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Department of Information Systems



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## Abstract

In today's world, effective management of chronic health conditions like diabetes is paramount to ensure optimal health outcomes. Living with diabetes can prove to be quite challenging due to several factors. These may include continuous monitoring of blood glucose levels, strict adherence to medication schedules, keeping an eye on one's dietary habits, and engaging in regular physical activity. People with diabetes often face difficulties in handling these complexities effectively, which may lead to less-than-optimal health outcomes and a lower quality of life. Additionally, it can be quite a task to find reliable information and support tailored to one's specific needs, which further exacerbates the difficulties associated with managing the condition.

GloucoGuide system aims to support individuals with diabetes by providing a comprehensive healthcare platform. It offers access to a wide range of health articles, personalized care plans, and health tracking tools to help users take control of their health and manage their condition effectively. Through its innovative features and user-centered design, GloucoGuide seeks to reduce the burden of diabetes management and promote proactive self-care behaviors. Its goal is to improve health outcomes for individuals with diabetes.

GloucoGuide tackles the problem of providing comprehensive and reliable health information for individuals with diabetes. Its primary method is online searching, which includes gathering information from credible online resources. GloucoGuide offers users access to personalized care plans, health tracking tools, a supportive community, and a wealth of health articles - all tailored to the unique needs of individuals with diabetes.

GloucoGuide is a user-friendly web application designed to provide easy and intuitive access to essential resources for managing diabetes. Its interactive features, such as informative health articles, reviews, and ratings, empower users to confidently discover and plan effective strategies for managing their condition.

In conclusion, GloucoGuide represents a major advance in diabetes care, offering individuals with diabetes a comprehensive, user-centric platform to effectively manage their condition and improve their quality of life. With its innovative features and user-friendly design, GloucoGuide aims to empower users to take control of their health and succeed on their journey to better health.

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## Chapter 1: Introduction

### 1.1 Background and Motivation

Diabetes, a chronic disease characterized by elevated blood glucose levels, poses a significant global health challenge. Over time, diabetes can result in severe damage to vital organs such as the heart, blood vessels, eyes, kidneys, and nerves. The escalating prevalence of diabetes has become a critical concern, with approximately 422 million individuals worldwide affected. Tragically, 1.5 million deaths are directly attributed to diabetes annually. This surge in cases and the increasing prevalence of diabetes over the past few decades necessitate innovative and accessible solutions for effective diabetes management.

Diabetes management involves a multifaceted approach, including lifestyle modifications, regular monitoring of blood glucose levels, adherence to medication schedules, and staying informed about the latest advancements in diabetes care, from here our project, GlucoGuide, was born. A comprehensive and user-friendly solution that empowers individuals to take control of their health.

The escalating impact of diabetes, in terms of the number of cases, long-term health effects, and associated mortality, is the driving force behind the development of our GlucoGuide Diabetic Management System. Recognizing the urgent need for comprehensive and user-friendly tools, GlucoGuide aims to empower individuals to proactively manage their diabetes, mitigate complications, and lead healthier lives.

## 1.2 Problem Statement

The prevalence of diabetes continues to rise globally, presenting significant challenges for affected individuals and healthcare systems alike. Despite the abundance of diabetes-related information online, there exists a lack of centralized platforms that offer comprehensive resources, and tools for effective diabetes management. GlucoGuide aims to address this gap by developing a user-centric diabetes website that serves as a reliable source of information and integrates practical tools to support individuals in managing their diabetes effectively. By providing accessible, evidence-based resources, GlucoGuide seeks to empower individuals with diabetes to make informed decisions about their health and well-being.

## 1.3 Objectives

- Design and implement machine learning algorithms capable of identifying who is most likely to have diabetes by asking a specific health question to each user.
- Create a to-do list of each user to help him manage and schedule his medicines or upload his health data around the period to see a graph of his health around this time.
- Improving GlucoGuide's educational materials to offer current knowledge on diabetes prevention, management, and lifestyle changes.
- Improving the user interface of GlucoGuide to ensure easy navigation and interaction with the system.

## 1.4 Project Scope and Limitations

### 1.4.1 Project scope:

GlucoGuide is envisioned as a comprehensive healthcare management system designed to address the specific needs of individuals with diabetes. The project aims to achieve the following key objectives:

1. **Accessible Information:** GlucoGuide provides reports on diabetes levels and recommended medical tests. Users will have access to critical information for properly monitoring and managing their diabetes.
2. **Promote Holistic Wellness:** The app allows users to find nearby pharmacies and clinics based on their location, making checks and tests more convenient.
3. **Promote a healthy lifestyle:** Users can read information on natural and lifestyle suggestions to improve their health.

### 1.4.2 Project Limitations:

Despite its enormous reach, GlucoGuide acknowledges some limitations:

1. **Device Integration:** GlucoGuide strives to interact easily with numerous devices, but device compatibility may limit real-time data tracking.
2. **Machine Learning Precision:** The precision of diabetes predictions depends on the quality and diversity of training data.

3. **Project Timeline Limitations:** The project's success is dependent on adhering to a specific timeline. Unexpected obstacles, changes in requirements, or unforeseen technological issues may create limits during development, affecting the total project timeline.

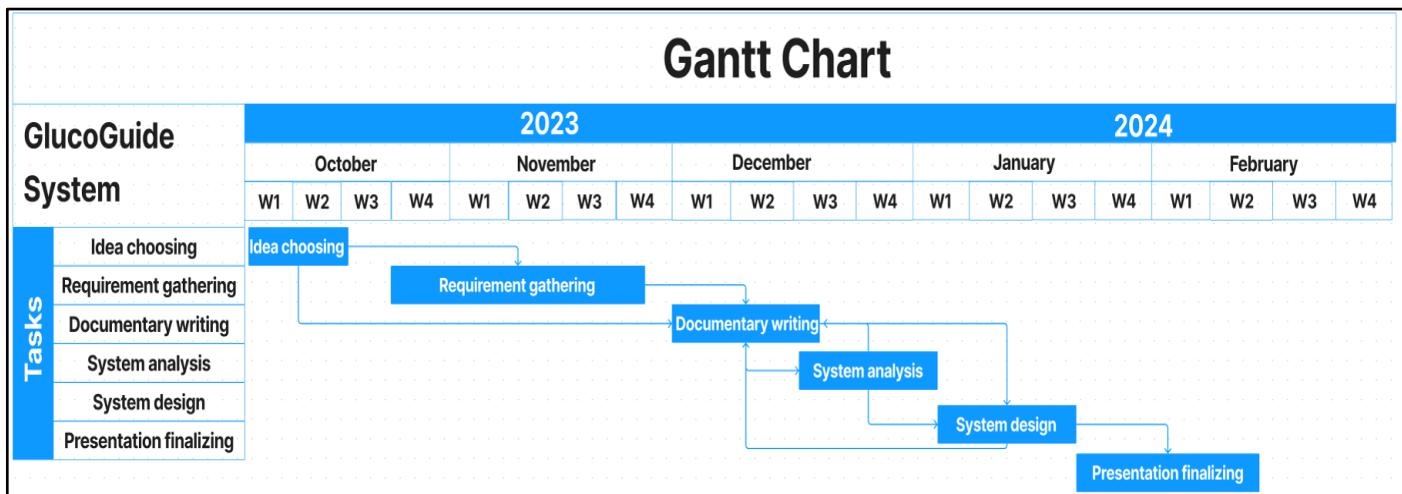


Figure 1: Analysis Gantt Chart

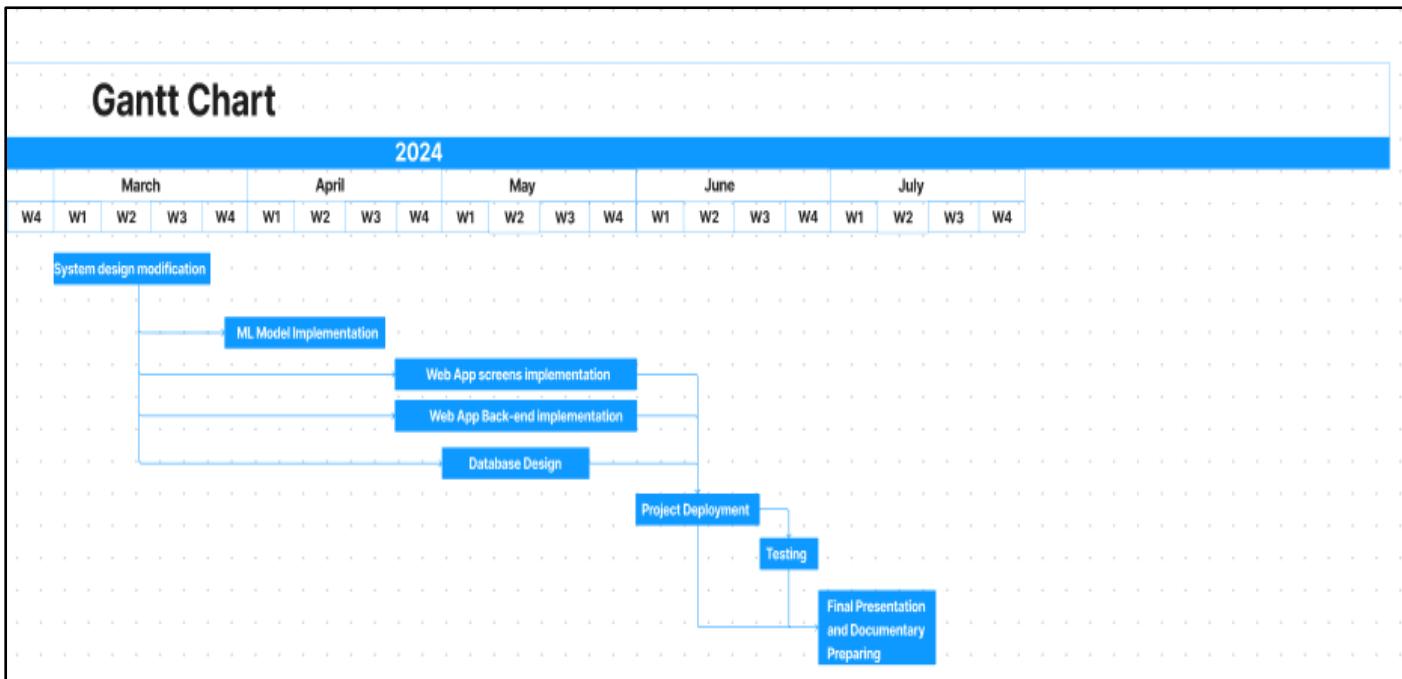


Figure 2: Implementation Gantt Chart

## 1.5 Project Methodology

### 1.5.1 Methodology Overview:

The development of GlucoGuide will follow a systematic methodology to ensure the creation of a robust, user-friendly, and effective healthcare management system for individuals with diabetes. The chosen methodology incorporates key stages, each contributing to the overall success of the project.

### 1.5.2 Waterfall Model:

The project will use a modified waterfall model, emphasizing clear phases and milestones. This will allow for a structured approach to development, ensuring that each stage is completed before moving on to the next. The key phases include:

- 1. Requirement Analysis:** In this phase, a thorough analysis of the requirements outlined in the project statement will be conducted. This will involve stakeholder consultations, user interviews, and a detailed examination of existing healthcare management systems. The goal is to establish a comprehensive understanding of user needs and system functionalities.
- 2. System Design:** Following the requirement analysis, the system design phase will commence. This involves creating a detailed technical architecture, database design, and user interface mock-ups for GlucoGuide. Special attention will be given to ensuring seamless integration with various devices, as well as an intuitive and accessible user interface.
- 3. Implementation:** With the design phase completed, the actual development of GlucoGuide will begin. This will involve coding, database setup, and integration with external devices and systems. Continuous testing and debugging will be performed to ensure the reliability and stability of the system.
- 4. Testing:** A comprehensive testing phase will be undertaken to validate the functionality, security, and performance of GlucoGuide. This includes unit testing, integration testing, and user acceptance testing. Feedback from testing will be used to refine and enhance the system.
- 5. Deployment:** Once testing is successful, GlucoGuide will be deployed in a controlled environment. User training sessions will be conducted to familiarize healthcare

professionals and patients with the system. Initial user feedback will be collected for further refinements.

- 6. Maintenance and Support:** Post-deployment, a maintenance plan will be implemented to address any issues that may arise. Regular updates and enhancements will be made based on user feedback and emerging technologies. Continuous support will be provided to ensure the smooth operation of GlucoGuide.

## 1.6 Project Report Outline

In the next chapters, we will discuss about GlucoGuide system in more detail

- **Chapter 2.** presents a sample of other market websites and systems that are related or like our system and have common functionalities with it
- **Chapter 3.** presents the analysis of the system by collecting and interpreting facts, identifying the problems, and decomposition of a system into its components. It gets deep into the functionalities that the system covers with more details, visually by diagrams and use cases and more analysis principles.
- **Chapter 4.** presents system design and introduces in more detail the designing of the architecture, components, and interfaces for a system so that it meets the end-user requirements and concentrates on concepts.
  - o System components diagram
  - o System class diagram
  - o System sequence diagrams
  - o System ERD
  - o System GUI
- **Chapter 5:** presents some of the detailed system test cases, and used testing tools, it also includes a project evaluation in terms of
  1. Cost (if possible)
  2. Time compared to contemporary systems (if possible)
  3. Environmental impact (if any)
  4. Social and Political Impact (if any)
- **Chapter 6:** presents conclusions to validate the system needs and how the presented system solved the problem stated. Finally, describe future suggestions to improve the system.

## Chapter 2: Market and Literature Survey

### Related work

#### 1- My-sugar App:

This app helps users track their blood sugar levels, carbohydrate intake, and insulin doses. It also provides insights and trends to better understand and manage diabetes.

##### - Its features:

1. Blood glucose tracking
2. Carbohydrate tracking.
3. Insulin tracking.
4. Activity tracking.
5. Meal logging.
6. Data analysis and insights.
7. Reminders and notification.
8. Integration with health devices.
9. Reports and exports.
10. Community support.

##### - Weakness points:

1. Not all this functionality is free.
2. Lack of integration with providers: As users themselves generate reports they couldn't be supported with reports provided by providers which could be valuable for the user's knowledge.
3. Customer support: As no exist of feedback or reviews this causes responsiveness or difficulty in resolving technical issues promptly, which could be frustrating for users who encounter problems while using the app.

#### 2- Glooko App:

Glooko syncs with various blood glucose meters, insulin pumps, and continuous glucose monitors to track blood sugar levels and other diabetes-related data. It also provides analytics and insights for better management.

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- **Its features:**

1. Blood glucose tracking
2. Carbohydrate tracking.
3. Insulin tracking.
4. Activity tracking.
5. Meal logging.
6. Data analysis and insights.
7. Medication reminder.
8. Integration with health providers.
9. Reports and insights.
10. Education resources.

- **Weakness points:**

1. Is not available in all countries.
2. Customer support: As there is no feedback or reviews this causes responsiveness or difficulty in resolving technical issues promptly, which could be frustrating for users who encounter problems while using the app.

### **Diabetes Digital Health:**

Diabetes Digital Health is a diabetes management app designed to help individuals with diabetes and their caregivers track and manage their condition effectively.

- **Its features:**

1. Blood glucose tracking
2. Carbohydrate tracking.
3. Insulin tracking.
4. Activity tracking.
5. Meal logging.
6. Data analysis and insights.
7. Medication reminder.
8. Integration with health providers.
9. Emergency Alert.

- **Weakness points:**

1. All this functionality is not free.
2. Customer support: As no exist of feedback or reviews this causes responsiveness or difficulty in resolving technical issues promptly, which could be frustrating for users who encounter problems while using the app.

**GlucoGuide App features:**

1. Blood glucose tracking
2. Carbohydrate tracking.
3. Insulin tracking.
4. Activity tracking.
5. Data analysis and insights.
6. Reports and exports.
7. Education resources.

**Differences in GlucoGuide App:**

1. Integration with provider.
2. Customer support: We allow users to make their own reviews and admin reply to them.
3. Search for a specific topic.
4. At the start GlucoGuide App predicts if the user has diabetes or not.
5. Provide users with locations of drugstores, clinics, and hospitals.
6. Allow the user to make his medication schedule.
7. Free for all countries.

## Chapter 3: GlucoGuide Analysis

### System architecture:

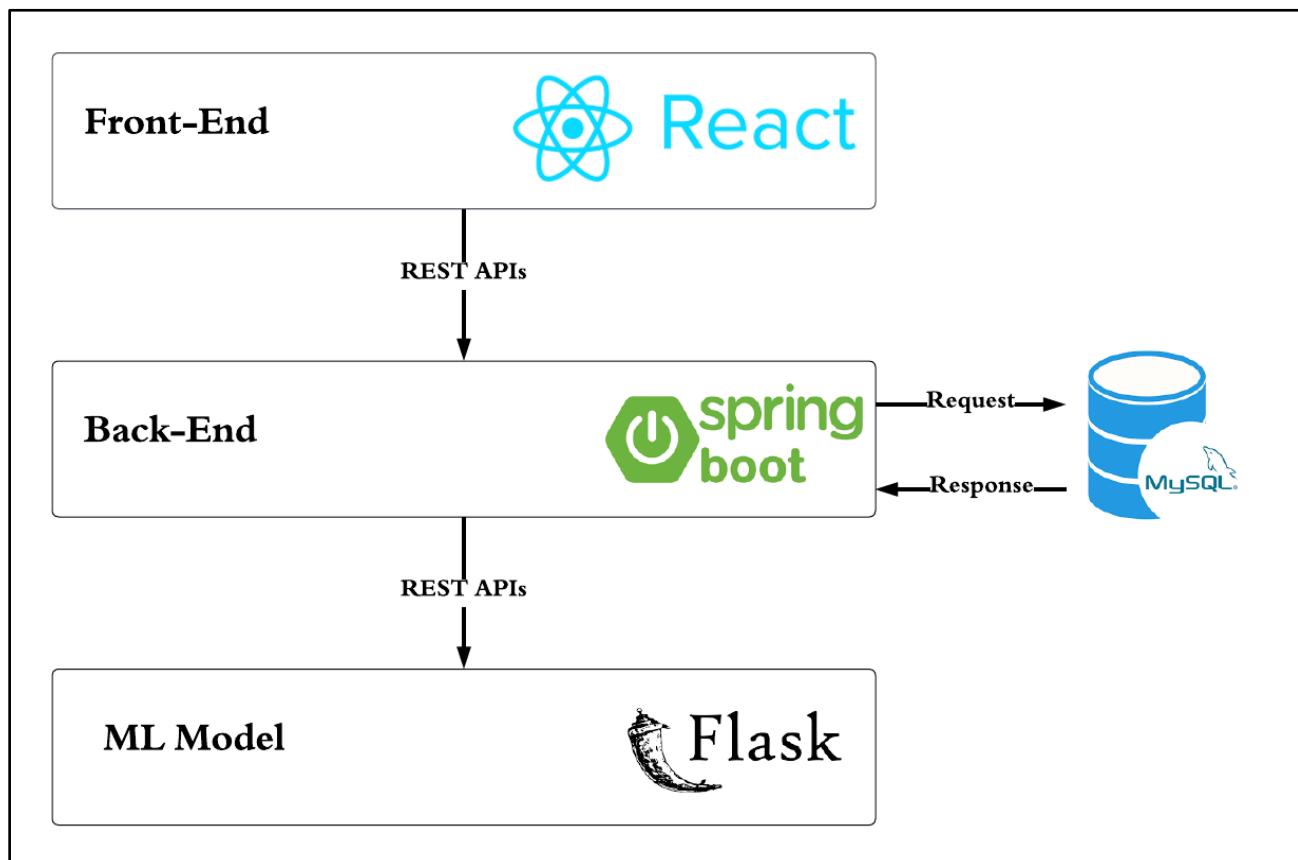


Figure 3: System architecture

### Stakeholders:

- **Users:** Individuals living with diabetes who will directly interact with the GlucoGuide platform to access educational resources, personalized care plans, health tracking tools, and community support.
- **Developers:** The team responsible for designing, developing, and maintaining the GlucoGuide web application, including software engineers, designers, and technical support staff.

