements:

1. Security:
    - The application must implement stringent security measures to safeguard user information and preserve confidentiality. Essential are data encryption and secure authentication.
2. Performance:

- Even with a large user base the application's responsiveness and performance should be optimal. The search and data retrieval response times should be as quick as possible.

3. Scalability:
    - The system must be designed to accommodate prospective increases in the number of users and the quantity of data.
3. Usability:
    - To encourage adoption, the user interface should be intuitive and user-friendly. The application should be usable by users with differing degrees of technical proficiency.

4. Reliability:
    - The application should operate without frequent errors or outages. The integrity and consistency of data should be preserved.
5. Compatibility:
    - The application should be compatible with a variety of mobile devices and operating systems in order to appeal to a larger audience. Data Backup and

7. Accessibility:

    - In compliance with accessibility guidelines, the application must be usable by users with impairments.

8. Performance Monitoring:
    - Continuous performance monitoring and optimization is required to ensure the responsiveness and efficacy of the application.

## 5.3 System Analysis

### 5.3.1 Six Element Analysis

| **Process** | **Human** | **Hardware** | **Software** | **Database** | **Network** |
|---|---|---|---|---|---|
| Login | All | Mobile phone | FamiPlasma Mobile app | FamiPlasma Database | Internet |
| Add Family members by QR code scanner | All | Mobile phone | FamiPlasma Mobile app | Update family creator tree data. | Internet |
| Add family members by Mail | All | Mobile phone | FamiPlasma Mobile app | Update family creator tree data | Internet |
| Remove Members | Family Creator | Mobile phone | FamiPlasma Mobile app | Update family creator tree data | Internet |
| Leave family | Family | Mobile phone | FamiPlasma | Update family | Internet |

| | | | | | |
|---|---|---|---|---|---|
| tree | members | | Mobile app | tree creator data and family members data. | |
| Update user data | All | Mobile phone | FamiPlasma Mobile app | Update user data | Internet |
| View family member data | Only family members | Mobile phone | FamiPlasma Mobile App | Load data Family members | Internet |
| View Blood Bank data | All | Mobile Phone | FamiPlasma Mobile App | Load data Blood bank | Internet |

Table 2: Six Element Analysis

## 5.3.2 Feasibility Analysis

**Technical Feasibility:**
FamiPlasma technical viability is contingent on the required infrastructure and technology availability. To ensure the project's success, it must have access to contemporary development platforms, secure data storage solutions, and databases that can integrate with external data sources, such as blood bank records. Implementing robust security measures, such as data encryption and secure authentication, is technically possible but requires cybersecurity expertise to protect user data safely. Scalability is possible through cloud services or server enhancements, but careful planning is required to accommodate potential growth in user numbers and data volume. Technically feasible, ensuring compatibility with multiple mobile devices and operating systems requires extensive testing and development efforts.

**Operational Feasibility:**
FamiPlasma operational viability is contingent on user adoption within families and effective coordination. A user engagement strategy and education on the app's benefits may be needed to convince users to register and actively participate. Effective communication and collaboration among family members are required for effective family coordination, which may necessitate awareness campaigns and support. Enforcing privacy controls and data management within a central database is operationally feasible but requires explicit user management and data privacy education. Support, updates, and maintenance on an ongoing basis are feasible from an operational standpoint but require dedicated resources and a support team.

**Economic Feasibility:**
Economic feasibility involves analyzing the FamiPlasma project's prospective costs and revenues. This includes app development costs, technology infrastructure costs, ongoing operational expenses, and salaries for support personnel. Identifying sustainable revenue streams, such as subscription fees, in-app advertising, and partnerships with blood banks is essential for long-term success. Economic viability requires calculating the anticipated return on investment (ROI) by estimating user numbers and potential revenue against development and operational costs, it is essential to conduct market research to evaluate demand,

competition, and growth prospects to ascertain the project's economic viability. Careful financial planning and business strategy are essential to ensure the project's economic success.

### 5.3.3 Problem Solution Analysis

**Problem Statement:**
The FamiPlasma initiative addresses the issue of inefficient family blood donation coordination. In the past, families have had trouble rapidly mobilising blood donors during emergencies, confirming donor eligibility, and protecting the confidentiality of sensitive medical information. Existing communication methods frequently fail to efficiently connect family members for blood donation, resulting in delays and complications in life-threatening situations.

**Solution:**
The FamiPlasma Mobile Application provides an innovative solution to the issue by providing a comprehensive and user-friendly platform for coordinating blood donation within families. The application simplifies the process of establishing a network of potential donors through user registration, QR code scanning, and family member management. The app allows users to search for specific blood groups, access donor information, and verify eligibility. Only authorized family members can access sensitive information thanks to stringent privacy controls. Additionally, the application allows users to monitor their blood donation history and gain access to vital information regarding nearby blood banks. By integrating these features and utilizing a central database, FamiPlasma enables families to respond quickly during emergencies, ensuring timely access to life-saving blood donations and fostering a culture of family unity and responsibility.

### 5.3.4 Effect and Constraints Analysis

**Effect Analysis:**

**Blood Donation Coordination Efficiency:** FamiPlasma simplifies the process of coordinating blood donations within families, resulting in faster emergency response times. This has the potential to save lives by assuring timely blood availability.

**Enhancing Family Unity:** The application fosters a sense of family solidarity and support. It encourages family members to unite for a common purpose, thereby strengthening familial ties and mutual responsibilities.

**Health Education:** FamiPlasma raises health awareness within families by providing information on the medical conditions and blood types of family members. This information is useful for proactive health management.

