FARMWATER ADVISOR SYSTEM

A MINI-PROJECT REPORT

Submitted by

LITHAN G-2116220701143

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AUTONOMOUS, CHENNAI

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BONAFIDE CERTIFICATE

Certified that this mini project " **FarmWater Advisor System**" is the bonafide work of "**LITHAN G (21162207701143)"** who carried out the project work under my supervision.

SIGNATURE
Mrs. JANANEE V,
Assistant Professor,
Computer Science & Engineering
Rajalakshmi Engineering College
Thandalam, Chennai -602105.

Submitted for the End semester practical examination to be held on ____

INTERNAL EXAMINER **EXTERNAL EXAMINER**

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ABSTRACT

The **FarmWater Advisor** is a web-based application designed to assist farmers and agricultural professionals in efficiently managing water resources for their crops. In light of increasing water scarcity and the critical importance of sustainable farming practices, this tool provides precise water requirement calculations tailored to specific crops, soil types, field sizes, and growth stages. By considering diverse variables such as crop water needs, soil absorption rates, and growth phase adjustments, the system offers personalized irrigation recommendations to optimize water use.

The system's backend is powered by MySQL, which stores essential data such as crop types, soil factors, growth stage factors, and user-specific water calculations. Users can register, log in, and access their profiles to save their calculation history and receive real-time insights. Through an intuitive user interface, users input details like crop type, soil characteristics, and growth phase. The application processes this data, referencing stored water usage and soil factors to determine the optimal water volume required per acre and provide recommendations for efficient irrigation practices.

This project supports both environmental and economic sustainability by helping farmers make data-driven irrigation decisions that conserve water and enhance crop yield.

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CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

The **FarmWater Advisor** is a web-based tool designed to help farmers optimize water use for crops by calculating precise irrigation requirements based on crop type, soil conditions, field size, and growth stages. In regions where water conservation is critical, this application provides actionable insights to improve resource efficiency and support sustainable agriculture. By offering a user-friendly interface, personalized calculation histories, and scientific recommendations, FarmWater Advisor empowers farmers and agricultural professionals to make data-driven decisions, thereby enhancing crop yield quality, preserving soil health, and contributing to environmental sustainability.

1.2. Scope of the Work

The scope of the FarmWater Advisor project encompasses developing a user-friendly web application that calculates accurate irrigation requirements based on user inputs such as crop type, soil type, field size, and growth stage. Key tasks include integrating a user management system for authentication, building a water calculator module to process data and deliver irrigation recommendations, and implementing a database to store user profiles and past water calculations for easy retrieval and analysis. Additionally, the application aims to provide personalized insights into water usage and efficiency, supporting farmers in sustainable water management. Future enhancements may include expanding the crop and soil databases, incorporating real-time weather data for

dynamic calculations, and offering predictive analysis features to further assist in water conservation efforts.

1.3. Aim and Objectives of the Project

The aim of the FarmWater Advisor project is to assist farmers in making informed decisions regarding efficient water usage for crop irrigation, ultimately promoting sustainable agricultural practices.

The primary objectives are:

1. **Accurate Irrigation Calculations**: To develop a system that calculates precise water requirements based on crop type, soil type, field size, and growth stage.
2. **Personalized User Profiles**: To provide users with a personal dashboard to track past irrigation calculations and manage their agricultural data efficiently.
3. **Sustainable Water Management**: To support farmers in adopting water-efficient practices by offering tailored irrigation recommendations, promoting resource conservation, and improving crop yields.
4. **Future Scalability**: To design the application with scalability in mind, allowing for future enhancements like real-time weather data integration and predictive analytics for improved decision-making.

CHAPTER 2

SYSTEM SPECIFICATIONS

2.1 SOFTWARE SPECIFICATIONS

The **software specifications** for the FarmWater Advisor project include the following:

1. **Frontend**:
    - **Languages**: HTML, CSS, JavaScript
    - **Libraries/Frameworks**: Bootstrap for responsive design and jQuery for AJAX requests
    - **UI Framework**: Custom CSS and Bootstrap to ensure an intuitive user interface and mobile responsiveness
2. **Backend**:
    - **Language**: Python
    - **Framework**: Flask for web application routing and RESTful API endpoints
    - **Database Connectivity**: MySQL connector for Python to interact with the MySQL database
3. **Database**:
    - **Database Management System (DBMS)**: MySQL for data storage, optimized for handling user profiles, water requirement data, and historical records
    - **Database Schema**: Structured tables including users1, water_calculations, water_requirements, soil_factors, and stage_factors
4. **Development Environment**:
    - **IDE/Text Editor**: VS Code or PyCharm