- **Admins:** Project managers, executives, and other decision-makers within the organization overseeing the development and implementation of the GlucoGuide platform, responsible for setting goals, allocating resources, and ensuring project success.

## Functional Requirements:

### 1. User Registration and Authentication:

- Users should be able to register for an account on the GlucoGuide platform.
- Registered users should be able to log in securely using their credentials.

### 2. Educational Resources:

The platform provides access to a variety of educational articles, medical reports, natural tips, and lifestyle guidance related to diabetes management.

### 3. Search within articles:

Users will be able to search for and browse educational resources based on relevant topics and categories.

### 4. Creating a health list:

Users should be able to create a health list such as a list of their glucose measures, medication schedules, and exercise routines.

### 5. Statistics Graph:

The platform supports the input and visualization of health data over time, allowing users to monitor trends and patterns in their health metrics.

### 6. Locator tool:

The platform includes interactive features such as Google Maps to help users explore and discover the location of the nearest clinic or pharmacy from their current location

### 7. Prediction of diabetes:

The platform provides a machine learning model that predicts if the user has diabetes or not by asking specific questions.

### 8. Admin registration and authentication (log in)

### 9. Publish articles about healthcare (e.g., medical reports, lifestyle tips...)

### 10. Notify users when articles are published

### 11. Manage reviews (reply, delete...)

### 12. Views all user's usage history within the GlucoGuide system.

## Non-Functional Requirements:

- 1. Usability:** The platform will have an intuitive and user-friendly interface, with clear navigation and easily accessible features.
- 2. Robustness:** The system will deal with bad user inputs and wrong data.
- 3. Scalability:** It should be able to handle increased traffic and resource demands without compromising performance or reliability.
- 4. Performance:**
  - Response Time: The system will respond to user requests in a minimum amount of time and with minimal latency.
  - It will be able to handle a large volume of users and data without experiencing significant slowdowns or interruptions.
- 5. Security:**
  - Authentication: The application will know the identity of a user when the user logs in with their email and password.
  - No other users can access or see another user's data.

## Use Case Diagram:

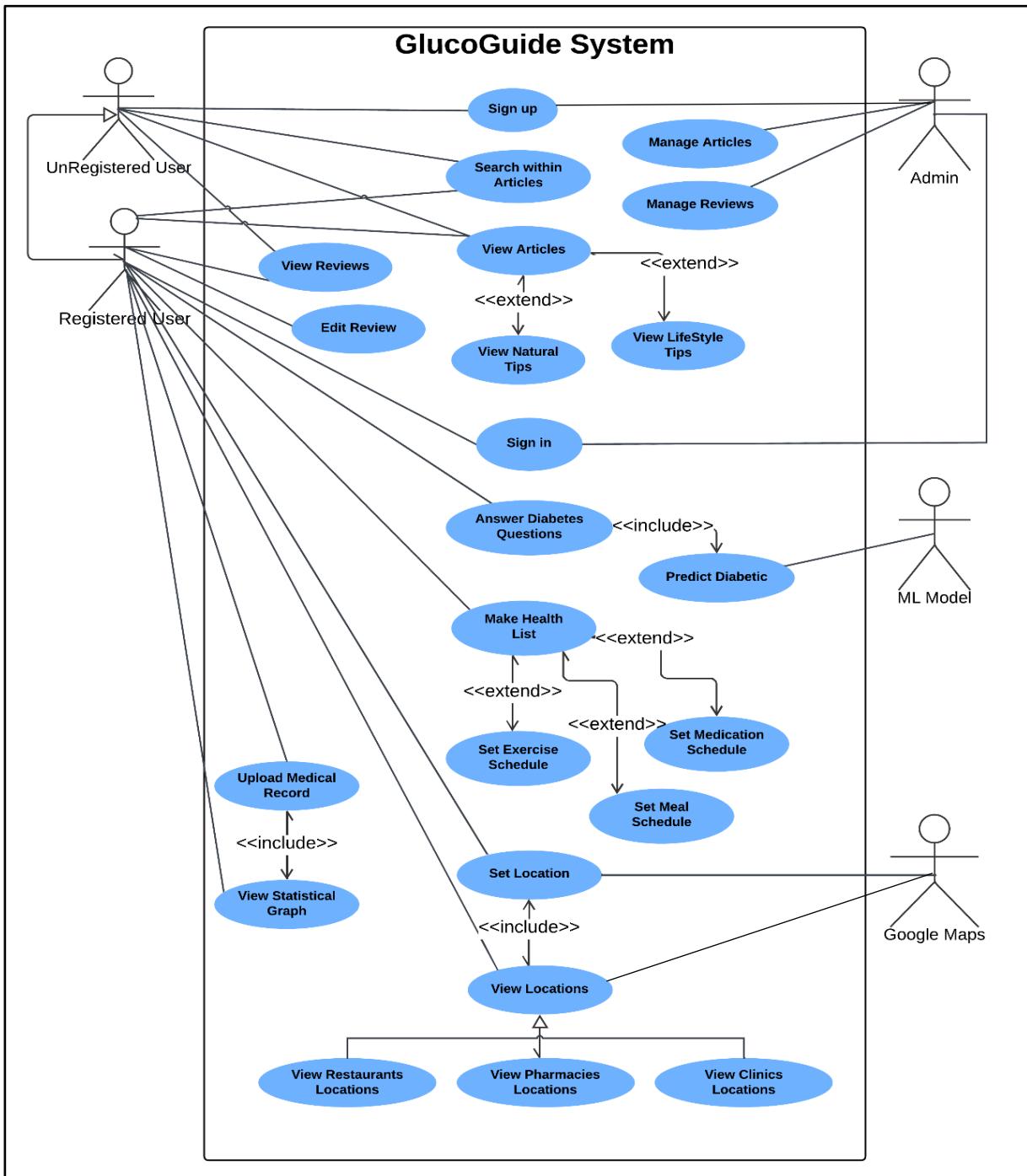


Figure 4: Use Case Diagram

## Use Case Tables (User Stories)

*Table 1: use case 1 → Sign Up*

<b>Use Case ID:</b>	US #1
<b>Use Case Name:</b>	Sign Up
<b>Actors:</b>	Unregistered user, Admin
<b>Description:</b>	Users sign up for the Glocoguide system to create a profile and gain access to system functionalities.
<b>Pre-conditions:</b>	The user does not have any existing account in the Glocoguide system with the same email
<b>Post-conditions:</b>	The user creates a profile in the Glocoguide system successfully
<b>Flow of Events:</b>	<ul style="list-style-type: none"> <li>1- The user accesses the sign-up page.</li> <li>2- User provides necessary information such as username, email, and password.</li> <li>3- The system validates this information to ensure its accuracy.</li> <li>4- Upon successful validation: the system stores the user's profile information securely in the database.</li> <li>5- The user receives a confirmation of successful registration.</li> <li>6- After creating an account, the User is redirected to the home page to access the Glocoguide system with the newly created credentials.</li> </ul>
<b>Exception conditions:</b>	If the user added invalid credentials the system returns an error message

*Table 2: use case 2 → View Reviews*

<b>Use Case ID:</b>	US #2
<b>Use Case Name:</b>	View Reviews
<b>Actors:</b>	Unregistered user, registered user
<b>Description:</b>	Users can view all Reviews provided by other users within the Glocoguide System.
<b>Pre-conditions:</b>	Users logged into the Glocoguide system.
<b>Post-conditions:</b>	The user has accessed and reviewed feedback shared by other users.
<b>Flow of Events:</b>	<ul style="list-style-type: none"> <li>1- The user navigates to the “View Reviews” page within the Glocoguide system.</li> <li>2- System retrieves and displays reviews and ratings provided by others.</li> <li>3- The user browses through the reviews and ratings provided by others.</li> <li>4- Upon completion, the user chooses to engage on another page or return to other functionalities in the system.</li> </ul>

**Table 3: use case 3 → View Natural Tips**

<b>Use Case ID:</b>	US #3
<b>Use Case Name:</b>	View Natural Tips
<b>Actors:</b>	Unregistered user, registered user
<b>Description:</b>	User access to articles and historical information on treating diabetes naturally through different stages.
<b>Pre-conditions:</b>	Users logged into the GlocuGuide system.
<b>Post-conditions:</b>	Users have accessed and reviewed articles on natural diabetes treatments focusing on nutrition.
<b>Flow of Events:</b>	<ul style="list-style-type: none"> <li>1- The user clicks on the articles button and chooses from the list of articles to navigate through “Natural Tips” within the GlocuGuide system.</li> <li>2- The system presents a collection of articles and resources on natural treatments for diabetes through nutrition.</li> <li>3- The user browses through these articles and the information provided.</li> <li>4- Upon completion, the user chooses to engage on another page or return to other functionalities in the system.</li> </ul>

**Table 4:use case 4 → View Lifestyle Tips**

<b>Use Case ID</b>	US #4
<b>Use Case Name</b>	View Lifestyle Tips
<b>Actor</b>	Unregistered user, registered user
<b>Description</b>	As a user, I want guidance on managing my lifestyle effectively, including diet and exercise recommendations for my specific level.
<b>Pre-Conditions</b>	The user is got into the GlocuGuide system.
<b>Post-conditions</b>	The user got into and reviewed lifestyle Tips regarding diet and exercise routines.
<b>Flow of Events</b>	<ul style="list-style-type: none"> <li>1- The user clicks on the articles button and chooses from the list of articles to navigate through "Lifestyle Tips" within the GlocuGuide system.</li> <li>2- The system presents lifestyle recommendations tailored for managing diabetes, including dietary advice and exercise routines for each diabetes level.</li> <li>3- The user explores the provided guidelines for his level of diabetes.</li> </ul>

**Table 5:use case 5 → Edit Review**

<b>Use Case ID:</b>	US #5
<b>Use Case Name:</b>	Edit Review
<b>Actors:</b>	Registered user
<b>Description:</b>	As a registered user with diabetes, I would like to rate and comment on the GloucoGuide system or edit my review
<b>Pre-conditions:</b>	The registered user logs into the GloucoGuide system.
<b>Post-conditions:</b>	The system stores the notes and ratings provided by the Registered user.
<b>Flow of Events:</b>	<ul style="list-style-type: none"> <li>1- The registered user logs into the “Edit Review” section within the GloucoGuide system.</li> <li>2- The user chooses the review or rating option, or both, to submit his evaluation.</li> <li>3- The user writes and submits a personal review based on his experience or use of the system.</li> <li>4- The system stores the submitted reviews and links them to the user’s profile.</li> </ul>

**Table 6:use case 6 → Sign In**

<b>Use Case ID</b>	US #6
<b>Use Case Name</b>	Sign In
<b>Actor</b>	Registered user, Admin
<b>Description</b>	As a Registered user, I want to sign in to the GloucoGuide system to access personalized functionalities.
<b>Pre-Conditions</b>	A registered user has valid credentials to log into the GlucoGuide system.
<b>Post-conditions</b>	Registered users successfully got authenticated and gained access to the GloucoGuide system.
<b>Flow of Events</b>	<ul style="list-style-type: none"> <li>1- Registered user clicks the “Sign In” button within the GloucoGuide platform.</li> <li>2- The user enters valid credentials such as username and password.</li> <li>3- The system verifies the entered information against the stored credentials within the database.</li> <li>4- Upon successful authentication: <ul style="list-style-type: none"> <li>- The system grants access to the Registered user.</li> <li>- User gains access to personalized functionalities and profile settings.</li> </ul> </li> </ul>
<b>Exception condition</b>	If the user added invalid credentials the system returns an error message

**Table 7:use case 7 → Answer Diabetes Questions**

<b>Use Case ID:</b>	US #7
<b>Use Case Name:</b>	Answer Diabetes Questions
<b>Actors:</b>	Registered User
<b>Description:</b>	Allows users to answer health questions to predict diabetes.
<b>Pre-conditions:</b>	The user is logged into the GloucoGuide system.
<b>Post-conditions:</b>	The user answers health questions and inputs responses into the machine learning model.
<b>Flow of Events:</b>	<ul style="list-style-type: none"> <li>1- The user selects the " Predict Diabetes" option.</li> <li>2- The system presents a series of health-related questions.</li> <li>3- The user answers the questions.</li> <li>4- The system sends input data to the machine learning model to predict the likelihood of diabetes.</li> </ul>

**Table 8: use case 8 --> Predict Diabetes**

<b>Use Case ID:</b>	US #8
<b>Use Case Name:</b>	Predict Diabetes
<b>Actors:</b>	Registered user
<b>Description:</b>	As a registered diabetes user, I want the system to predict my likelihood of developing diabetes based on the above relevant health questions using a machine learning model.
<b>Pre-conditions:</b>	The Registered user logs into the GloucoGuide system.
<b>Post-conditions:</b>	The system provides a prediction of the likely (positive) and unlikely (negative) chances of a Registered user to develop diabetes.
<b>Flow of Events:</b>	<ul style="list-style-type: none"> <li>1- A Registered user accesses the “Diabetes Prediction” feature within the GloucoGuide system.</li> <li>2- The user answers some necessary questions required for prediction.</li> <li>3- The system uses the ML model to analyze the provided data.</li> <li>4- The system displays positive (likely) and negative (unlikely) probabilities of developing diabetes</li> </ul>

**Table 9: use case 9 --> Make Health List**

<b>Use Case ID:</b>	US #9
<b>Use Case Name:</b>	Make Health List
<b>Actors:</b>	Registered user
<b>Description:</b>	As a Registered user, I want to create and manage a checklist within the GlucoGuide system to track tasks related to managing my health.
<b>Pre-conditions:</b>	The user is logged into the GlucoGuide system.
<b>Post-conditions:</b>	The user successfully creates a health checklist.
<b>Flow of Events:</b>	<ol style="list-style-type: none"> <li>1- The user selects the "Make List" option.</li> <li>2- The system presents options (types of lists) for creating a checklist.</li> <li>3- The user chooses to create a checklist.</li> <li>4- The system prompts the user to add items to the checklist.</li> <li>5- The user adds items to the checklist.</li> <li>6- The system saves the checklist in the user's profile.</li> </ol>

**Table 10:use case 9.1 → Set Meal Schedule**

<b>Use Case ID:</b>	US #9.1
<b>Use Case Name:</b>	Set Meal Schedule
<b>Actors:</b>	Registered User
<b>Description:</b>	Allows users to set meal-related items in their health schedule.
<b>Pre-conditions:</b>	The user is creating a health schedule in the "Make Health List" use case
<b>Post-conditions:</b>	The user successfully adds meal items to the schedule and receives alerts at the specified meal times.
<b>Flow of Events:</b>	<ul style="list-style-type: none"> <li>1- The user navigates to the Records feature.</li> <li>2- The user navigates to the meal schedule form.</li> <li>3- The user enters the meal type (e.g., breakfast, lunch, dinner) and the corresponding time through the form.</li> <li>4- The user submits the form.</li> <li>5- The system updates the schedule with the meal items.</li> <li>6- The system alerts the user when it is the specified meal time.</li> </ul>

**Table 11: use case 9.2 → Set Medication Schedule**

<b>Use Case ID:</b>	US #9.2
<b>Use Case Name:</b>	Set Medication Schedule
<b>Actors:</b>	Registered User
<b>Description:</b>	Allow user to set a schedule for taking their medication at specific times.
<b>Pre-conditions:</b>	The user is creating a health checklist in the "Make Health List" use case.
<b>Post-conditions:</b>	The user successfully adds medication items to the checklist.
<b>Flow of Events:</b>	<ul style="list-style-type: none"> <li>1- The user adds medication-related items to the health checklist.</li> <li>2- The system updates the checklist with medication items</li> </ul>

**Table 12: use case 9.3 → Set Exercises Schedule**

<b>Use Case ID:</b>	US #9.3
<b>Use Case Name:</b>	Set Exercises Schedule
<b>Actors:</b>	Registered User
<b>Description:</b>	Allows users to set exercise-related items in their health checklist.
<b>Pre-conditions:</b>	The user is creating a health checklist in the "Make Health List" use case.
<b>Post-conditions:</b>	The user successfully adds exercise items to the checklist.
<b>Flow of Events:</b>	<ul style="list-style-type: none"> <li>1- The user adds exercise-related items to the health checklist.</li> <li>2- The system updates the checklist with exercise items.</li> </ul>

**Table 13: use case 10 → View Articles**

<b>Use Case ID:</b>	US #10
<b>Use Case Name:</b>	View Articles
<b>Actors:</b>	Unregistered User, Registered User
<b>Description:</b>	Allows users to view articles based on selected categories, including managing articles, viewing medical reports, natural tips, and lifestyle Tips.
<b>Pre-conditions:</b>	None.
<b>Post-conditions:</b>	Users can navigate to their preferred category of articles and successfully view the articles within that category
<b>Flow of Events:</b>	<ul style="list-style-type: none"> <li>1- The user selects the "View Article" option.</li> <li>2- The system presents a list of article categories to the user.</li> <li>3- The user chooses a specific category (e.g., "Medical Reports," "Natural Tips," "Lifestyle Tips").</li> <li>4- The system displays a list of articles within the selected category.</li> <li>5- The user selects a specific article.</li> <li>6- The system retrieves and displays the selected article.</li> </ul>