**Donating Blood Routinely:** The app's monitoring of blood donation history and recognition of donors may encourage people to donate blood on a regular basis, thereby contributing to blood banks and reducing blood shortages.

**Data Security:** Strict privacy controls safeguard sensitive medical data, ensuring that it remains private and is only accessible to authorized family members.

## Constraints Analysis:

During the development and implementation of FamiPlasma, several constraints and obstacles must be considered:

**User Acceptance:** It may be difficult to convince family members to acquire and actively use the application. Effective user engagement strategies are necessary to overcome resistance to change and ensure widespread adoption.

**Privacy Issues:** Even though privacy controls are in place, there may still be security concerns regarding sensitive medical information. Addressing these issues and ensuring strong data security is crucial.

**Technical Difficulties:** Creating and maintaining a secure and scalable technical infrastructure could present technical difficulties. Compatibility with multiple mobile devices and operating systems is also a technical factor to consider.

**Market Concurrence:** Existing blood donation applications and platforms may have an impact on the success of FamiPlasma. To distinguish itself and attract consumers, an organization will require effective marketing and distinctive features.

**Economic Persistence:** Determining a viable revenue model and attaining economic sustainability are crucial for the project's long-term success. It will be essential to balance development and operational costs with potential revenue streams.

**User Instruction:** Educating users on the benefits and features of the application may require resources and ongoing effort. Training and support for users will be required for a successful adoption.

## 5.4 System Design

### 5.4.1 UML Diagrams

UML (Unified Modelling Language) diagrams are standardized visual representations used in software engineering and system design to depict different aspects of a system or software application. They aid projects by providing clear visualizations, facilitating effective communication among team members and stakeholders, and serving as documentation for the system's architecture and design.

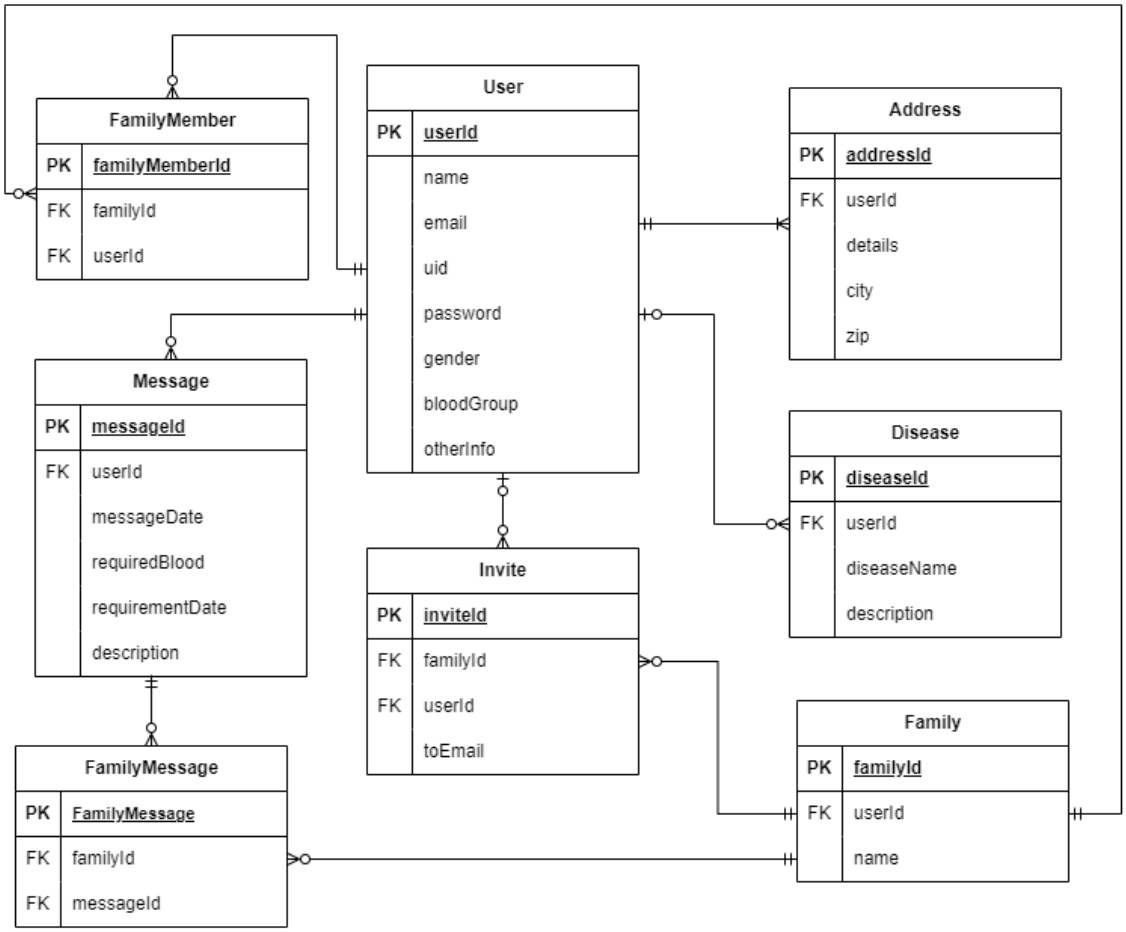



Figure 6: FamiPlasma Entity Relationship Diagram (ERD)