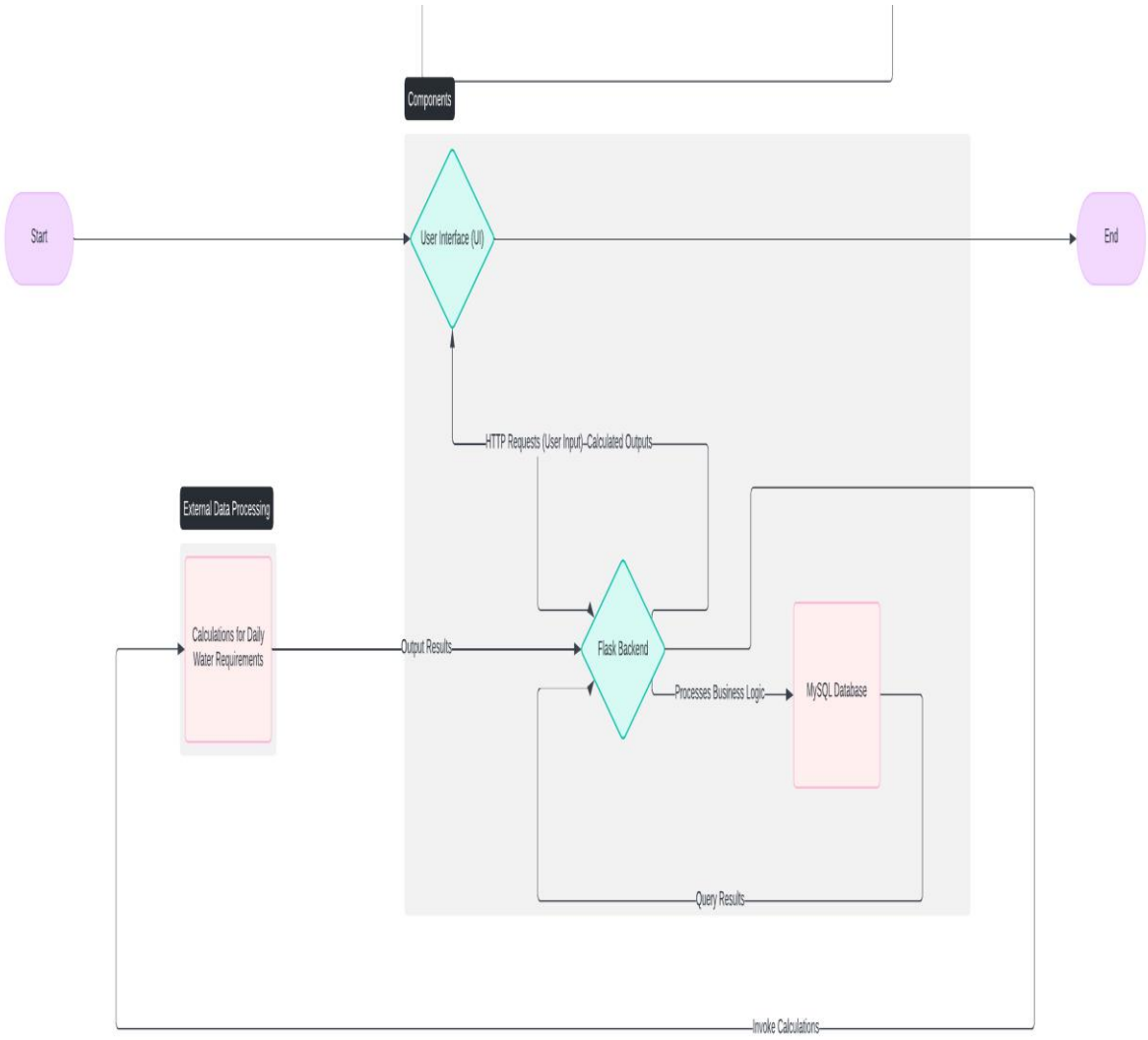
- **Version Control**: Git for tracking changes and collaboration
- **Local Server**: Flask's built-in development server or Docker (optional for consistent environment setup)

5. **Hosting/Deployment**:
   - **Web Server**: Flask's production environment or deployment on services like Heroku or AWS (optional)
   - **Operating System**: Cross-platform support for Windows, macOS, and Linux for development and deployment
6. **Dependencies**:
   - Flask, MySQL Connector for Python, and additional libraries specified in requirements.txt for easy setup on different systems
7. **Browser Compatibility**:
   - **Targeted Browsers**: Chrome, Firefox, Safari, and Edge for desktop and mobile compatibility

These specifications ensure that FarmWater Advisor is user-friendly, efficient, and scalable, providing a strong foundation for future growth.