**Table 14: use case 11 → Manage Reviews**

<b>Use Case ID:</b>	US #11
<b>Use Case Name:</b>	Manage Reviews
<b>Actors:</b>	Admin
<b>Description:</b>	Allows the admin to manage reviews, including hiding, deleting, or taking other actions.
<b>Pre-conditions:</b>	Admin is logged into the GloucoGuide system.
<b>Post-conditions:</b>	Admin successfully manages reviews.
<b>Flow of Events:</b>	<ol style="list-style-type: none"> <li>1- Admin selects the "Manage Reviews" option.</li> <li>2- The system presents options for hiding, deleting, or other review management actions.</li> <li>3- Admin chooses a specific action.</li> <li>4- The system prompts the admin to provide necessary details based on the chosen action.</li> <li>5- Admin completes the action.</li> <li>6- The system updates the reviews database accordingly.</li> </ol>

**Table 15: use case 12 → Manage Articles**

<b>Use Case ID:</b>	US #12
<b>Use Case Name:</b>	Manage Articles
<b>Actors:</b>	Admin
<b>Description:</b>	Enables the admin to manage operations on articles, including posting, editing, and deleting.
<b>Pre-conditions:</b>	Admin is logged into the GloucoGuide system.
<b>Post-conditions:</b>	Admin successfully manages articles.
<b>Flow of Events:</b>	<ol style="list-style-type: none"> <li>1- Admin selects the "Manage Articles" option.</li> <li>2- The system presents options for posting, editing, or deleting articles.</li> <li>3- Admin chooses a specific operation.</li> <li>4- The system prompts the admin to provide necessary details based on the chosen operation.</li> <li>5- Admin completes the operation.</li> <li>6- The system updates the articles database accordingly.</li> </ol>

**Table 16: use case 13 → Upload Medical Records**

<b>Use Case ID:</b>	US #13
<b>Use Case Name:</b>	Upload Medical Records
<b>Actors:</b>	Registered user.
<b>Description:</b>	Allows users to upload their medical records and save them (e.g., glucose measurements, weight) to the system.
<b>Pre-conditions:</b>	The user is logged into the GloucoGuide system.
<b>Post-conditions:</b>	User successfully uploads their medical records.
<b>Flow of Events:</b>	<ol style="list-style-type: none"> <li>1- The user selects the "Upload Medical Record" option.</li> <li>2- The system prompts the user to upload medical records.</li> <li>3- User selects and uploads medical records.</li> <li>4- The system saves the uploaded medical records in the user's profile.</li> </ol>

**Table 17: use Case 14 → View Locations**

<b>Use Case ID:</b>	US #14
<b>Use Case Name:</b>	View Locations
<b>Actors:</b>	Registered User.
<b>Description:</b>	As a registered user, I want to view nearby clinic and pharmacy locations within the GloucoGuide system for easy access to medical facilities.
<b>Pre-conditions:</b>	The registered user logs into the GloucoGuide system.
<b>Post-conditions:</b>	The registered user has accessed and reviewed nearby clinic and pharmacy locations.
<b>Flow of Events:</b>	<ol style="list-style-type: none"> <li>1- Registered users access the "View Locations" feature within the GloucoGuide platform.</li> <li>2- The system provides options to view the geographical locations of nearby clinics and pharmacies.</li> <li>3- The user selects either the "View Clinic Location" or "View Pharmacies Location" option.</li> <li>4- The system displays the respective geographical locations on a map or in a list format for user reference.</li> </ol>

**Table 18: use case 16 → Set Location**

<b>Use Case ID:</b>	US #16
<b>Use Case Name:</b>	Set Location
<b>Actors:</b>	Registered User, Google map
<b>Description:</b>	As a registered user, I want to determine my geographic location within the GloucoGuide system using Google Maps services to facilitate location-based functionality.
<b>Pre-conditions:</b>	The registered user logs into the GloucoGuide system.
<b>Post-conditions:</b>	GloucoGuide pinpoints the user's precise location using Google Maps.
<b>Flow of Events:</b>	<ul style="list-style-type: none"> <li>1- The registered user accesses the “Set Location” feature within the GloucoGuide system.</li> <li>2- The system prompts the user to select the “Use Google Map” option to determine his location.</li> <li>3- The system redirects the user to interact with Google Maps functions to enter his geographical location and finish.</li> <li>4- The user completes his location selection using Google Maps services.</li> <li>5- The specified location data is sent back to the GloucoGuide system for verification and storage associated with the user profile.</li> </ul>

**Table 19: use case 16.1 → View Clinics Locations**

<b>Use Case ID:</b>	US #16.1
<b>Use Case Name:</b>	view clinics Locations
<b>Actors:</b>	Registered User.
<b>Description:</b>	As a registered user, I want to view the geographical locations of surrounding clinics within the GloucoGuide system for easy access to medical facilities.
<b>Pre-conditions:</b>	The registered user logs into the GloucoGuide system.
<b>Post-conditions:</b>	The user has accessed and reviewed the geographical locations of nearby clinics.
<b>Flow of Events:</b>	<ul style="list-style-type: none"> <li>1- Registered user accesses the "View Locations" feature within the GloucoGuide platform.</li> <li>2- The system provides options to view the geographical locations of nearby clinics and pharmacies.</li> <li>3- The user selects the "Clinic Locations" option.</li> <li>4- The system displays the geographical locations of clinics on a map or in a list format for user reference.</li> </ul>

**Table 20: use case 16.2 → View Pharmacies Locations**

<b>Use Case ID:</b>	US #16.2
<b>Use Case Name:</b>	view Pharmacies Locations
<b>Actors:</b>	Registered User.
<b>Description:</b>	As a registered user, I want to view nearby clinic and pharmacy locations within the GloucoGuide system for easy access to medical facilities.
<b>Pre-conditions:</b>	The registered user logs into the GloucoGuide system.
<b>Post-conditions:</b>	The registered user has accessed and reviewed nearby pharmacies locations.
<b>Flow of Events</b>	<ul style="list-style-type: none"> <li>1- Registered user accesses the "View Locations" feature within the GloucoGuide platform.</li> <li>2- The system provides options to view the geographical locations of nearby clinics and pharmacies.</li> <li>3- The user selects the "Pharmacies Locations".</li> <li>4- The system displays the respective geographical locations of pharmacies on a map or in a list format for user reference.</li> </ul>

**Table 21: use case 16.3 → View Restaurants Location**

<b>Use Case ID:</b>	US #16.3
<b>Use Case Name:</b>	View Restaurant Locations
<b>Actors:</b>	Registered user.
<b>Description:</b>	As a registered user, I want to view nearby restaurant locations within the GlucoGuide system for easy access to dining options that are suitable for people with diabetes.
<b>Pre-conditions:</b>	The registered user logs into the GlucoGuide system.
<b>Post-conditions:</b>	The registered user has accessed and reviewed nearby restaurant locations that are suitable for people with diabetes.
<b>Flow of Events:</b>	<ol style="list-style-type: none"> <li>1. Registered user accesses the "Find Nearby Locations" feature within the GlucoGuide platform.</li> <li>2. The system provides options to view the geographical locations of nearby restaurants.</li> <li>3. The user selects the "Nearby Restaurants"</li> <li>1- The system displays the respective geographical locations of restaurants on a map or in a list format for user reference.</li> </ol>

**Table 22:use case 17 → View Statistical Graph**

<b>Use Case ID:</b>	US #17
<b>Use Case Name:</b>	View Statistical Graph
<b>Actors:</b>	Registered user.
<b>Description:</b>	Allows users to display a graph representation of their medical records.
<b>Pre-conditions:</b>	The user has uploaded their medical records to the GloucoGuide system.
<b>Post-conditions:</b>	User successfully views a graph representation of their medical records.
<b>Flow of Events:</b>	<p>1- The user selects the "View Statistics Graph" option.      2- The system retrieves the user's medical records.      3- The user chooses which medical records (glucose measurement, carbohydrate, ...)      4- The system generates a graph representation based on the user's choice</p> <p>The user views the graph.</p>

**Table 23:use case 18 → Search Within Articles**

<b>Use Case ID:</b>	US #19
<b>Use Case Name:</b>	Search within Articles
<b>Actors:</b>	Unregistered User, Registered User
<b>Description:</b>	Allows users to search for specific keywords phrases or categories within the articles available on GloucoGuide.
<b>Pre-conditions:</b>	None.
<b>Post-conditions:</b>	The user receives search results matching their query.
<b>Flow of Events:</b>	<p>1- The user navigates to the search interface within the GloucoGuide platform.      2- The user enters their search query into the search bar.      3- The system processes the search query and retrieves relevant articles based on the query.      4- The system displays the search results to the user, including article titles, summaries, and links to view the full articles.</p>
<b>Exception Conditions</b>	If no matching articles are found, the system displays a message indicating that no results were found for the search query.