## 5.5.2 Use Case Diagram:

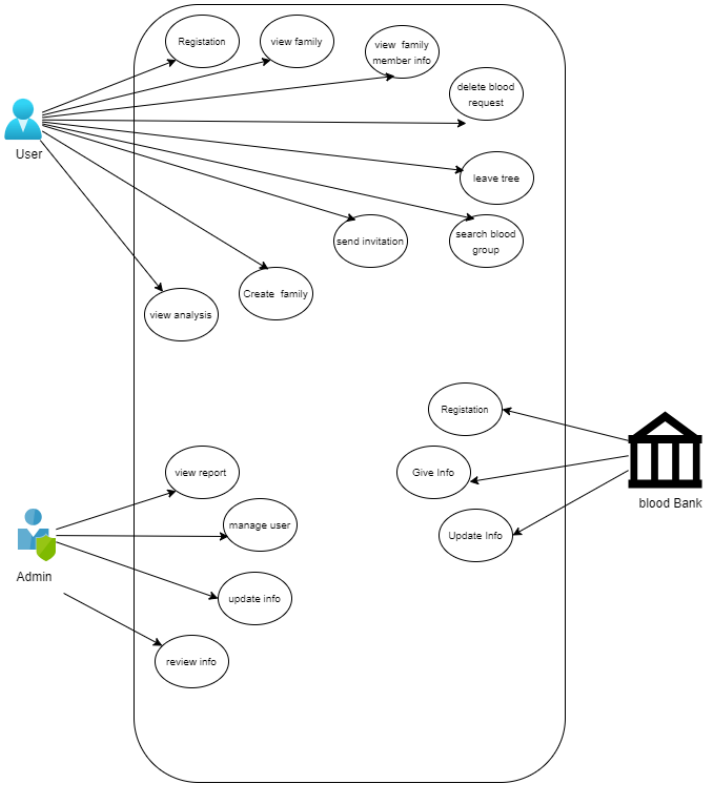



Figure 7: Use Case Diagram for FamiPlasma

## 5.4.3 Activity Diagrams:

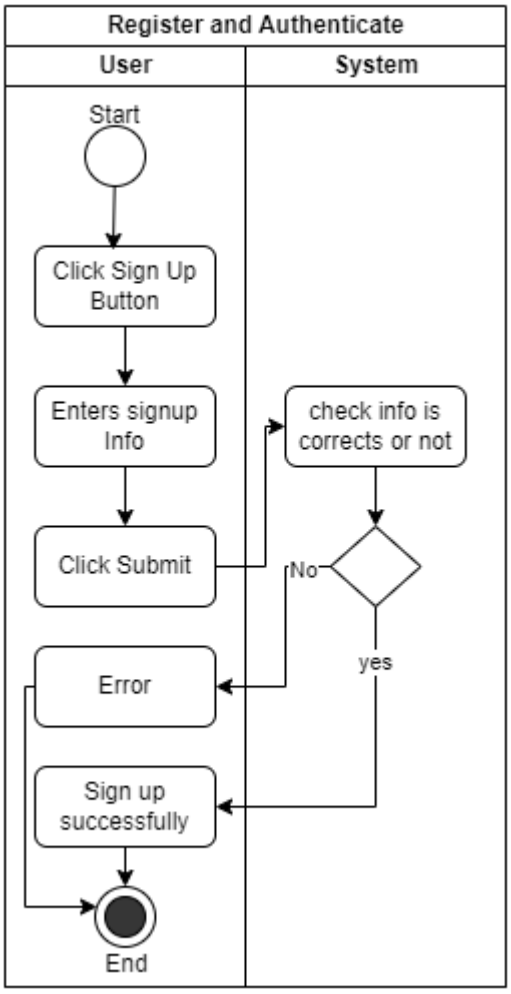



Figure 8: Register and Authenticate Activity Diagram.

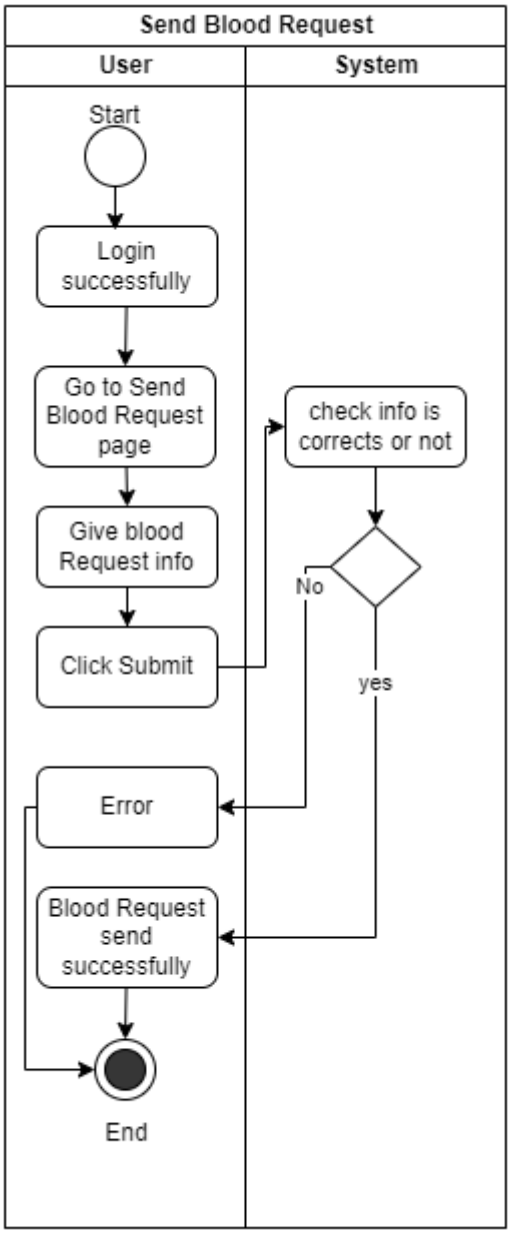



Figure 9: Send Blood Request Activity Diagram.