CHAPTER 3

ARCHITECTURE DIAGRAM



CHAPTER 4

MODULE DESCRIPTION

The FarmWater Advisor project is organized into several key modules, each designed to provide specific functionalities that support water calculation and management for agricultural fields:

1. **User Authentication Module**:
    - **Description**: Manages user accounts, including signup, login, and session handling. Ensures secure access to personalized features within the application.
    - **Functions**: Sign up for new users, login validation, session management, and logout functionality.
    - **Purpose**: Allows users to have secure, personalized access to the platform, storing user-specific data like saved calculations and profile details.
2. **Profile Management Module**:
    - **Description**: Allows users to view and manage their profile information, including username, email, and other personal details.
    - **Functions**: Fetches user details from the database, displays them in the profile page, and allows profile updates.
    - **Purpose**: Provides a user-friendly interface for users to access and update their personal information.
3. **Water Calculation Module**:
    - **Description**: The core of the application, responsible for calculating the water requirements based on crop type, soil type, field size, and growth stage.

- **Functions**: Takes user inputs, fetches water requirement data from the database, and applies formulas to generate daily and weekly water usage estimates.
- **Purpose**: Helps farmers estimate daily water needs and provides recommendations for effective water management tailored to specific field conditions.

4. **Data Storage and Management Module**:
   - **Description**: Manages database interactions to store and retrieve user data, calculation histories, water requirements, soil factors, and growth stage factors.
   - **Functions**: Handles CRUD operations on tables such as users1, water_calculations, water_requirements, soil_factors, and stage_factors.
   - **Purpose**: Centralized data storage to ensure quick retrieval of all necessary data for calculations, user management, and generating reports.
5. **Dashboard Module**:
   - **Description**: Provides users with an overview of their recent activities and calculations. It displays relevant data and links to key features.
   - **Functions**: Displays recent water calculations, recommendations, and access to additional resources.
   - **Purpose**: Offers a centralized access point for users to quickly view their activity and navigate through the app’s features.
6. **Recommendation Module**:
   - **Description**: Generates soil and water management recommendations based on the user's inputs, such as soil type and field conditions.

- **Functions**: Fetches recommendations from the database based on soil type and displays them after water calculations.
- **Purpose**: Provides actionable insights to farmers to optimize water usage and improve crop yield through recommended practices.