## Chapter 4: GlucoGuide Design and Implementation

### System Components Diagram

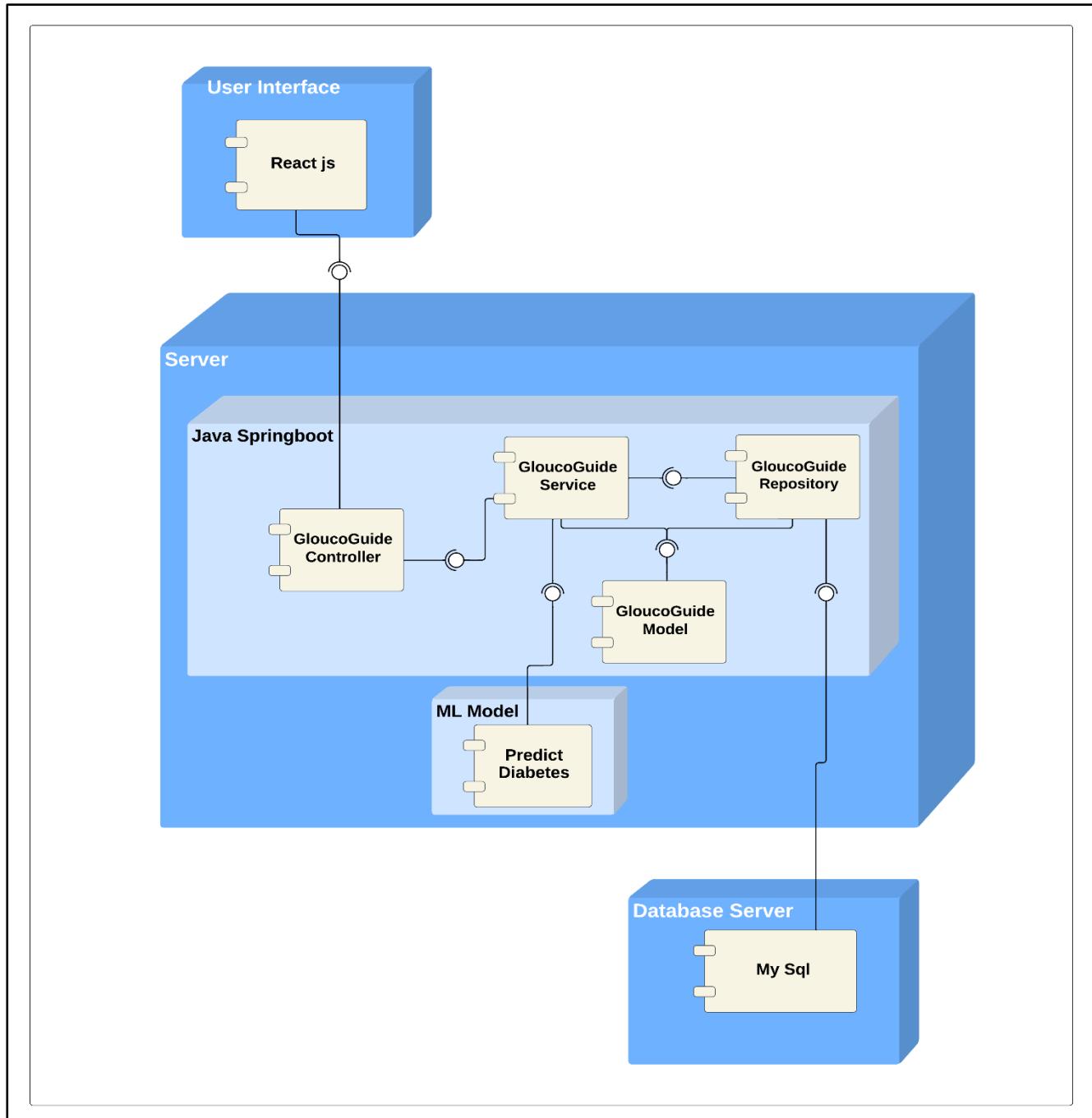


Figure 5 : System Components Diagram

## System Class Diagram

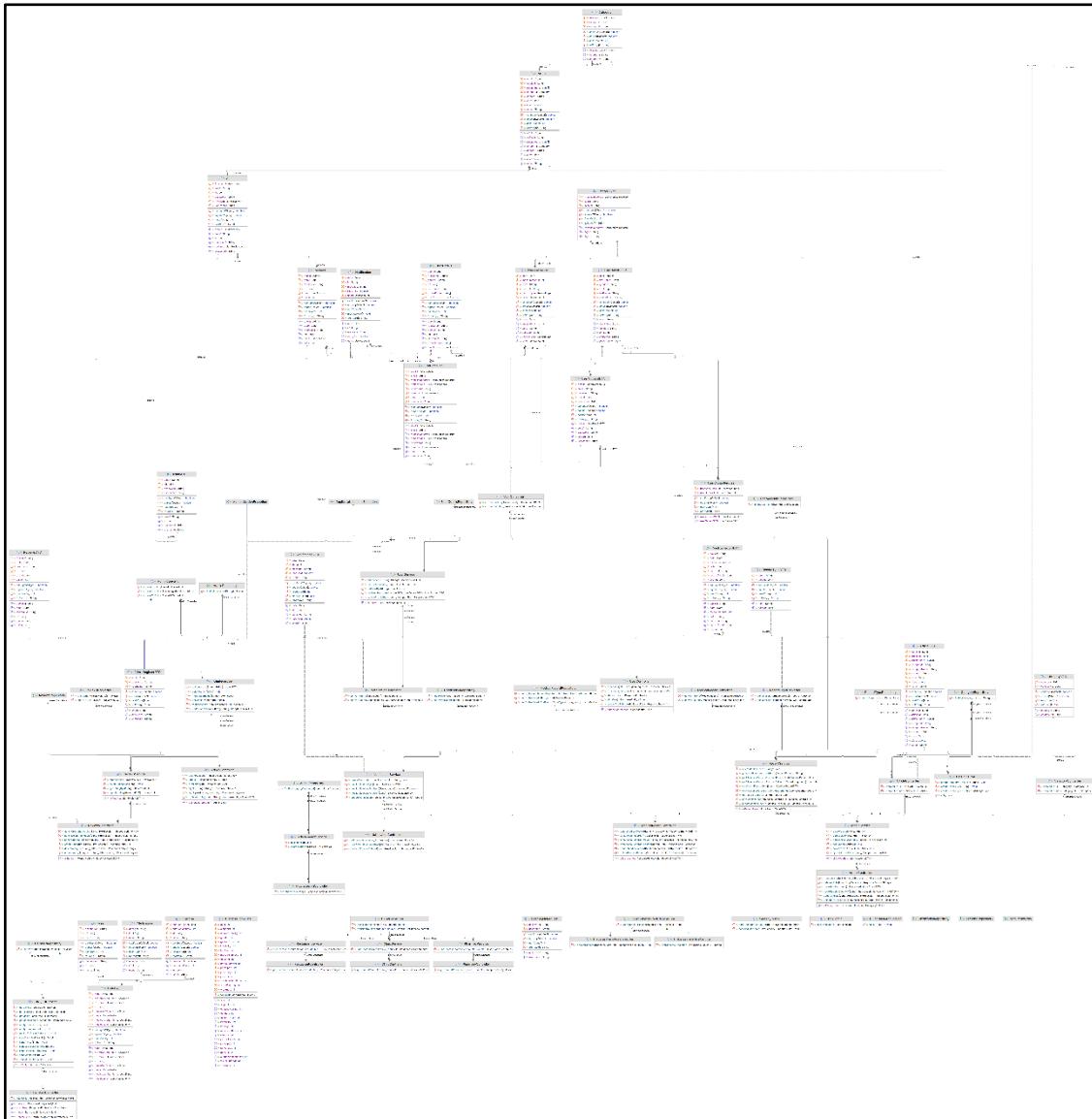


Figure 6: System Class Diagram

## User Class Diagram

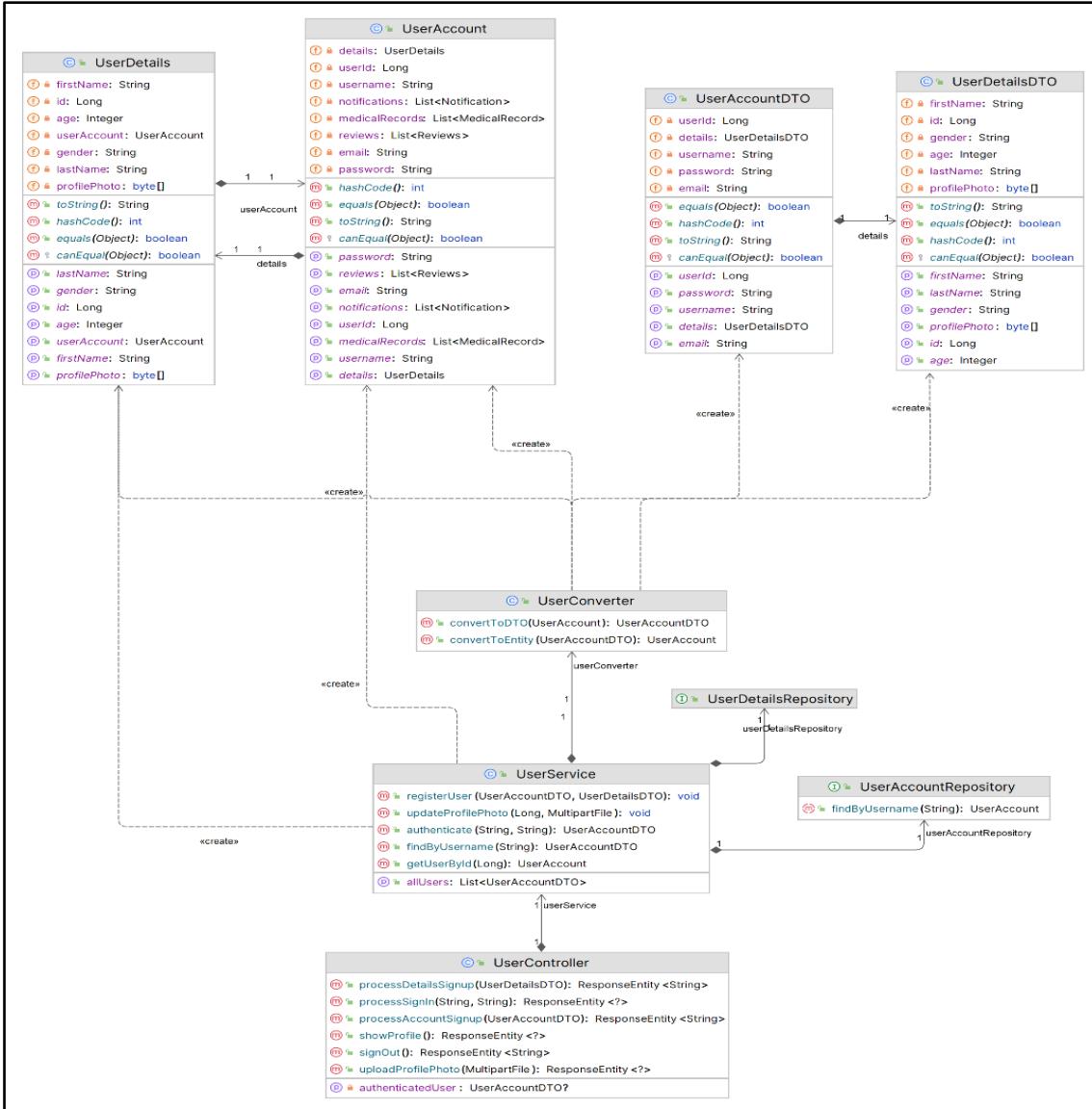


Figure 7: User Class Diagram

## Admin Class Diagram

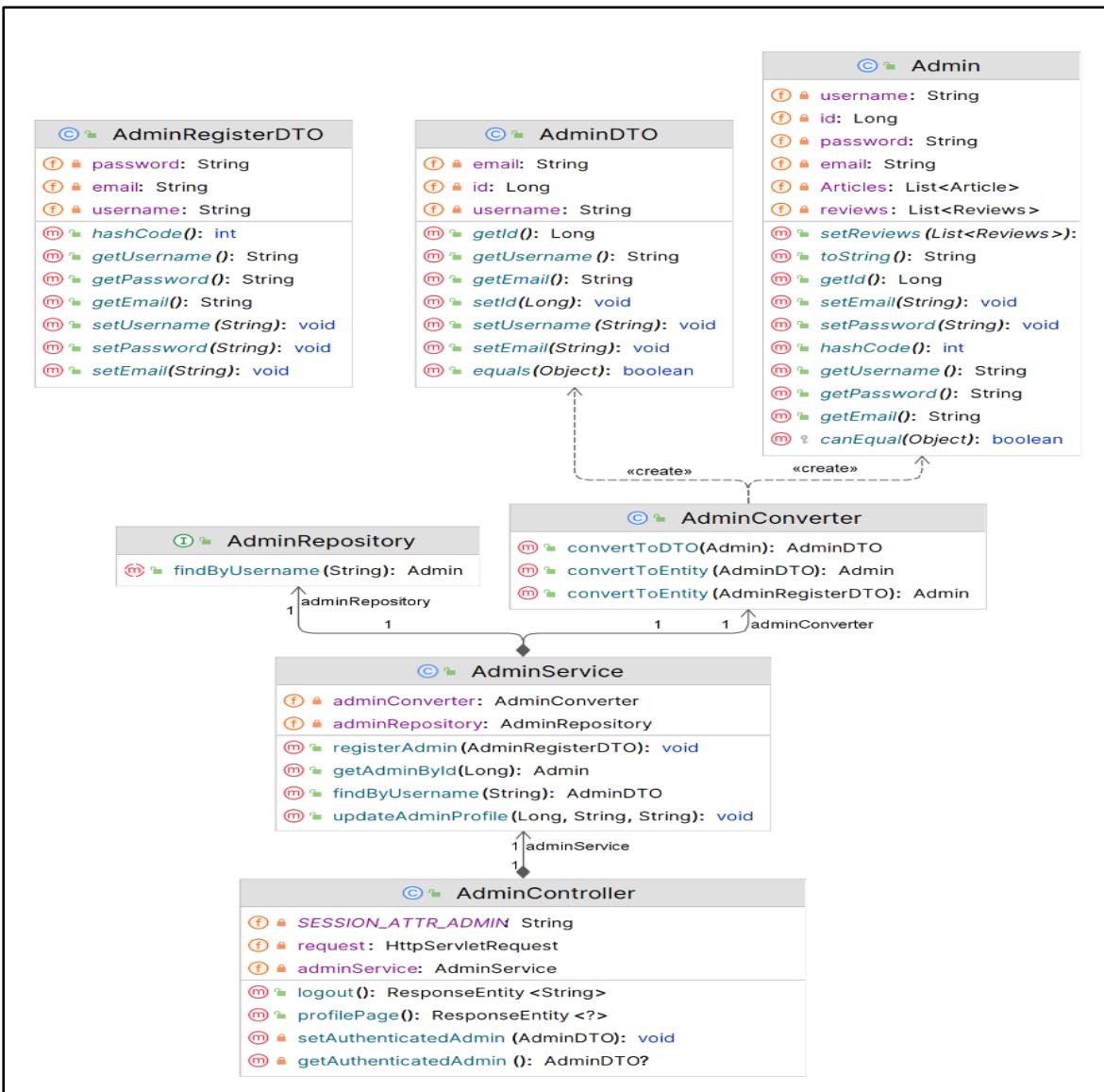


Figure 9: Admin Class Diagram

## Article Class Diagram

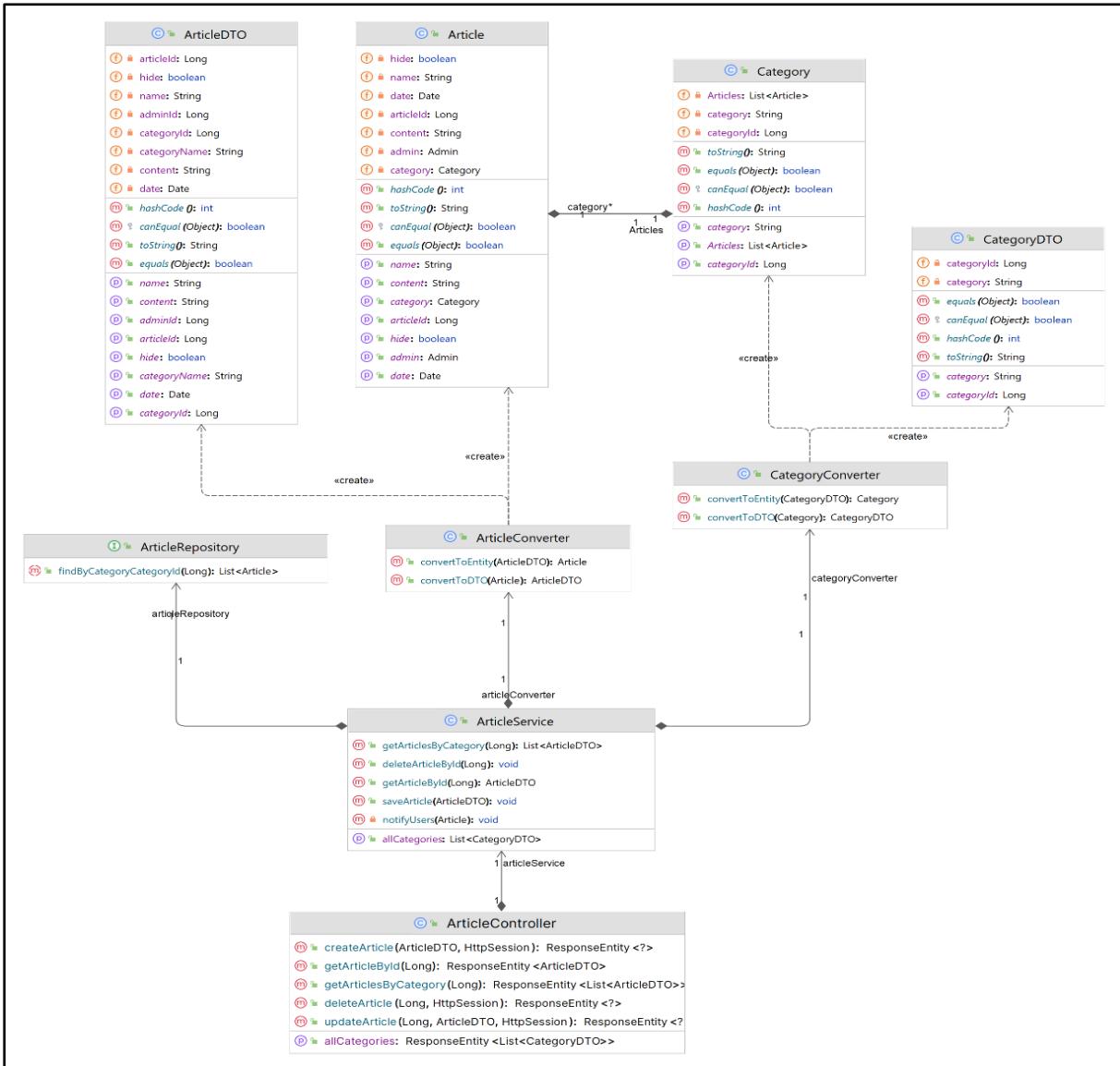


Figure 10: Article Class Diagram

## Article Search Class Diagram

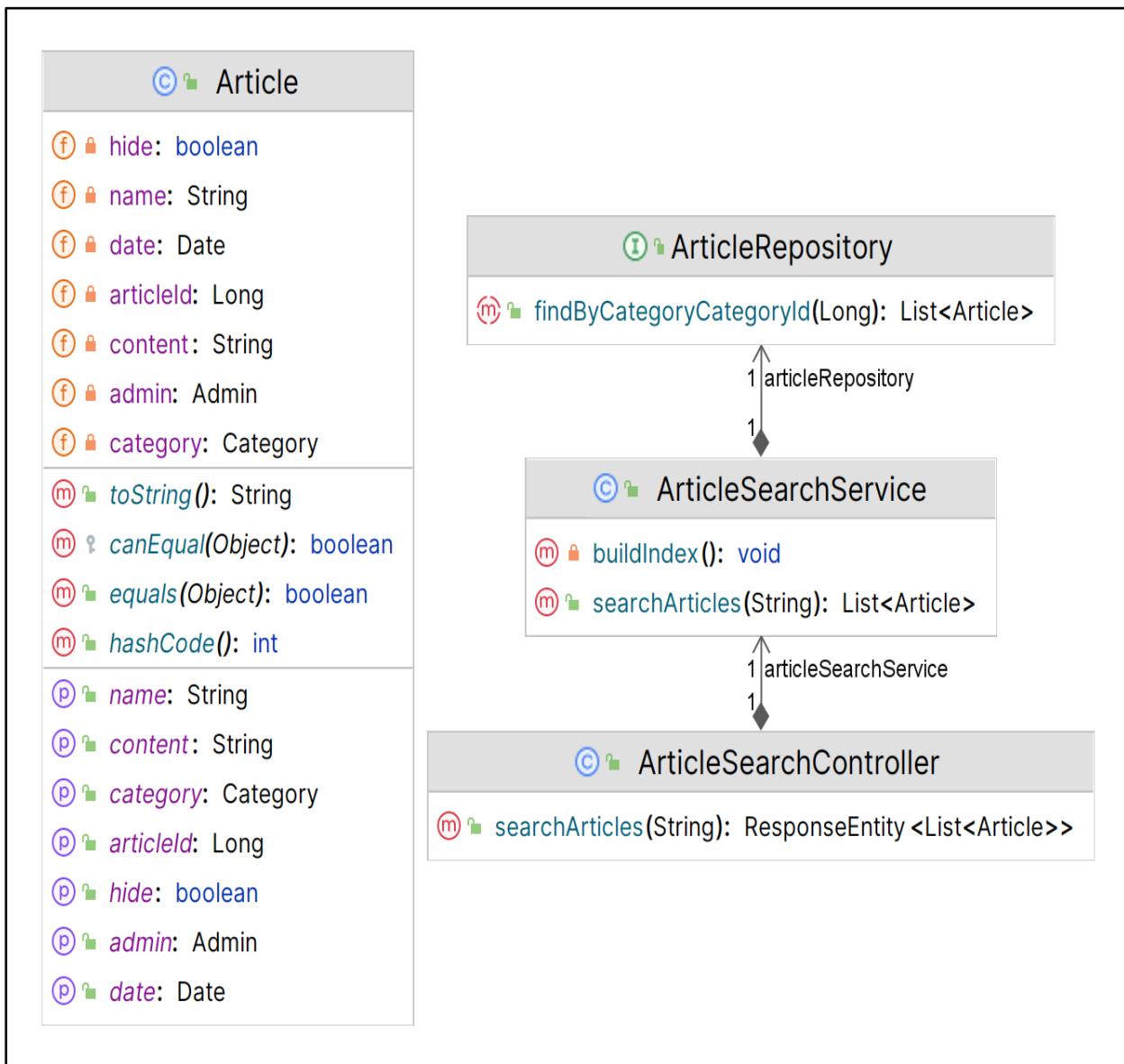


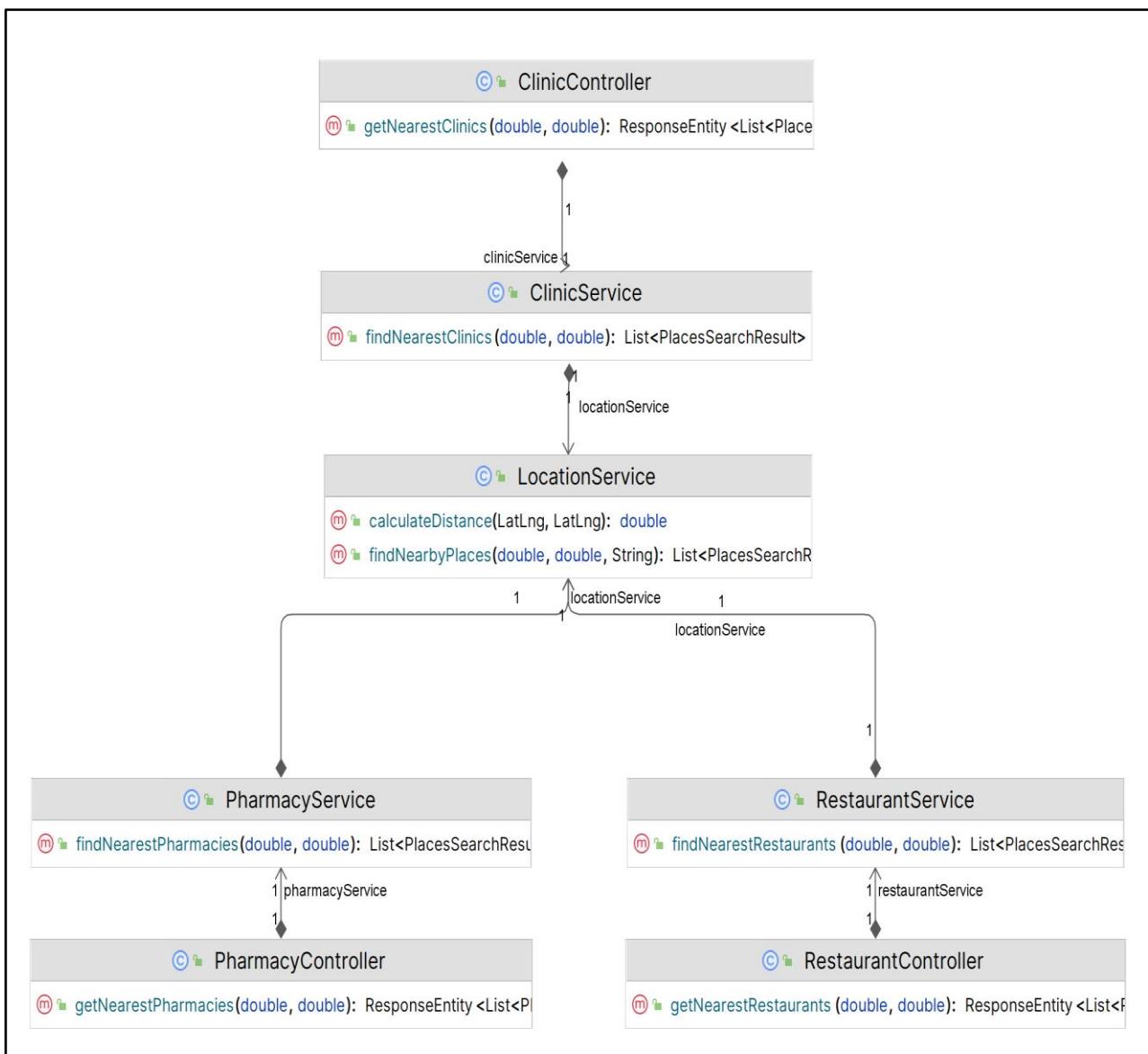
Figure 11: Article Search Class Diagram