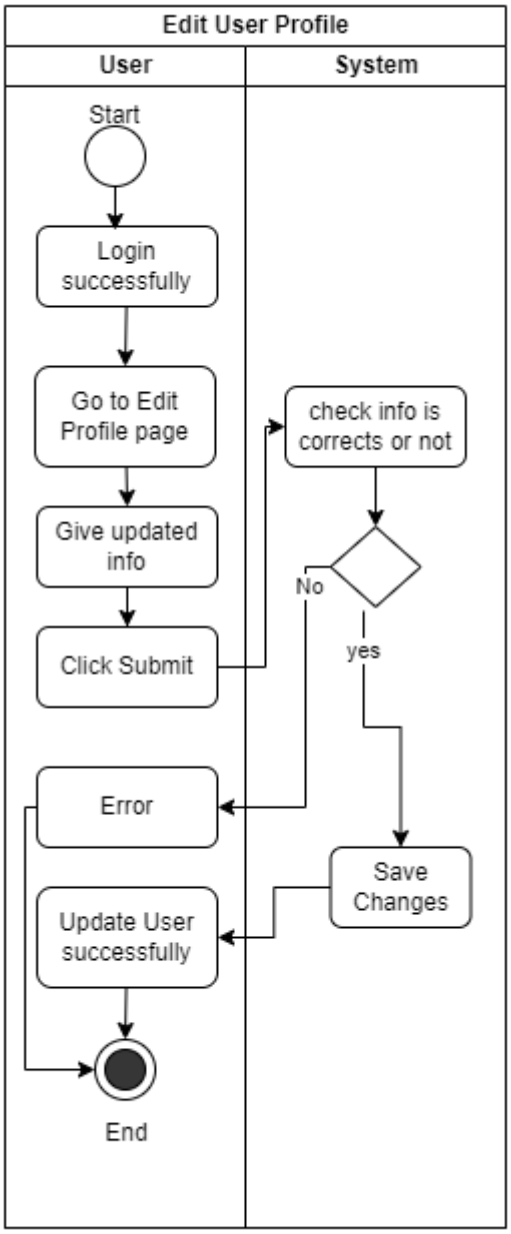



Figure 10: Edit User Profile Activity Diagram.

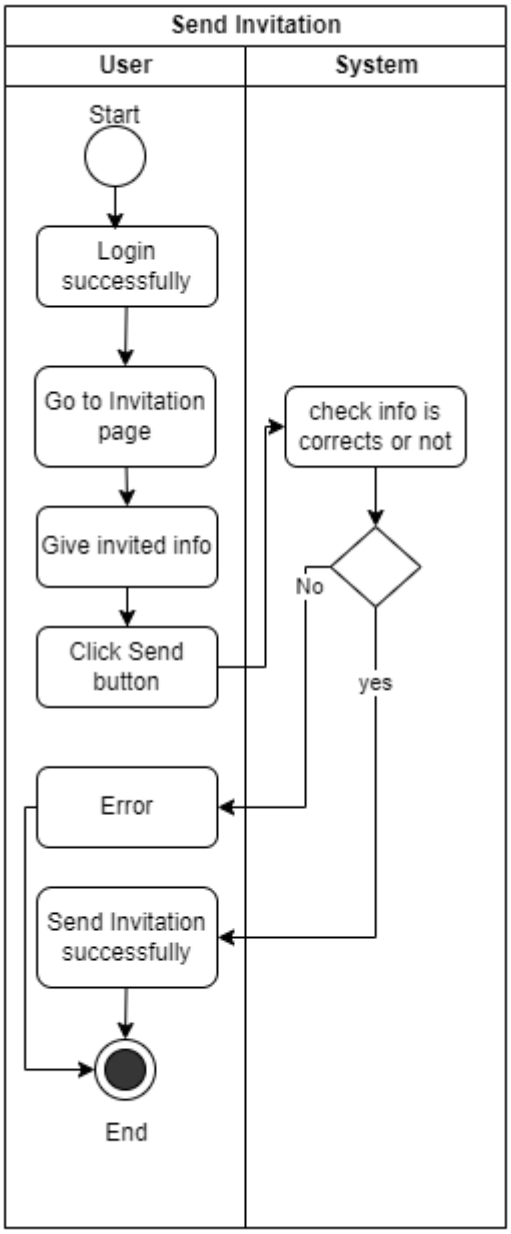



Figure 11: Send Invitation Activity Diagram.

## 5.5 Implementation

In my FamiPlasma project, I consistently prioritize efficiency and employ effective state management techniques. Flutter Provider serves as a cornerstone for maintaining and orchestrating app state seamlessly. My approach to coding focuses on decomposing complex tasks into simpler, reusable components. This modularity not only improves code organization, but also encourages code reuse, thereby reducing redundancy and maintenance time. By adhering to these principles, I ensure that FamiPlasma codebase remains efficient.