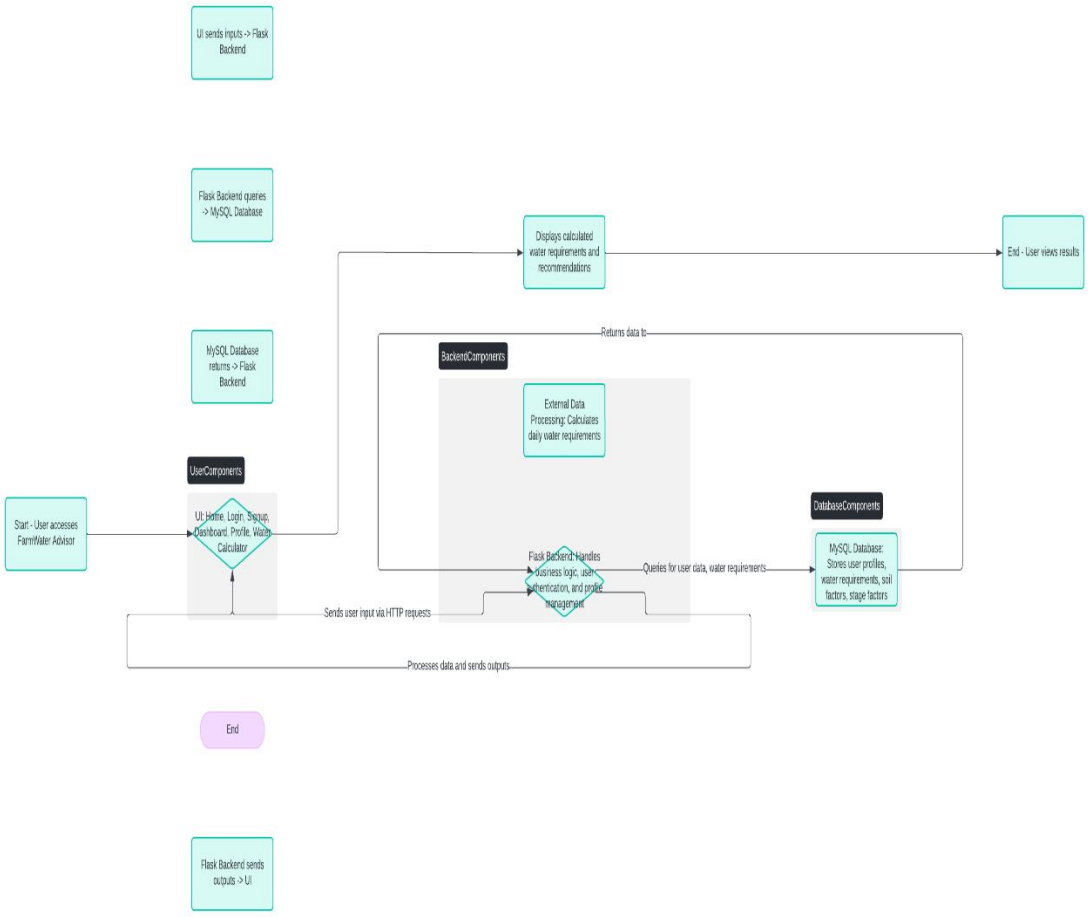
7. **Report Generation Module**:
   - **Description**: Summarizes water usage data and recommendations into a readable format.
   - **Functions**: Extracts calculation history and recommendations for each user, generating reports to help track and manage water usage over time.
   - **Purpose**: Helps farmers and users to maintain a record of water usage and management practices to improve long-term planning.

Each module integrates with others to create a cohesive, comprehensive water advisory platform that supports sustainable agricultural practices.