## Daily List Class Diagram



Figure 12: Daily List Class Diagram

## Location Service Class Diagram



*Figure 13: Location Service Class Diagram*

## Medical Record Class Diagram



Figure 14: Medical Record Class Diagram

## Notification Class Diagram

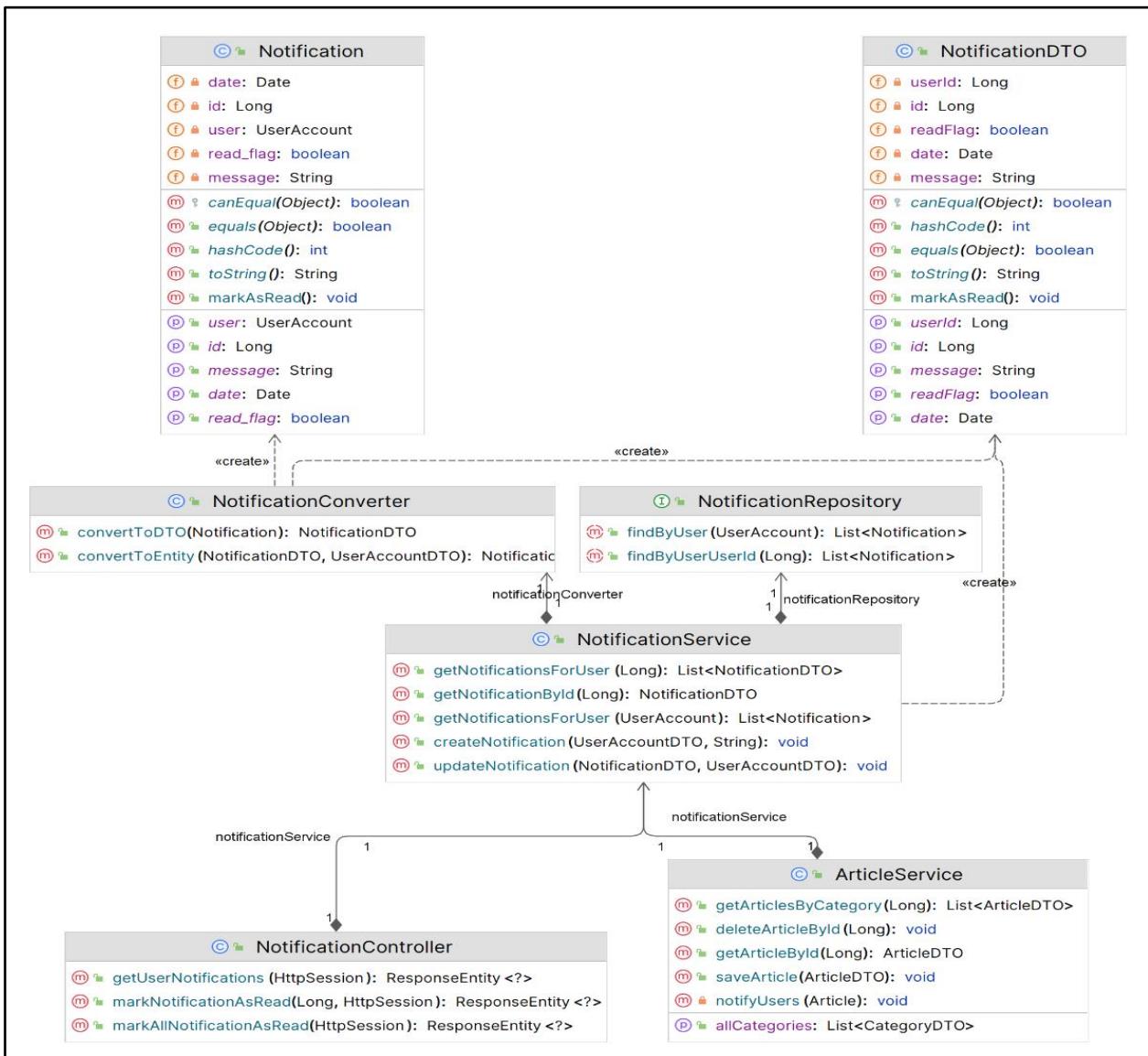


Figure 15: Notification Class Diagram

## Prediction Class Diagram

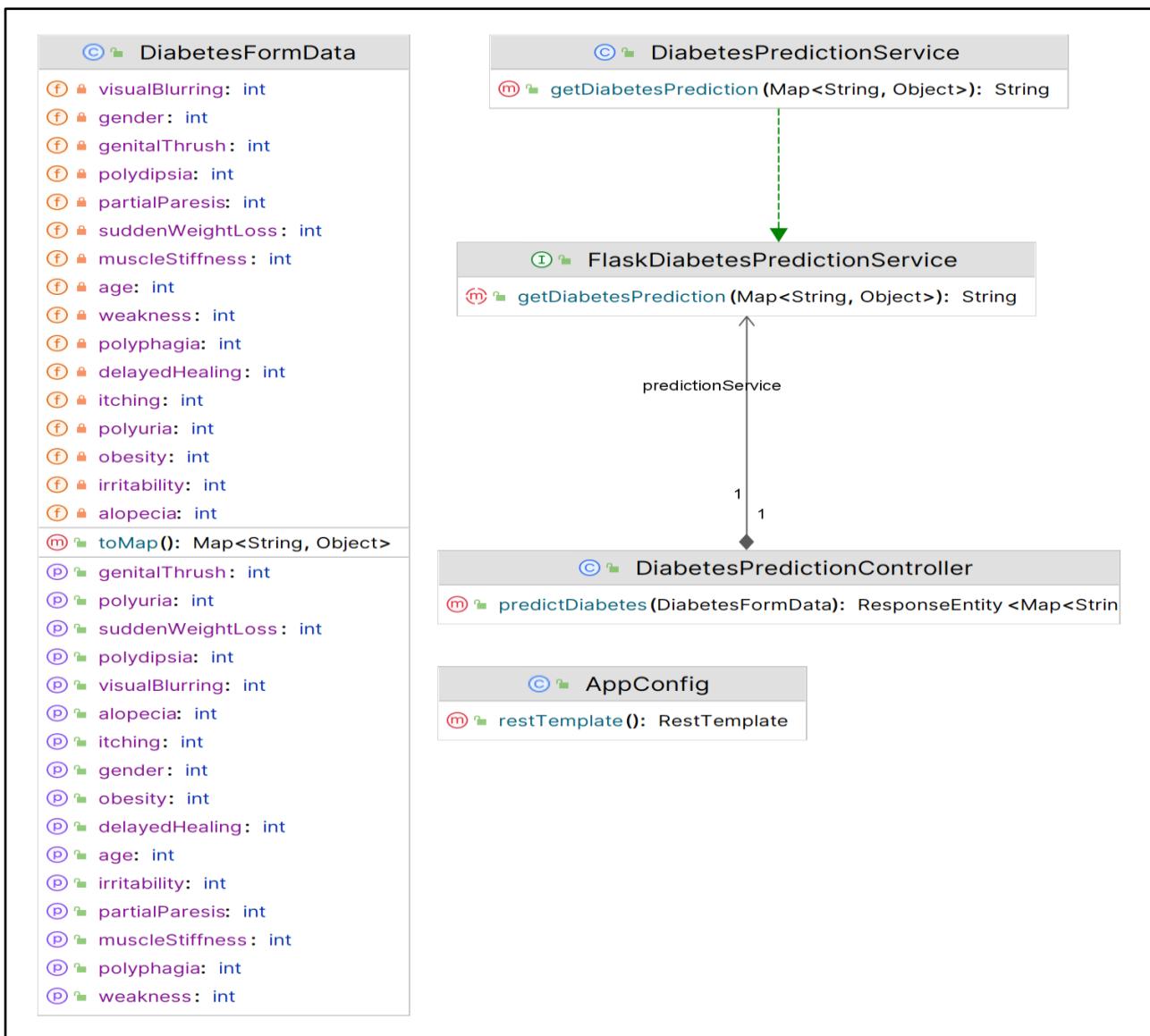


Figure 16: Prediction Class Diagram

## Sequence Diagrams

### 1. Sign up

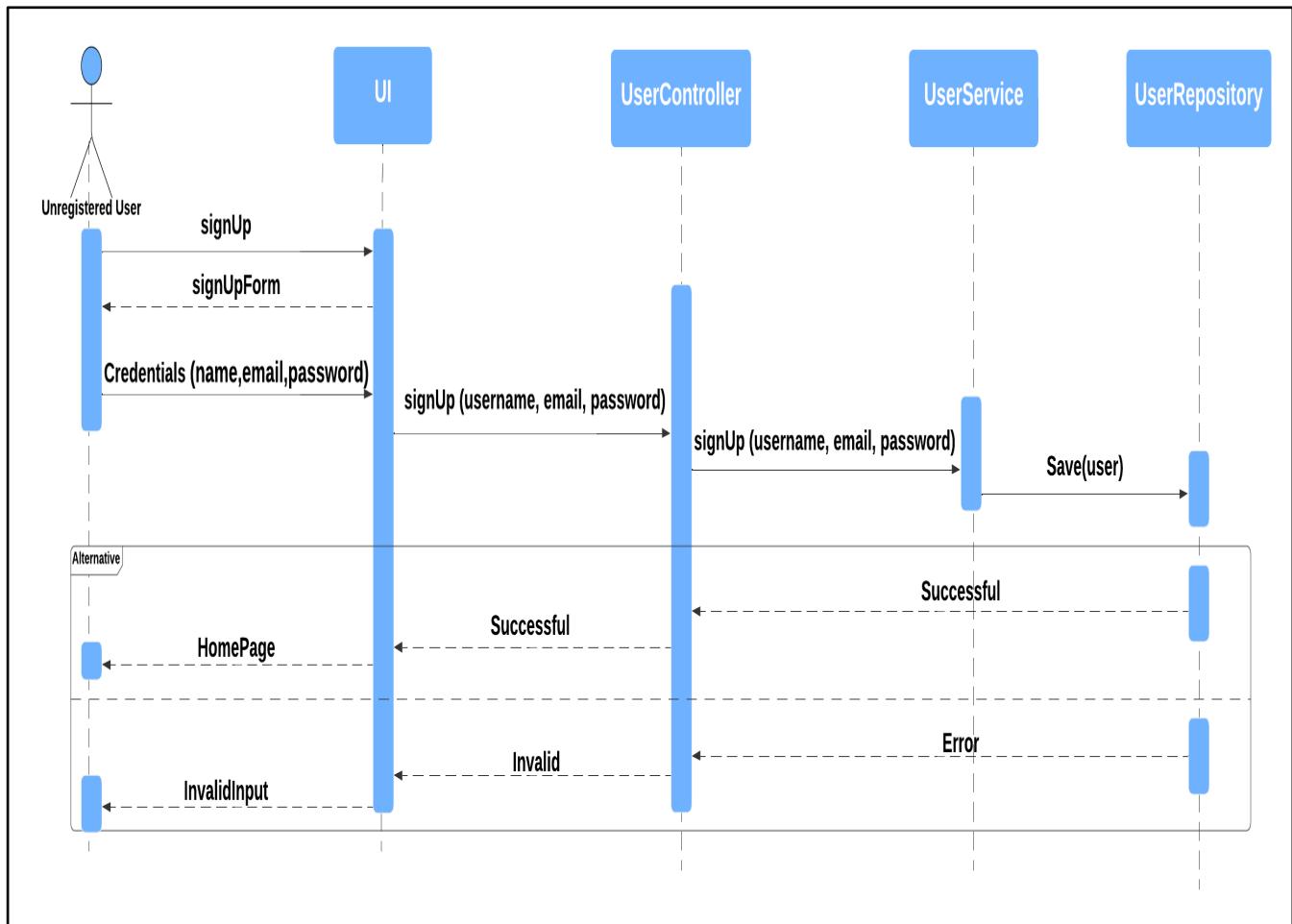


Figure 17: Sign Up

## 2. Sign In

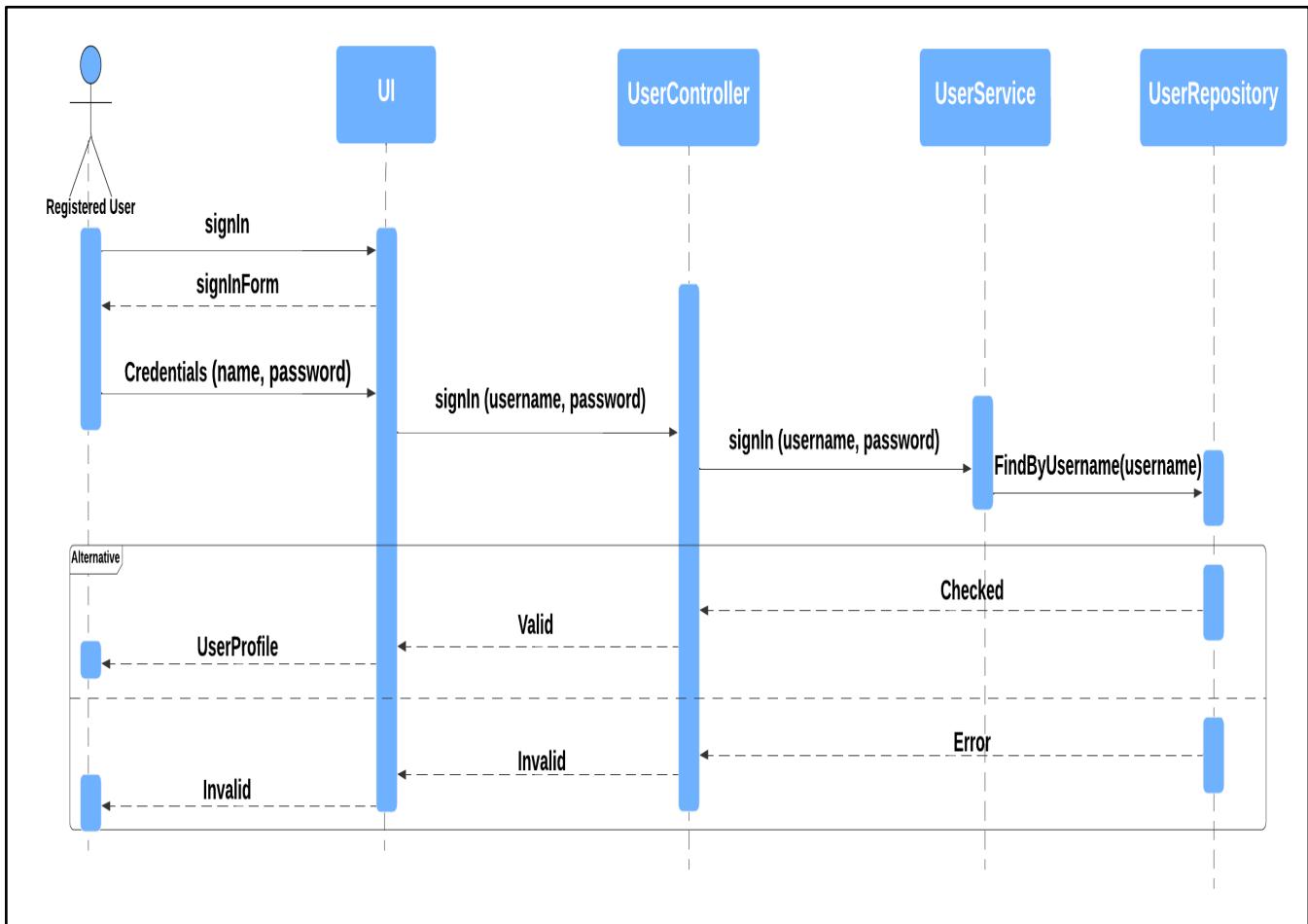


Figure 18: Sign In

### 3. View Review, Edit Review

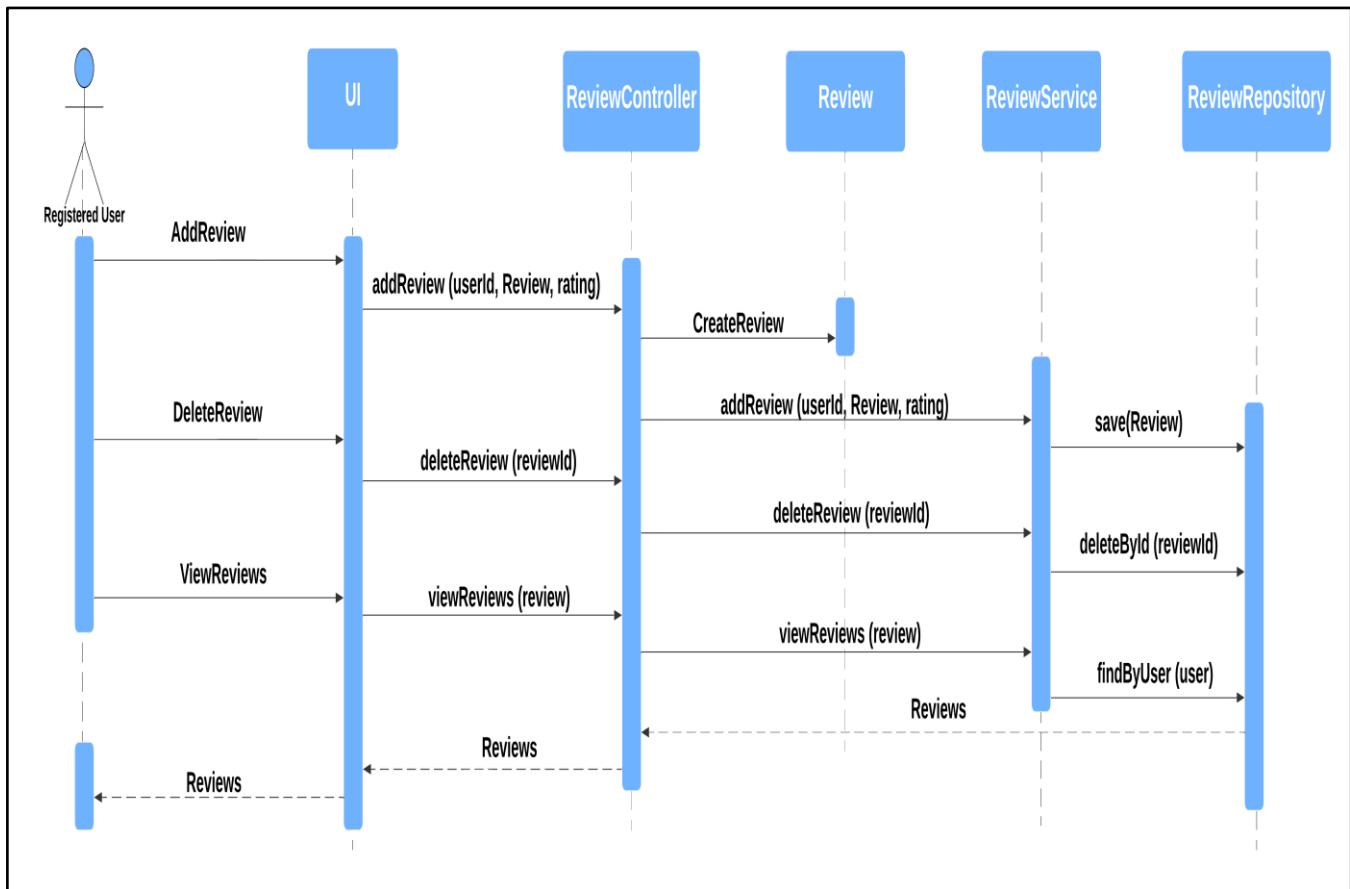
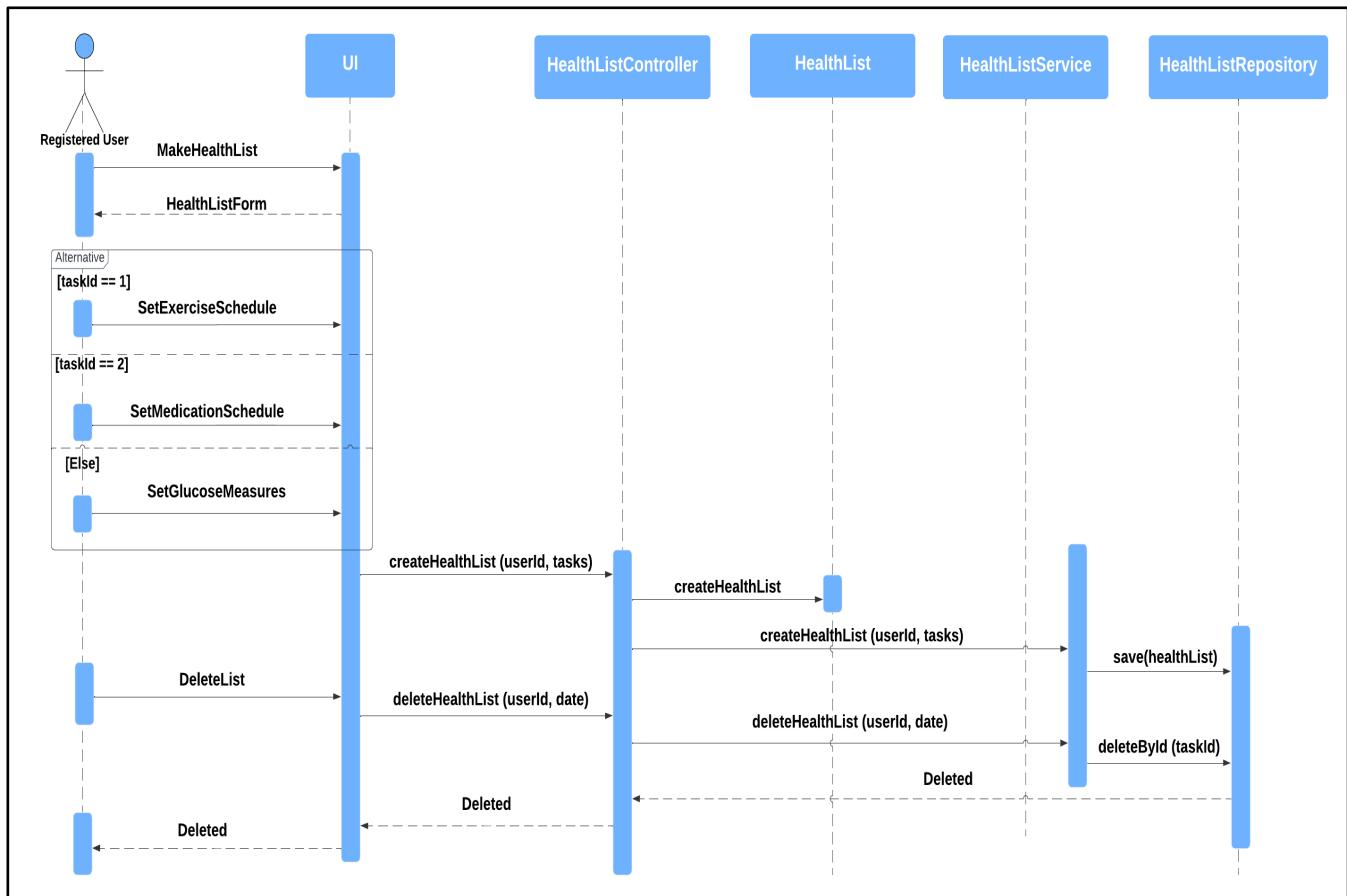