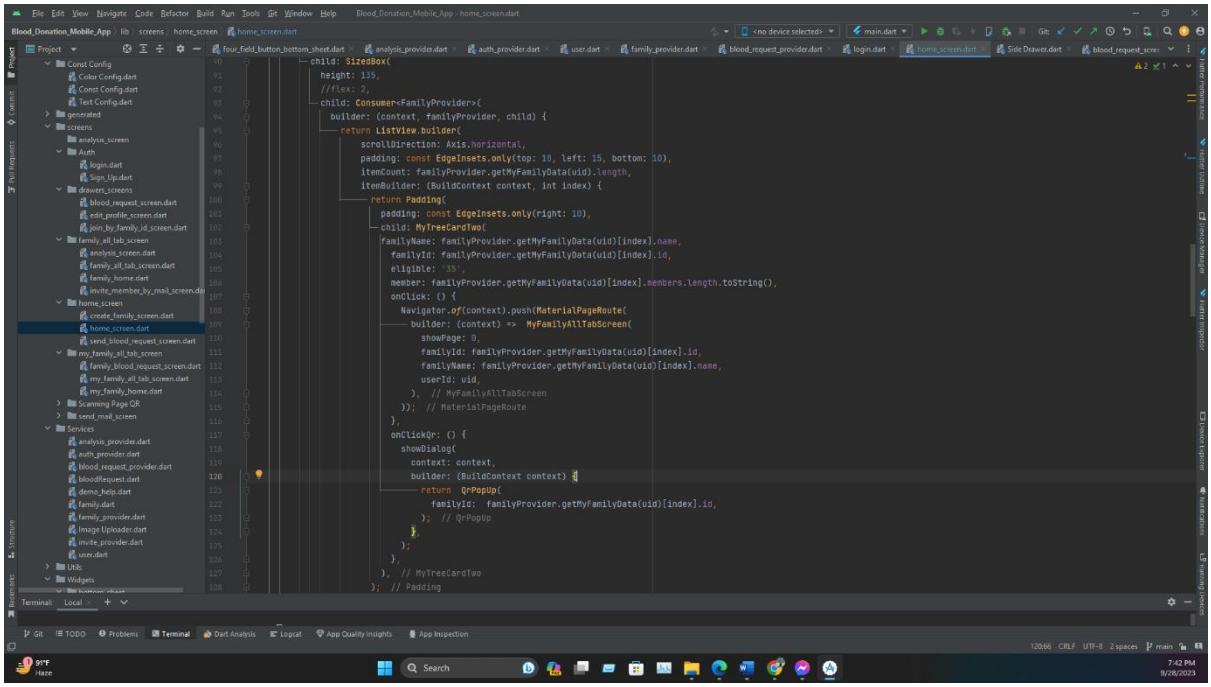


Figure 12: Coding screenshot

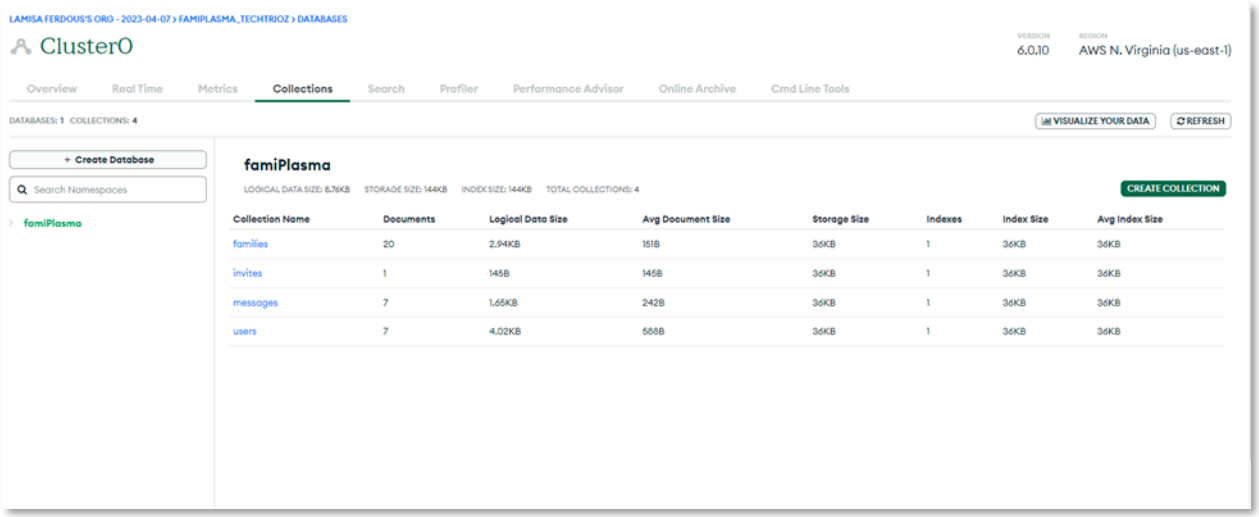



Figure 13: Database screenshot

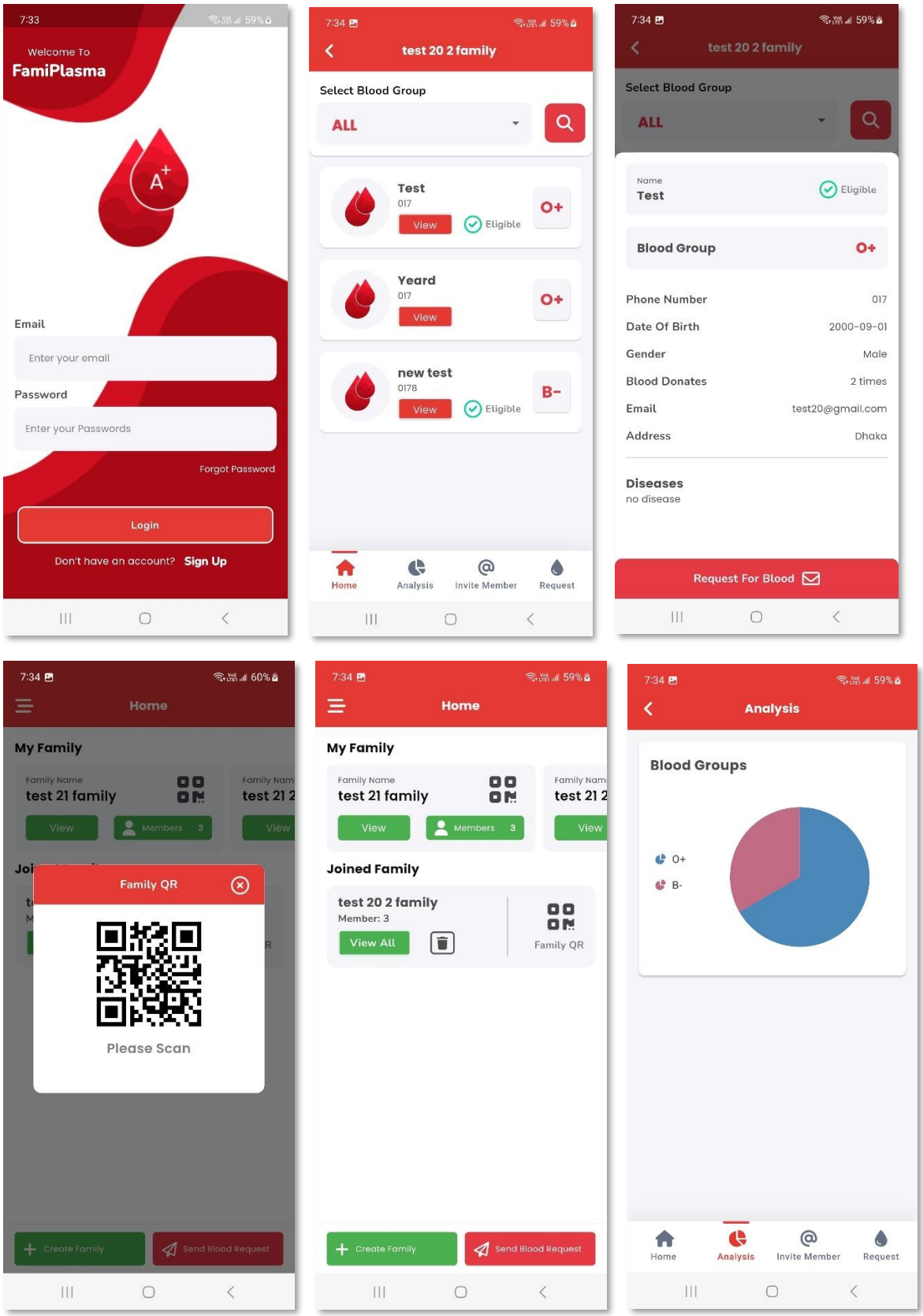



Figure 14: UI screenshot

## 5.5 Testing

Software testing is essential for detecting bugs, ensuring functionality, and increasing user satisfaction. It verifies that the software satisfies the requirements, reduces errors, and enhances the software's dependability, security, and performance. Testing is an essential step in the software development process because it reduces risks, reduces maintenance costs, and increases confidence in the software's quality.

### 5.6.1 FamiPlasma System Input Table

| **Test Case ID** | **Test Scenario** | **Test Inputs** |
|---|---|---|
| TC01 | User Signup | Name, Email, Password, Blood- Group |
| TC02 | User Login | Email, Password |
| TC03 | Create Family | Family Name |
| TC04 | Send Blood Request | Blood Group, Family Name, Required Date, Discerption |
| TC05 | Invite Member | Recipient email, Discerption |
| TC06 | Update User Profile | Name, Email, Password, Blood- Group, Eligible Status, Gender, Date of Birth, NOD, Weight, Disease, Address |
| TC07 | Leave Family Tree | User Id, Family ID |
| TC08 | Remove Member | Member Id, Family ID |

Table 3: FamiPlasma Input table with Field

### 5.6.2 FamiPlasma System Output

| **Test Case ID** | **Test Scenario** | **Test Output** |
|---|---|---|
| TC01 | User Signup | Successfully Signup in FamiPlasma System |