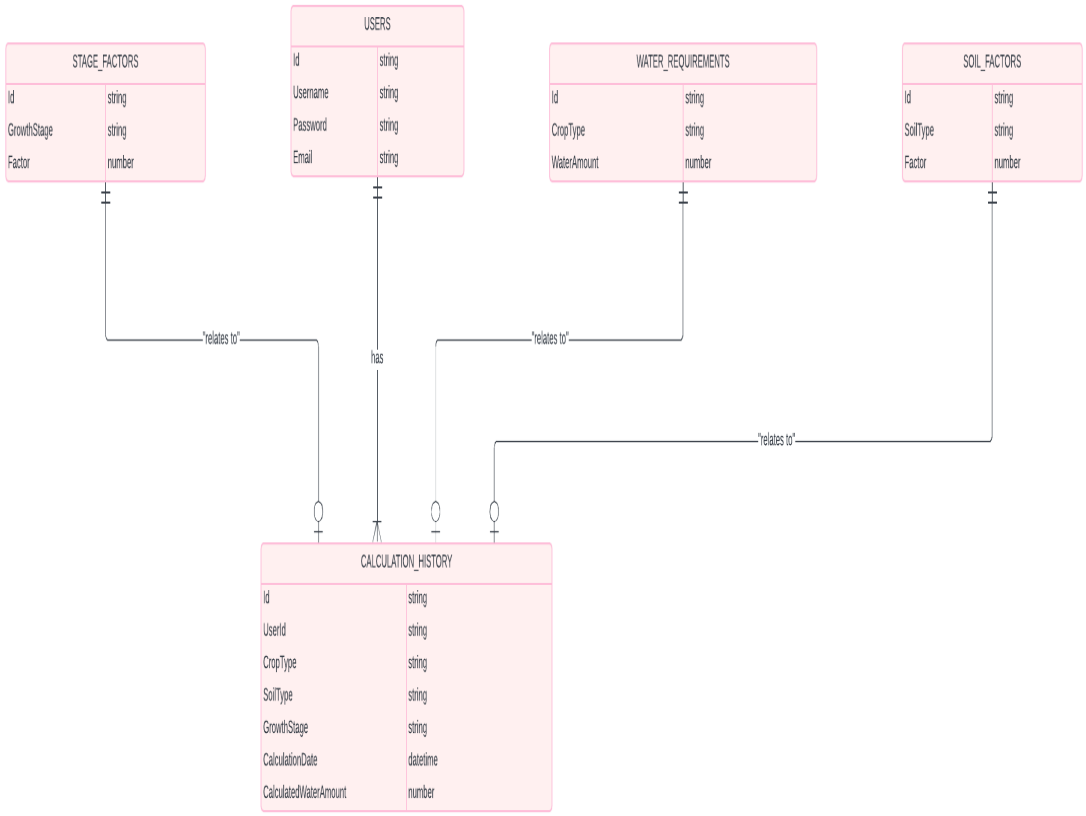
CHAPTER 5

SYSTEM DESIGN

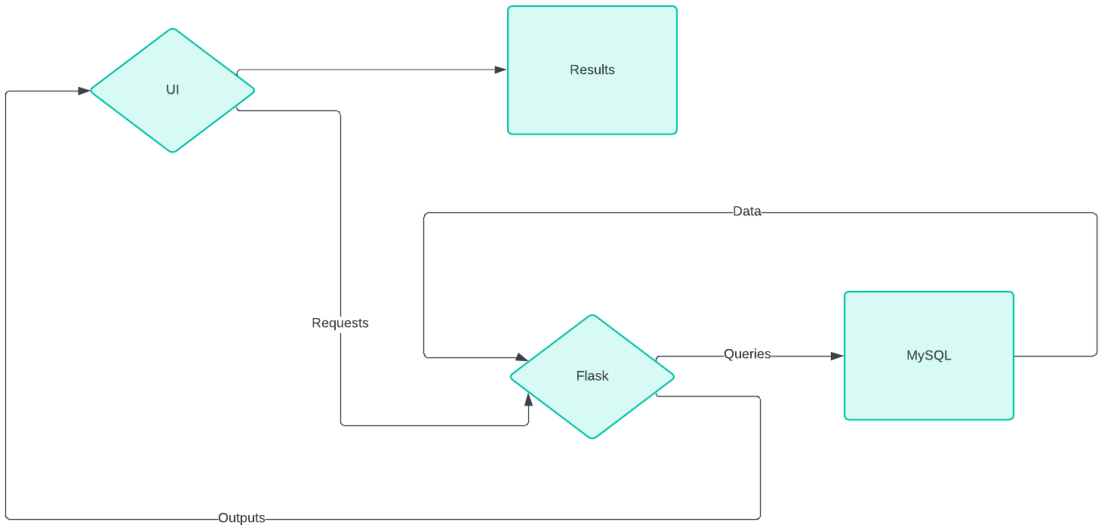
5.1 USE CASE DIAGRAM



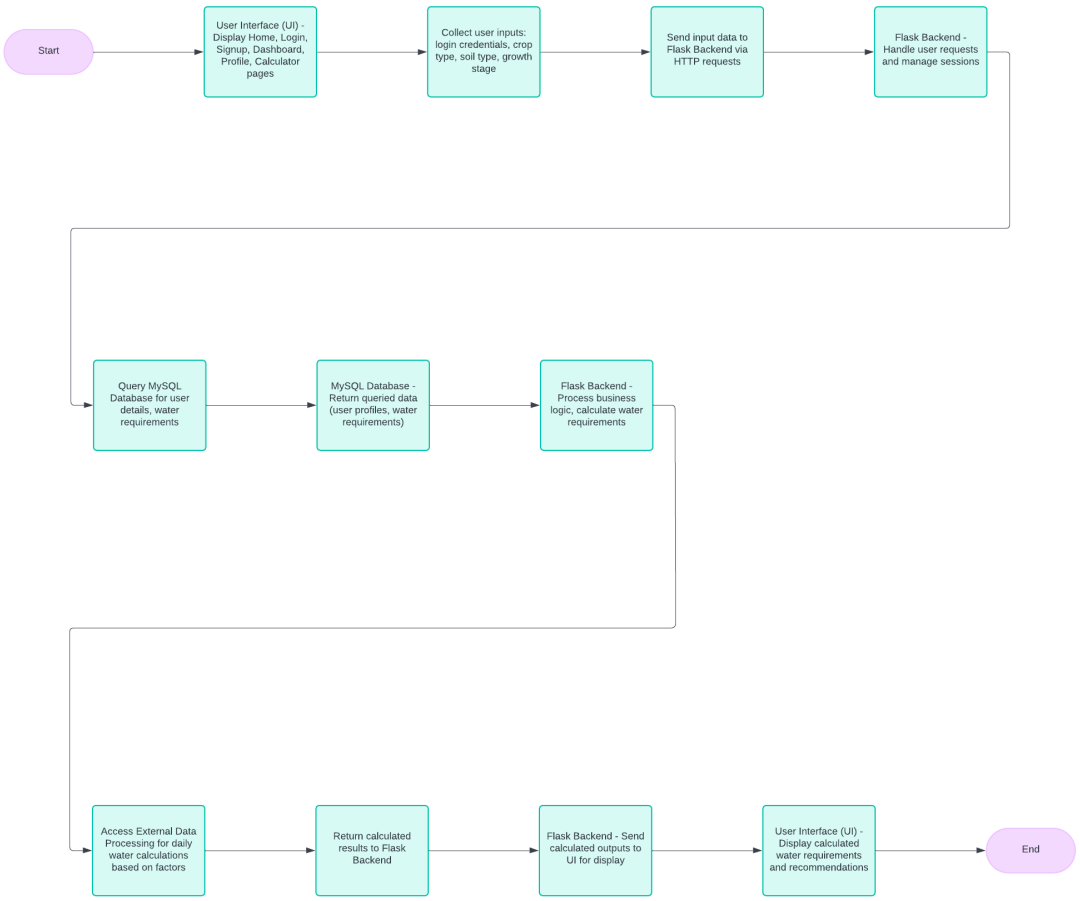
5.2. ER DIAGRAM



5.3 DATA FLOW DIAGRAM



5.4.ACTIVITY_DIAGRAM



CHAPTER 6

SAMPLECODING

HOME.HTML

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Home - FarmWater Advisor</title>
</head>
<body>
    <h1>Welcome to FarmWater Advisor</h1>
    <p>Optimize water use for agricultural sustainability.</p>
    <button onclick="window.location.href='/login'">Login</button>
    <button onclick="window.location.href='/signup'">Sign Up</button>
</body>
</html>
```

LOGIN.HTML

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Login</title>
</head>
<body>
    <h1>Login</h1>
```

```
    <form action="/login" method="post">
        <label for="username">Username:</label>
        <input type="text" id="username" name="username" required><br><br>
        <label for="password">Password:</label>
        <input type="password" id="password" name="password"
required><br><br>
        <button type="submit">Login</button>
    </form>
    <p>Don't have an account? <a href="/signup">Sign up here</a>.</p>
</body>
</html>
```

SIGNUP.HTML

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Sign Up</title>
</head>
<body>
    <h1>Sign Up</h1>
    <form action="/signup" method="post">
        <label for="username">Username:</label>
        <input type="text" id="username" name="username" required><br><br>
        <label for="password">Password:</label>
        <input type="password" id="password" name="password"
required><br><br>
        <label for="confirm_password">Confirm Password:</label>
```

```