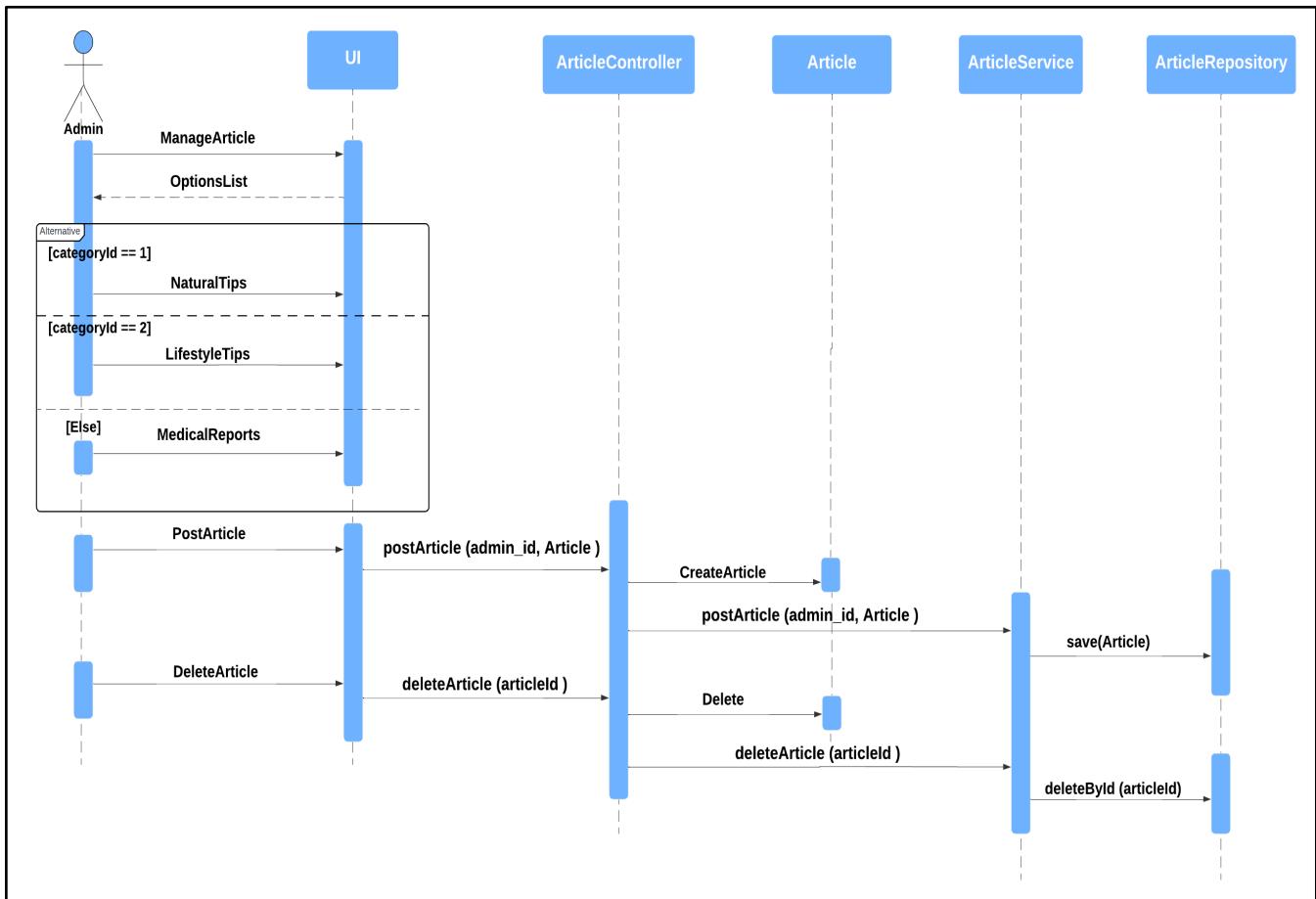
Figure 19: View Review, Edit Review

#### 4. Make Health List



*Figure 20: Make Health List*

## 5. Manage Article



*Figure 21: Manage Article*

## 6. Manage Review

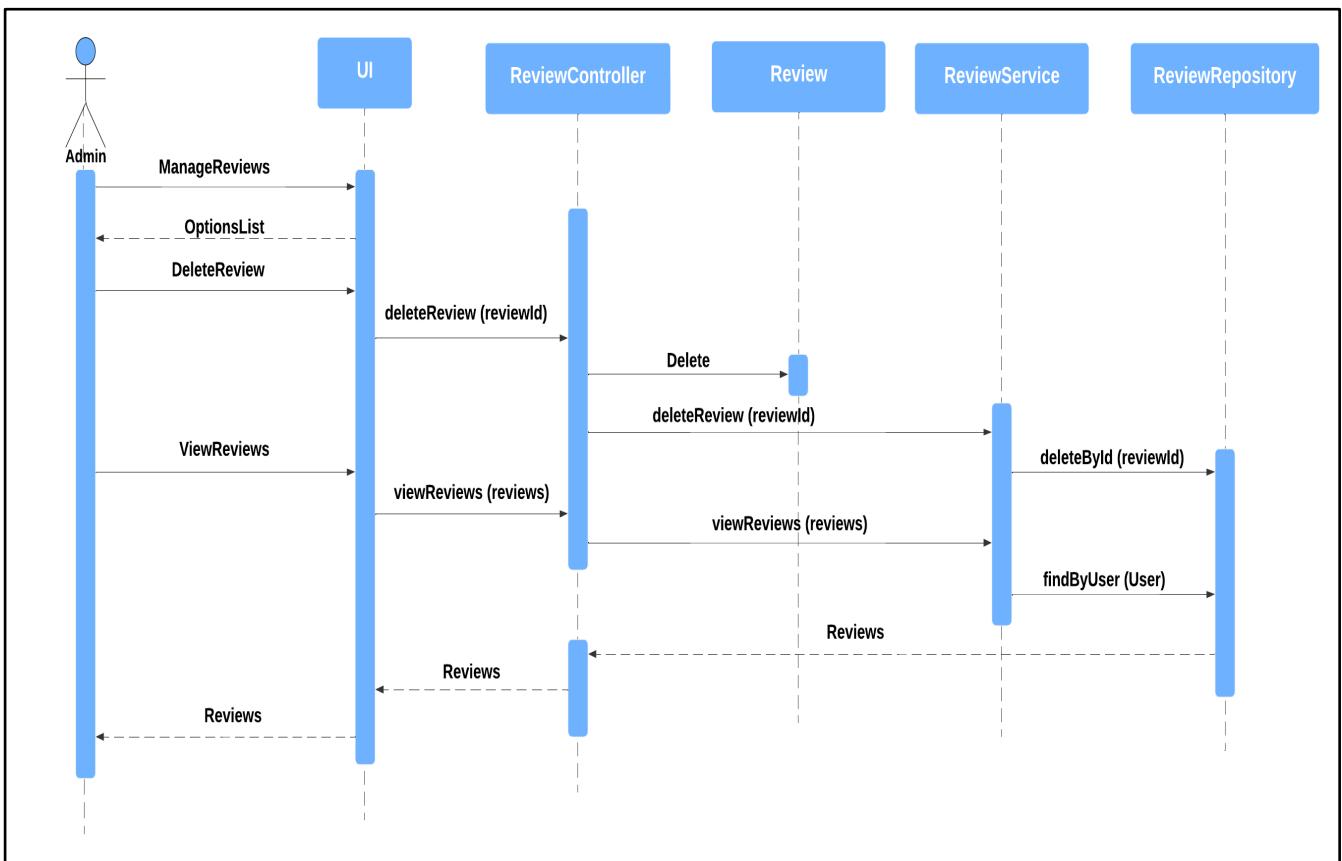
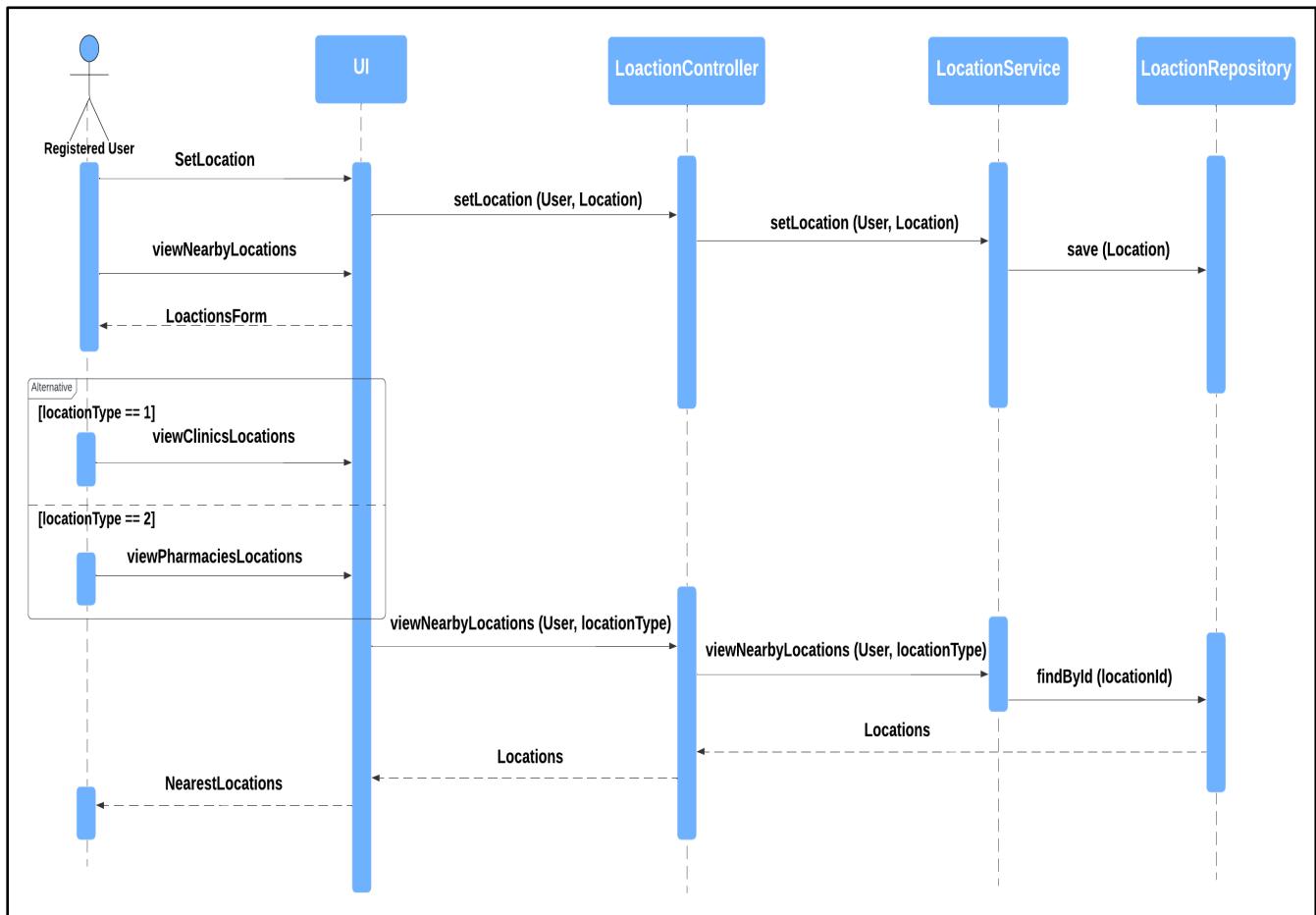