| TC02 | User Login | Successfully login in FamiPlasma User Dashboard. |

| | | |
|---|---|---|
| TC03 | Create Family | Family Create Successfully. |
| TC04 | Send Blood Request | Sending Blood Request Successfully. |
| TC05 | Invite Member | Inviting Member Successfully. |
| TC06 | Update User Profile | Update User Profile Successfully. |
| TC07 | Leave Family Tree | Leave Family Tree Successfully. |
| TC08 | Remove Member | Remove Member from My Family tree Successfully. |

Table 4: FamiPlasma Output table

## 5.6.3 Designing Test Cases

| **Test Case ID** | **Test Scenario** | **Test Inputs** | **Test Output** | **Pass/Fail** |
|---|---|---|---|---|
| TC01 | User Signup | Name, Email, Password, Blood- Group | Successfully Signup in FamiPlasma System | Pass |
| TC02 | User Login | Email, Password | Successfully login in FamiPlasma User Dashboard. | pass |
| TC03 | Create Family | Family Name | Error: No name given | Fail |
| TC04 | Send Blood Request | Blood Group, Family Name, Required Date, Discerption | Sending Blood Request Successfully. | Pass |
| TC05 | Invite Member | Recipient email, Discerption | Inviting Member Successfully. | Pass |
| TC06 | Update User Profile | Name, Email, Password, Blood- Group, Eligible Status, Gender, Date of Birth, NOD, Weight, Disease, Address | Update User Profile Successfully. | Pass |

| | | | | |
|---|---|---|---|---|
| TC07 | Leave Family Tree | User Id, Family ID | Leave Family Tree Successfully. | Pass |
| TC08 | Remove Member | Member Id, Family ID | Remove Member from My Family tree Successfully. | Pass |

Table 5: FamiPlasma Designing Test case pass or fail

### 5.6.4 Test Results

Most test cases have passed, such as user signup, login, blood request processing, member invitations, user profile updates, leaving family trees, and removing members. However, the "Create Family" (TC03) test case failed, indicating a problem with incomplete family name information during family creation. This scenario requires additional investigation and debugging.

- Test Case ID: A unique identification for each test scenario.
- Test Scenario: A clear description of the functionality or scenario under test. This column describes what the test case is designed to evaluate.
- Test Inputs: The inputs or data provided to the system during the test. This column specifies which values or information were utilized to run the test.
- Test Output: The expected output or result that should be obtained when the test is executed successfully. This column tells you what you should expect to happen based on the test data.
- Pass/Fail: The result of the test case.

# Chapter 6

# Results & Analysis

In this section, we will discuss the development and implementation of our Project FamiPlasma, as well as the final achievements system outcome.

| **Authentication and User Management:** | |
|---|---|
| API Endpoint | Description |
| GET: /BaseUrl/users/${uid} | Login |
| POST: /BaseUrl/users | Register |
| PUT: /BaseUrl/users/profile/${uid} | Update User Profile |
| PUT: /BaseUrl/families/memberDelete/${id} | Delete Member from Family Group |
| PUT: /BaseUrl/users/groupDelete/${uid} | Delete User Group |

Figure 15: This API is used for user Signup, login, and user management

| **Invitations:** | |
|---|---|
| API Endpoint | Description |
| GET: /BaseUrl/invites/${emain} | Check for Invitations |
| PUT: /BaseUrl/users/groupUpdateMany/${_uid} | Update User with Family Data |
| PUT: /BaseUrl/families/${_uid} | Update Families with User ID |
| DELETE: /BaseUrl/invites | Delete Invitations |
| POST: /BaseUrl/invites | Post Invitation Details |

Figure 16: This API is used for user/member invitation

| **Family Groups:** | |
|---|---|
| API Endpoint | Description |
| GET: /BaseUrl/families/${userUid} | Get User's Family Groups |
| GET: /BaseUrl/users/allGroupsUsers/${userUid} | Get Users in User's Family Groups |
| POST: /BaseUrl/families | Create New Family Group |
| PUT: /BaseUrl/users/groupUpdateOne/${user?.uid} | Update User's Family Groups |

Figure 17: This API is used for get family data, get user from family, create new family, update user family group.

| **Blood Request:** | |
|---|---|
| API Endpoint | Description |
| GET: /BaseUrl/messages/${uid} | Get Request |
| POST: /BaseUrl/messages | Post Request |
| DELETE: /BaseUrl/messages | Delete Request |

Figure 18 This API is used for blood request to get blood request, send blood request, delete blood request.

## System Achievement:

- FamiPlasma Mobile application successfully intricated with hosted API and the all-functionality work properly.
- This system can do many things like generate QR code automatically, scan QR code, send invitation through email, Analysis Blood group and make pie Chart.
- This system can make a huge impact when we need emergency blood. Through this system we can manage blood much faster.

## Analysis of Challenges Faced during the FamiPlasma Project:

- Throughout the duration of the work, we encountered and successfully overcame many challenges.
- Adopting agile development methodologies was essential for accommodating changing requirements and incorporating user feedback.
- Maintaining data security and system dependability were crucial factors that received meticulous attention and resolution.

FamiPlasma mobile application integrates effectively with a hosted API, providing automated QR code generation, email invitations, and blood group analysis via pie charts. This system has the potential to speed up emergency blood management. Agile development techniques were utilized to overcome obstacles, such as changing requirements, while data security and dependability remained top priorities. The initiative exemplifies our commitment to innovation and has the potential to revolutionize the allocation of emergency blood resources.

# Chapter 7

# Project as Engineering Problem Analysis

## 7.1 Sustainability of the Project/Work

Sustainability refers to the capacity of the "FamiPlasma" project to endure and remain viable over the long term, continuing to provide value to its users and stakeholders. Sustainability in a completing like FamiPlasma can be evaluated from multiple perspectives.

- **User Adoption and Growth:** Usually, the user adoption and expansion of sustainable initiatives is consistent over time. The initiative becomes more sustainable as more

users join and actively utilize the platform. This can be measured by monitoring users' registration, activity, and retention rates.

- **Financial Sustainability:** For projects to operate and expand, financial resources are required. Financially viable projects have a defined revenue model or source of funding to cover operational costs, development, and maintenance. This may include advertising revenues, premium features, donations, and monetary grants.

- **Technical Sustainability:** The project's technical infrastructure must be robust and scalable to accommodate growing usage and evolving technology. Regular maintenance and updates are indispensable for preserving the platform's functionality and security.

## 7.2 Social and Environmental Effects and Analysis

The "FamiPlasma" initiative has significant social effects by increasing blood availability, promoting health awareness, and strengthening family bonds. It encourages a sense of community and assistance among its users. However, it should resolve concerns regarding personal and medical information privacy.