Figure 22: Manage Review

## 7. Set Location, View Locations



*Figure 23: Set Location, View Locations*

### 8. Answer Diabetes Questions, Predict Diabetes

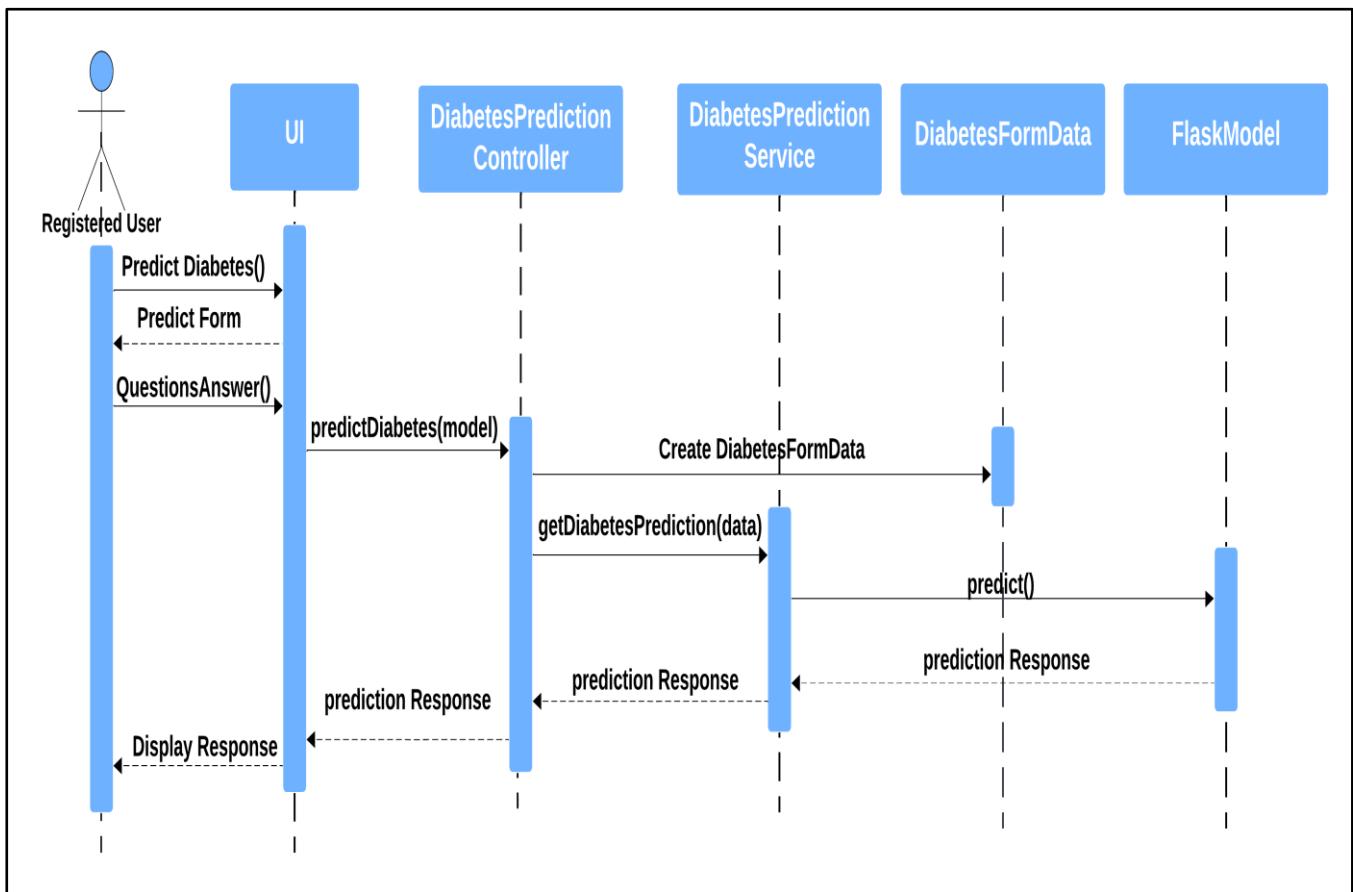


Figure 24: Answer Diabetes Questions, Predict Diabetes

## 9. Upload Medical Record

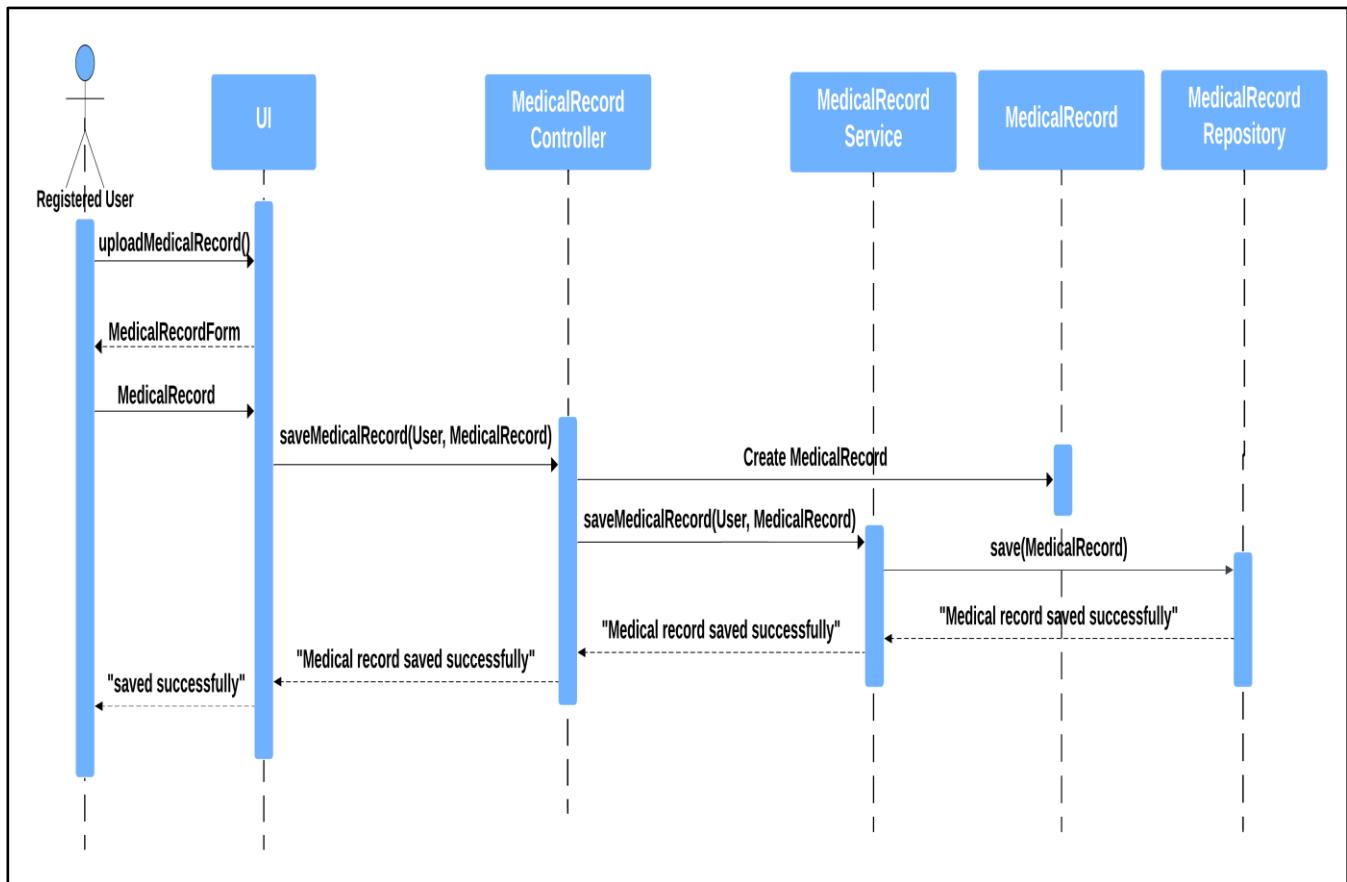


Figure 25: Upload Medical Record

## 10. View Statistics Graph

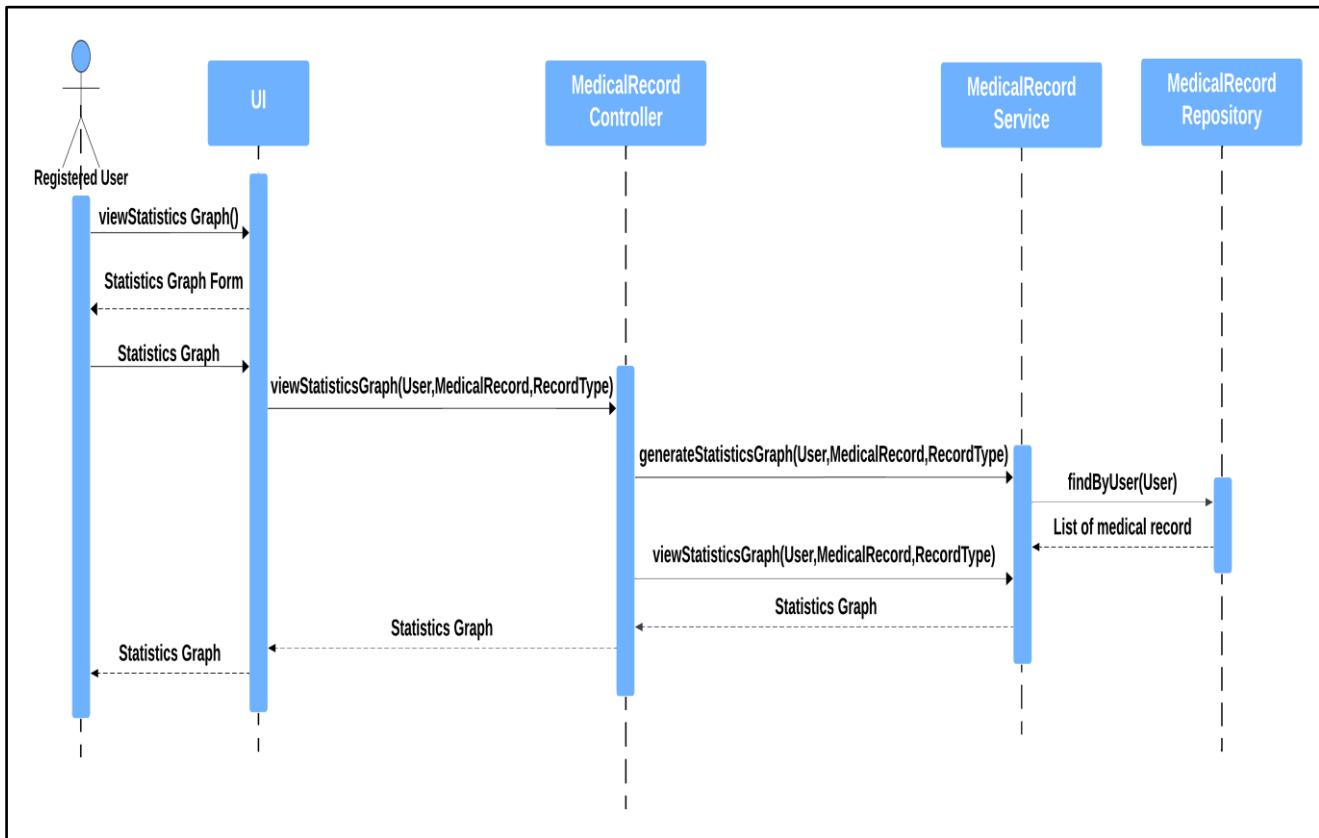


Figure 26: View Statistics Graph

## 11. Search Within Articles

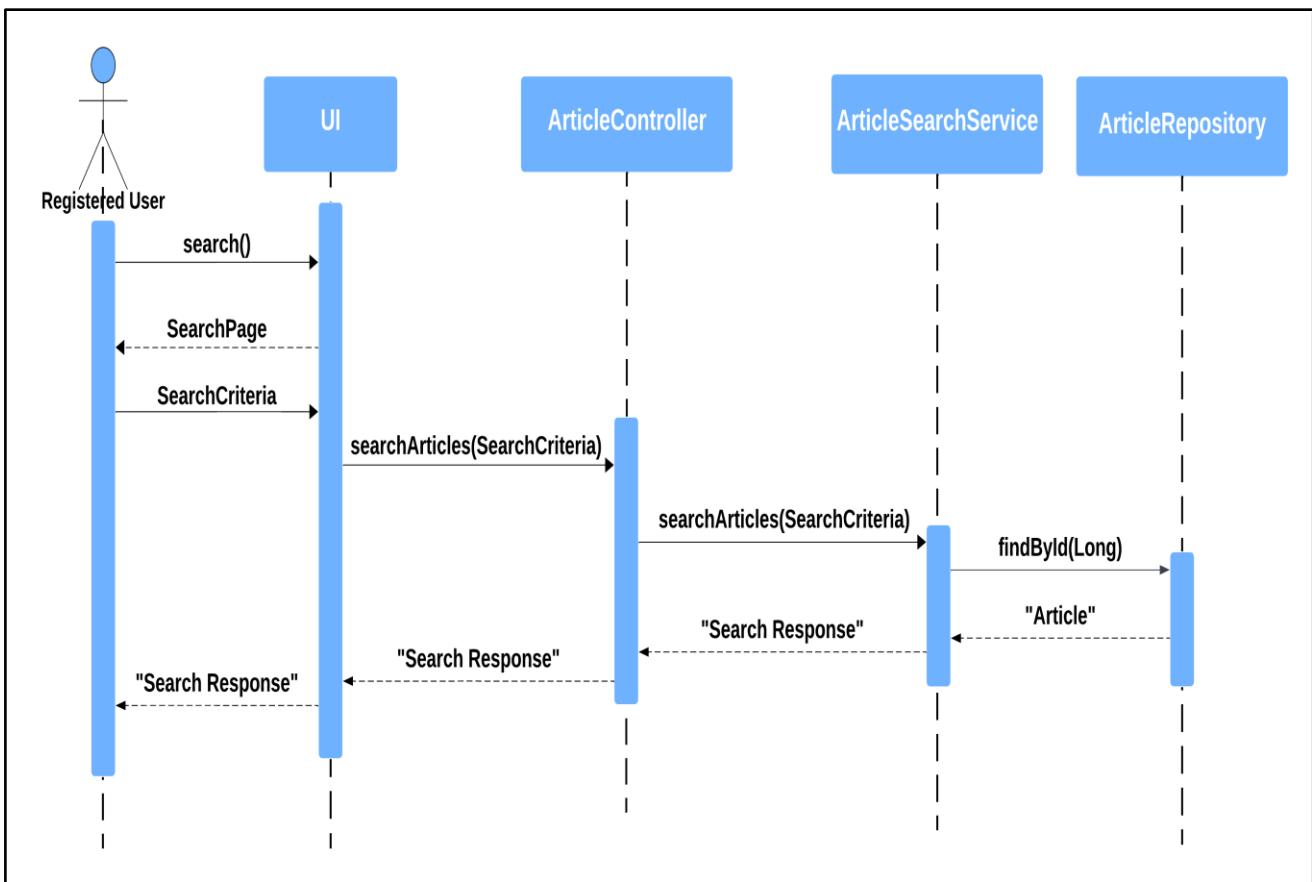


Figure 27: Search Within Articles

## ERD

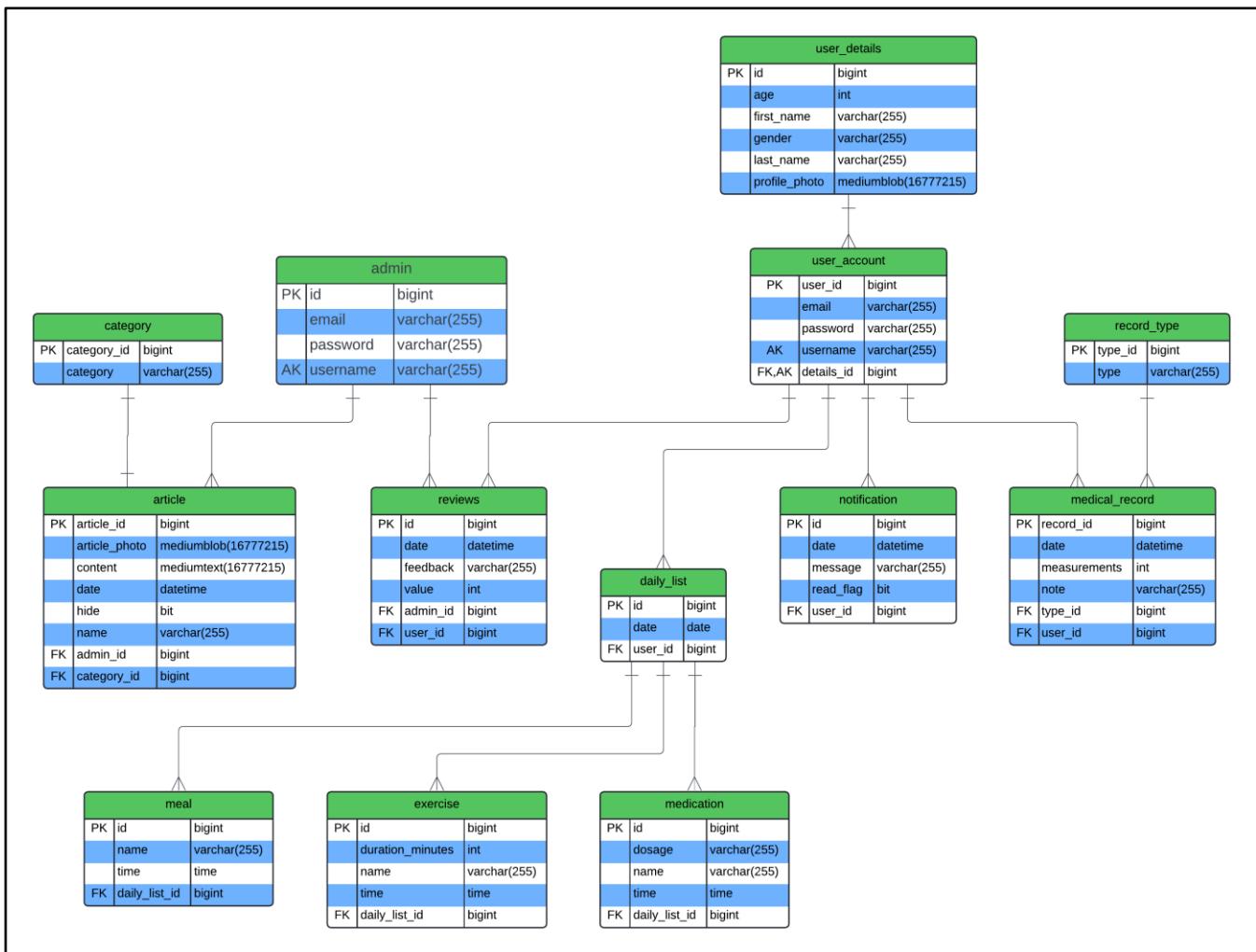


Figure 28: ERD

## User Interface Design

The screenshot shows the homepage of the GlucoGuide website. At the top left is the logo 'GLUCO GUIDE' with a green circular icon containing a stylized 'G'. The top navigation bar includes 'Home', 'Reviews', and 'Articles' buttons. On the right are 'Sign In' and 'Sign Up' buttons, a search bar with the placeholder 'aloë', and a 'Search' button. The main content area features a large dark blue header with the text 'Created for a better healthy life'. Below it is a smaller text block: 'Welcome To GlucoGuide, we will provide you with various information, lifestyle, and methods to cope with diabetes in the right way and know what your body needs'. To the right of the text is a photograph of a person's hands using a blood glucose meter to check blood glucose levels.

The screenshot shows a landing page from the GlucoGuide website. The top navigation bar is identical to the homepage. The main content area features a large dark blue header with the text 'Select Your New Perfect Life'. Below it is a smaller text block: 'It's your time to manage your Health using your Assistant GlucoGuide Application.' At the bottom left is a 'Sign Up to see more' button. To the right is a photograph of a luxury ROLEX Submariner watch with a red bezel and a black dial.

 GLUCO GUIDE

Home    Reviews    Articles    Sign In    Sign Up     Search

### What Our Happy Users Say!

Sign up to be able to see more features of our GlucoGuide App.

Alice: This website is amazing!  
★★★★★

Bob: I found exactly what I needed.  
★★★★★

Charlie: The user interface could be better.  
★★★★★

Dave: Great customer support!  
★★★★★

### Natural Tips for Diabetes



Aloe vera may help people with prediabetes or type 2 diabetes lower fasting blood sugar and A1C levels.



Ginger improves the body's sensitivity to insulin and helps increase insulin secretion.

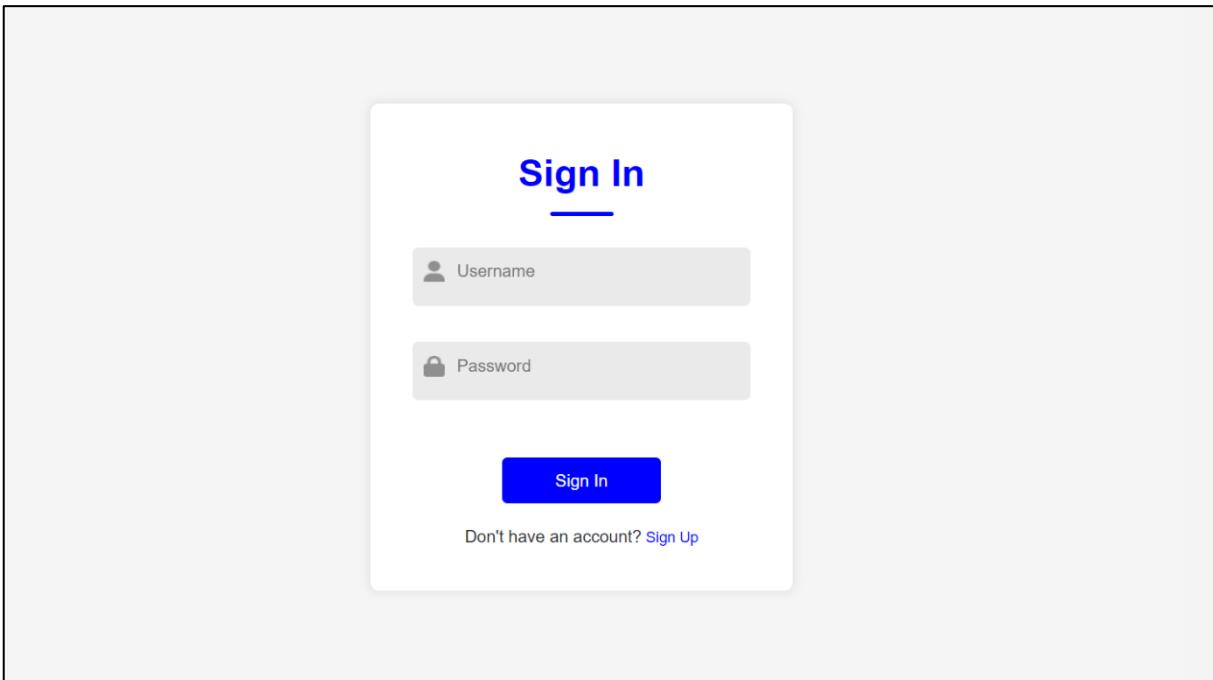


Fenugreek helps in lowering blood sugar and cholesterol levels.

[View More Natural Effects](#)

The screenshot shows a web browser displaying the GlucoGuide website. The header includes a logo, navigation links for Home, Reviews, and Articles, and buttons for Sign In and Sign Up. A search bar contains the text "aloe". Below the header, a search result titled "Diabetes Diet Plans to Lose Weight" is shown. The result includes a brief description of diabetes diet plans and links to "What's a healthy weight to aim for?" and "Know your weight".