As a digital platform, "FamiPlasma" has a smaller environmental impact than physical activities. Hosting and data management that are energy-efficient can further reduce its environmental footprint. The initiative has the potential to provide positive social benefits while having a minimal impact on the environment.

## 7.3 Addressing Ethics and Ethical Issues

It is essential for the responsible development and operation of the "FamiPlasma" undertaking to address ethical and moral concerns. Here are important ethical considerations and strategies for addressing them:

- **Data Privacy and Security:** Make sure to implement strong data privacy procedures to safeguard users' private and medical data. Implement access controls, strong encryption, and frequent security assessments. Depending on the user base and data handled, adhere to the appropriate data protection laws.

- **Informed Consent:** Before collecting and sharing users' data, get their consent. Provide choices for users to govern their data and clearly explain how user data will be utilized.

- **Transparency:** Be truthful and open about the project's goals, data management procedures, and any outside partnerships. Keep your terms of service and privacy policies accessible and clear.

- **Community Guidelines:** To ensure respectful and effective user interactions, establish and enforce community rules. Respond fast and transparently to hate speech, harassment, and improper content.

"FamiPlasma" can enforce ethical standards, preserve user rights, and maintain user confidence while providing its users with beneficial health-related services by proactively addressing these ethical issues. Ethical compliance is legally required and crucial to the project's legitimacy and long-term success.

# Chapter 8

# Lesson Learned

I had the chance to work on three unique projects during my internship, FamiPlasma being one of them. Along with helping me advance professionally, this experience provided me with a steep learning curve. I'd want to impart some important knowledge I learned throughout this time:

- **Teamwork and Collaboration:** How to collaborate well with others was one of the most important skills that I learned. I learned the value of communication, empathy, and compromise while working with colleagues who had varied backgrounds and skill sets. I found that when a team works well together, the outcomes frequently outperform the sum of the individual efforts.

- **Adaptation to Technology:** Today's world moves quickly, and technology is always changing. My internship reminded me how important it is to keep up with the most recent tools and technologies in my industry. As adopting new technology became second nature, I came to understand how important flexibility is in the digital world for career advancement.

- **Adapting to a New Environment:** It can be intimidating to join a new organization, but it can also be an opportunity for personal development. Initially, assimilating to the new work environment, company culture, and workflow processes presented obstacles. However, I soon realized that being adaptable to change and actively seeking assistance from coworkers facilitated my integration and success in the new environment.

- **Goal Setting and Time Management:** A key component of my internship experience was setting distinct, doable goals for each project. I learned that organizing my time more effectively and preparing ahead required breaking up difficult activities into smaller, achievable pieces. I was more productive and was able to regularly produce results of excellent quality because of this ability.

## 8.1 Problems Faced During this Period.

The company's internal procedures, including the project management software and communication channels, were at first difficult to understand. My work became confused and inefficient as a result.

## 8.2 Solution of those Problems

To address this issue, I sought the advice of seasoned teammates and attended company-sponsored training sessions. I took notes, asked questions, and practiced using the instruments until I mastered them. In addition, I maintained open communication channels with my team to ensure that I was in accordance with their expectations and procedures. I became more confident in my role due to my efforts to acclimatize to the new working environment, which took time.

# Chapter 9

# Future Work & Conclusion

## 9.1 Future Works

Future developments for "FamiPlasma" may include a range of changes, expansions, and upgrades to better meet the needs of its users and accomplish its objectives. Here are some probable directions for the future:

1. **Health Tracking Features:** Develop and enhance health tracking tools enabling families to track health metrics, immunizations, and doctor's appointments.

2. **Enhanced Privacy Controls:** To ensure the highest level of data security and user confidence, work on giving users even more precise control over their privacy preferences and data sharing preferences.

3. **Community Events:** To enhance the sense of community and support among users, plan and coordinate virtual or local community events like donation drives and health awareness lectures. These gatherings can connect and engage your user base more deeply.

## 9.2 Conclusion

My internship journey has been a transformative experience, equipping me with invaluable skills and insights that extend far beyond the workplace. Working in a collaborative team environment taught me the significance of effective communication, adaptability to evolving technologies, and the power of collective effort. Amidst the challenges faced during the development of the FamiPlasma Mobile application, I learned the art of problem-solving, largely thanks to the guidance and mentorship provided by experienced project seniors. Today, I stand confidently capable of crafting mobile applications independently. This internship period has not only enriched my professional capabilities but has also nurtured a newfound self-assuredness that will undoubtedly propel me forward in my career with enthusiasm and determination.

# Bibliography

[1]T. Dyba and T. Dingsoyr, “What Do We Know about Agile Software Development?,” *IEEE Software*, vol. 26, no. 5, pp. 6–9, Sep. 2009, doi: https://doi.org/10.1109/ms.2009.145.

[2]“Software Engineering | System Design Strategy - GeeksforGeeks,” *GeeksforGeeks*, May 21, 2019. https://www.geeksforgeeks.org/software-engineering-system-design-strategy/

# Consent From




**An Undergraduate Internship/Project on Topic**

**"FamiPlasma Mobile App"**

By

**Md. Yeard Morshed**

Student ID: **2022372**

**Summer, 2023**

## 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.

This internship report is checked with Turnitin and/or Ithenticate plagiarism checker, and the score is:

Turnitin Score (%) : 8%
Ithenticate Score (%) :

(Signature of the Supervisor)

**Mr. Md. Mahmudul Kabir Peyal**

Research & Development Officer
Department of Computer Science and Engineering
Independent University, Bangladesh