The screenshot shows the login screen of the GlucoGuide app. It features a large title "Welcome To GlucoGuide App" and a question "Are You an admin or a user". Below the question are two green buttons labeled "User" and "Admin".



The image shows the home screen of the 'GLUCO GUIDE' app. At the top, there is a navigation bar with tabs: 'Reviews', 'Articles', 'Records', 'Health Lists', 'Predict Diabetes', 'Graphs', and 'Locations'. To the right of the tabs are icons for search, user profile, and sharing. Below the navigation bar, there is a large callout box with the heading 'What Our Happy Users Say!' and a subtext 'Sign up to be able to see more features of our GlucoGuide App.' There is also a blue circular button with a plus sign. To the right of the callout box are four review cards:

- Alice:** This website is amazing! ★★★★☆  
[Like](#)
- Bob:** I found exactly what I needed.  
★★★★★  
[Edit](#) [Delete](#)
- Charlie:** The user interface could be better.  
★★★★★  
[Like](#)
- Dave:** Great customer support!  
★★★★★

## Upload Glucose Measure

**Measurement:**

**Notes:**  (Note: This field is currently empty.)

**Date:**  (Note: This field is currently empty.)

**Upload**

### Medical Records

Your blood glucose level is low. Consume fast-acting carbohydrates to raise blood sugar quickly. If experiencing symptoms like shakiness, sweating, or confusion, seek medical attention.

Measurement	Notes	Date	Actions
4	•	2024-07-16	<span style="color: green;">Update</span> <span style="color: red;">Delete</span>

**Back to Form**

### Medication Data

Medication Name:

Dose:

For example 100mg

Time:

Date:

### Exercise Data

Exercise Name:

Time:

Duration (in minutes):

Date:

## Meal Data

Meal Type:

Select a meal type

Time:

--:-- --

Date:

07/08/2024

Back

Submit

### Health Data Schedule

Type	Name	Dose	Duration	Time	Date	Actions
Meal	-	-	-	16:52	2024-07-08	<button>Update</button>
Exercise	-	-	10	21:51	2024-06-27	<button>Update</button>
Meal	Lunch	-	-	19:52	2024-07-01	<button>Update</button>

[Back to Form](#)

The screenshot shows the 'Diabetes Prediction' section of the Gluco Guide website. At the top, there is a navigation bar with links for 'Reviews', 'Articles', 'Records', 'Health Lists', 'Predict Diabetes', 'Graphs', and 'Locations'. To the right of the navigation bar are icons for search, user profile, and export. The main form area is titled 'Diabetes Prediction' and contains the following fields:

- Age (20-65) :** [Input field]
- Gender:** [Select dropdown menu with 'Select' option]
- Polyuria (Excessive Urination) :** [Select dropdown menu with 'Select' option]
- Polydipsia (Excessive Thirst) :** [Select dropdown menu with 'Select' option]
- Sudden Weight Loss:** [Select dropdown menu with 'Select' option]
- Weakness:** [Select dropdown menu with 'Select' option]
- Polypagia (Excessive Hunger) :** [Select dropdown menu with 'Select' option]
- Genital Thrush:** [Select dropdown menu with 'Select' option]

The screenshot shows the 'Glucose Data Graph' section of the Gluco Guide website. At the top, there is a navigation bar with links for 'Reviews', 'Articles', 'Records', 'Health Lists', 'Predict Diabetes', 'Graphs', and 'Locations'. To the right of the navigation bar are icons for search, user profile, and export. The main form area is titled 'Glucose Data Graph' and contains the following field:

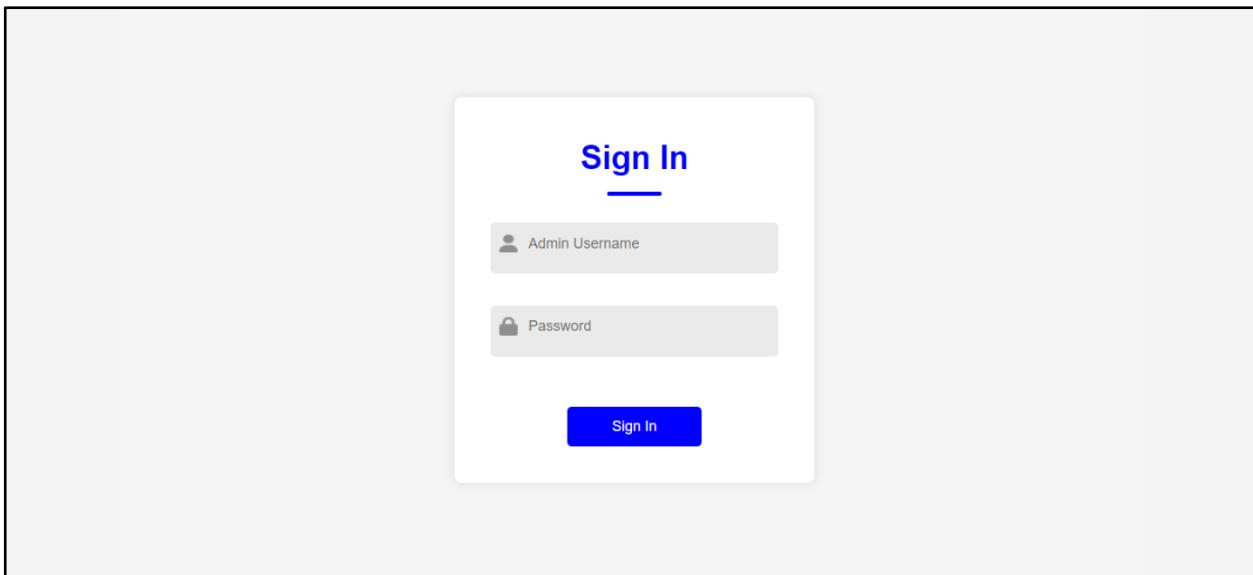
**Start Date:** [Input field for date in mm/dd/yyyy format] [Calendar icon]

**Generate Graph** [Blue button]

The screenshot shows the Gluco Guide mobile application interface. At the top left is the logo 'GLUCO GUIDE'. The top navigation bar includes links for 'Reviews', 'Articles', 'Records', 'Health Lists', 'Predict Diabetes', 'Graphs', and 'Locations'. On the far right of the top bar are icons for search, user profile, and account settings. The main content area has a light gray background. In the center, the heading 'Find Nearby Locations' is displayed above three blue rectangular buttons: 'Nearby Clinics' (with a hospital icon), 'Nearby Pharmacies' (with a pharmacy icon), and 'Nearby Restaurants' (with a restaurant icon). Below these buttons, the text 'No locations found' is centered.

The screenshot shows the user profile page for a user named 'Abdullah123'. At the top left is a placeholder circular profile picture with the text '100 x 100'. To the right of the picture, the username 'Abdullah123' and email 'Abdullah123@example.com' are displayed. Below this is a green 'Upload Photo' button. The page is divided into sections by green horizontal lines. The first section is 'User Account' containing the username and email. The second section is 'User Details' listing the first name 'Abdullah', last name 'Mahmoud', gender 'Male', and age '22'. The third section is 'Notifications' which lists three items: 'User profile updated.', 'Password changed successfully.', and 'New login from unrecognized device.' At the bottom is a red 'Logout' button.

## Admin Interface Design

A screenshot of the "GlucoGUIDE" mobile application interface. At the top, there's a navigation bar with a logo, "GLUCO GUIDE", three green buttons labeled "Reviews", "Post Articles", and "Add Admin", and a user profile icon with a logout arrow. Below the navigation is a section titled "What Our Happy Users Say!" containing four review cards. Each card has a five-star rating, a user name, a review text, a "Like" button, and a "Delete" button. The reviews are:

- Alice: This website is amazing!
- Bob: found exactly what I needed.
- Charlie: The user interface could be better.
- Dave: Great customer support!

At the bottom left is a blue circular button with a plus sign. A "See More" button is located at the bottom right.

**GLUCO GUIDE**

Reviews Post Articles Add Admin

User icon

### Natural Tips for Diabetes



Aloe vera may help people with prediabetes or type 2 diabetes lower fasting blood sugar and A1C levels.

[Edit](#) [Delete](#)



Ginger improves the body's sensitivity to insulin and helps increase insulin secretion.

[Edit](#) [Delete](#)



Fenugreek helps in lowering blood sugar and cholesterol levels.

[Edit](#) [Delete](#)

[View More Natural Effects](#) [Add Tip](#)

Choose File No file chosen

Enter tip description

[Save Tip](#)

**GLUCO GUIDE**

Reviews Post Articles Add Admin

User icon

### Diabetes Diet Plans to Lose Weight

You may have heard that diabetes can be controlled by diet. There is no such thing as a special diet exclusively for people with diabetes. There are a lot of different ways to lose weight – but there's no one-size-fits-all diet. It starts with finding a way to eat fewer calories than you need. A calorie (or kcal) is a unit of energy, which is in the food and drink we consume. Your body uses energy for everything we do – from breathing and sleeping to exercising. When you eat, you're replacing the energy you've used, which helps you to maintain a healthy weight. As a general guide, government recommendations are that men need around 2,500kcal a day to maintain a healthy weight, and women need around 2,000kcal a day. But most people need different amounts of calories based on how their bodies work, how active they are and any weight management goals.

[Edit](#) [Delete](#)

### What's a healthy weight to aim for?

Before you get started, you need to know what a healthy weight is and what numbers you're aiming for. This is about working out your Body Mass Index (BMI) and your waist size.

**Know your weight**

Research shows that the more weight you lose, the greater the health benefits, but even losing just 5% of extra weight will improve your health.

BMI uses your height and weight to work out if you're a healthy weight. It doesn't look at how much fat you have around the middle, so that's why you need to measure your waist too.

**Know your waist size**

A healthy waist size depends on your gender and ethnicity. It should be:

- less than 80cm (31.5in) for all women
- less than 94cm (37in) for most men
- less than 90cm (35in) for South Asian men.

[Edit](#) [Delete](#)

### Add Admin

---

Username

Email

Password

admin22  
admin2@example.com

---

**Admin Account**

Username:

Password:

Are you sure you want to delete your account?

## Implementation

### Front end

- *React JS*

1. Ease of learning, the library is comparatively easy to learn and implement so businesses can get a jump-start quickly.
2. All components of the React application are reusable and responsible for outputting a small reusable piece of HTML code.
3. It is a great performer as it manages a virtual DOM (Document Object Model).
4. High compatibility it can work with other JS libraries and does not limit the possibility of using additional tools for website creation.

### Back end

- *Java + Spring Boot*

Our main technology for the back end of GlucoGuide is Spring Boot because it offers the following advantages for developing modern applications:

1. Spring Boot works well with some of the most popular embedded servlet containers and uses Tomcat as its default, but you can easily swap it.
2. Spring Boot's in-memory database and embedded server (Tomcat) decrease or eliminate the boilerplate code typically needed to set up an application.
3. Spring Boot uses a boot initializer to compile the source language. This bootstrapping technique makes it possible for users to save space on their devices and load applications quickly.

## Machine Learning

- *Python*

Python's extensive library ecosystem, robust visualization capabilities, low barrier to entry, strong community support, flexibility, readability, and platform independence make it an ideal choice for machine learning purposes.

- *Flask*

1. Scalable
2. Flexible
3. Easy to negotiate.
4. Lightweight

- *SKLearn Pandas*

We used it because it is the most useful library for machine learning in Python, it provides a selection of efficient tools for machine learning including classification, regression, clustering, and dimensionality reduction via a consistent interface in Python.

- *Models*

Random forest for binary classification

## Data Base

- *MySQL*

1. **Scalability:** MySQL is highly scalable and can handle large volumes of data and high traffic loads.
2. **Performance:** MySQL is known for its fast performance and efficient query processing. It's optimized for read-heavy workloads and can handle complex queries efficiently.

## Chapter 5: Testing and Evaluation

### Testing:

*Table 24: Testing*

Test Case ID	Functionality	Input	Expected output
TC01	Register user	Username, Password, Email, First Name, Last Name, Gender, Age, Profile Photo	Receive confirmation "User registered successfully" and see user details in profile.
TC02	Login	-Valid Username and password	Receive confirmation "Login successful" and access user dashboard.
		-Invalid Username or password	Receive error message "Invalid username or password".
TC03	Update profile photo	User ID, Profile Photo (Multipart File)	Receive confirmation "Profile photo updated successfully" and see the updated photo in profile.
TC04	Find user by username	Username	User details displayed on the screen
TC05	Get user by id	Id	See user details displayed on the screen, or error message "User not found" if the ID is invalid.
TC06	Get all users	-	List of users displayed on the screen
TC07	Get diabetes prediction	Age, Gender, BMI, Blood Pressure,	Receive prediction result (e.g., "Positive" or

		Insulin Level, etc. (form data)	"Negative") displayed on the screen.
			Receive error message "Error processing prediction response".
TC08	Retrieve all ratings	-	-A list of reviews.
TC09	Create rating	Rating value and feedback entered in the form (e.g., Value: 5, Feedback: "Excellent")	Response status: Created, message: "Review created successfully"
TC10	Update rating	Rating ID, updated rating value, and updated feedback entered in the form	Response status: OK, message: "Review updated successfully"
TC11	Delete rating	Review ID	Response status: OK, message: "Review deleted successfully"
TC12	Retrieve articles by category	Category	See a list of articles belonging to a selected category displayed on the screen.
TC13	Post a new article	Article title, Content, and Category	Receive confirmation that the article was successfully posted and see it listed among other articles.
TC14	Update an existing article by admin	Edit the content and save changes	Receive a confirmation that the article successfully updated and see the updated content displayed
TC15	View all article categories	Access Categories section	View list of all available categories
TC16	Delete an article by admin	Select the delete option for a specific article and confirm the action	Receive a confirmation that the article was successfully deleted with

TC17	Find nearby places	-users location, Places type('pharmacy')	List of nearby pharmacies within a 5km radius from the input location
TC18	Find nearest pharmacy		Receive a list of nearby pharmacies with their details displayed on the screen.
TC19	Find nearest restaurants		Receive a list of nearby restaurants with their details displayed on the screen.
TC20	Find nearest clinics		Receive a list of nearby clinics with their details displayed on the screen.
TC21	Get daily list	Date	Display the daily list for the specified date.
			Return null if no daily list is found for the specified date.
TC22	Save daily list	Daily list with date	Save the daily list and display the saved list

## Chapter 6 Conclusions and Future Work.

### 6.1 Conclusions

The GlucoGuide project set out to create a comprehensive and user-friendly platform designed to support individuals living with diabetes. This platform addresses several key challenges faced by diabetics, including continuous blood glucose monitoring, adherence to medication schedules, dietary management, and physical activity tracking. By integrating educational resources, personalized care plans, health tracking tools, and community support, GlucoGuide provides a holistic approach to diabetes management.

#### Validation of System Needs

##### 1. Comprehensive Resource Access:

- **Need:** Individuals with diabetes often struggle to find reliable and centralized information tailored to their specific needs.
- **Solution:** GlucoGuide offers a wide range of educational articles, medical reports, natural tips, and lifestyle guidance, ensuring users have access to credible and relevant information.

##### 2. Personalized Health Management:

- **Need:** Managing diabetes requires personalized care plans and tracking tools to monitor health metrics effectively.
- **Solution:** Users can create health lists, input and visualize health data over time, and receive machine learning-based predictions to assist in proactive diabetes management.

##### 3. Convenient Healthcare Access:

- **Need:** Finding nearby healthcare facilities can be challenging, especially for those in unfamiliar areas.

- **Solution:** The locator tool integrated with Google Maps helps users find the nearest clinics and pharmacies, promoting timely and convenient healthcare access.

#### 4. User Engagement and Support:

- **Need:** Ongoing support and engagement are crucial for sustained diabetes management.
- **Solution:** Notifications about new articles and community support features keep users informed and engaged with the platform, fostering a supportive environment.

#### 5. Ease of Use:

- **Need:** A user-friendly interface is essential for ensuring that all users, regardless of technical proficiency, can navigate and use the platform effectively.
- **Solution:** The use of React JS for the front end ensures a highly responsive and intuitive user interface, making the platform accessible and easy to use.

### System Effectiveness

GlucoGuide effectively addresses the problems stated in the project scope by providing a centralized, reliable, and comprehensive diabetes management system. The integration of various tools and resources tailored to the unique needs of individuals with diabetes demonstrates the platform's capability to enhance user experience and support effective diabetes management. The implementation of secure user registration and authentication processes ensures that user data is protected, maintaining the integrity and privacy of personal health information.

## 6.2 Future Work

While GlucoGuide has successfully met its initial objectives, there are several areas for future enhancement to further improve the system and expand its capabilities.

### 1. Enhanced Device Integration:

- **Future Work:** Improve compatibility with a wider range of health monitoring devices to facilitate real-time data tracking and seamless integration of health metrics.

### 2. Advanced Machine Learning Models:

- **Future Work:** Develop and implement more sophisticated machine learning models that can provide more accurate predictions and personalized health insights based on a broader dataset.

### 3. Expanded Language Support:

- **Future Work:** Increase the number of supported languages to cater to a more diverse user base, ensuring that language is not a barrier to accessing critical diabetes management resources.

### 4. Mobile Application Development:

- **Future Work:** Develop a mobile application version of GlucoGuide to provide users with on-the-go access to the platform's features and functionalities.

### 5. Integration with Wearable Technology:

- **Future Work:** Integrate GlucoGuide with popular wearable devices to automatically sync health data, offering users a more streamlined and automated tracking experience.

## 6. Community Engagement Features:

- **Future Work:** Enhance community engagement features by introducing forums, chat rooms, and support groups where users can share experiences, seek advice, and provide mutual support.

## 7. Diet and Exercise Planning Tools:

- **Future Work:** Incorporate advanced diet and exercise planning tools that provide personalized recommendations based on user health data and goals, promoting holistic diabetes management.

## 8. Collaborations with Healthcare Providers:

- **Future Work:** Establish partnerships with healthcare providers to offer telemedicine services, enabling users to consult with medical professionals directly through the platform.

## 9. Data Analytics and Reporting:

- **Future Work:** Implement advanced data analytics and reporting tools that allow users to generate detailed reports on their health metrics, which can be shared with healthcare providers for more informed decision-making.

## Conclusion

In conclusion, GlucoGuide has successfully developed a robust, user-centric platform that addresses the critical needs of individuals with diabetes. By providing comprehensive resources, personalized care plans, health tracking tools, and community support, GlucoGuide empowers users to take control of their health and manage their condition effectively. The suggested future enhancements will further strengthen the platform, ensuring that GlucoGuide continues to evolve and meet the changing needs of its users, ultimately contributing to better health outcomes and an improved quality of life for individuals living with diabetes.