        <input type="password" id="confirm_password" name="confirm_password" required><br><br>
        <label for="email">Email:</label>
        <input type="email" id="email" name="email" required><br><br>
        <label for="full_name">Full Name:</label>
        <input type="text" id="full_name" name="full_name" required><br><br>
        <label for="phone_number">Phone Number:</label>
        <input type="text" id="phone_number" name="phone_number"><br><br>
        <button type="submit">Sign Up</button>
    </form>
    <p>Already have an account? <a href="/login">Login here</a>.</p>
</body>
</html>
```

DASHBOARD.HTML

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Dashboard</title>
</head>
<body>
    <h1>Dashboard</h1>
    <button onclick="window.location.href='/water-calculator'">Water Calculator</button>
    <button onclick="window.location.href='/profile'">View Profile</button>
    <button onclick="window.location.href='/logout'">Logout</button>
</body>
</html>
```

PROFILE.HTML

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>User Profile</title>
    <link rel="stylesheet" href="/static/profile.css">
</head>
<body>
    <nav>
        <div class="logo">FarmWater Advisor</div>
        <div class="nav-buttons">
            <button onclick="window.location.href='/dashboard'" class="back-button">Back to Dashboard</button>
            <button onclick="window.location.href='/logout'">Logout</button>
        </div>
    </nav>
    <div class="container">
        <h1>User Profile</h1>
        <p><strong>User ID:</strong> {{ user[0] }}</p>
        <p><strong>Name:</strong> {{ user[1] }}</p>
        <p><strong>Email:</strong> {{ user[3] }}</p>
    </div>
</body>
</html>
```

CHAPTER 7

SCREENSHOTS

Fig.7.1 Farmer login

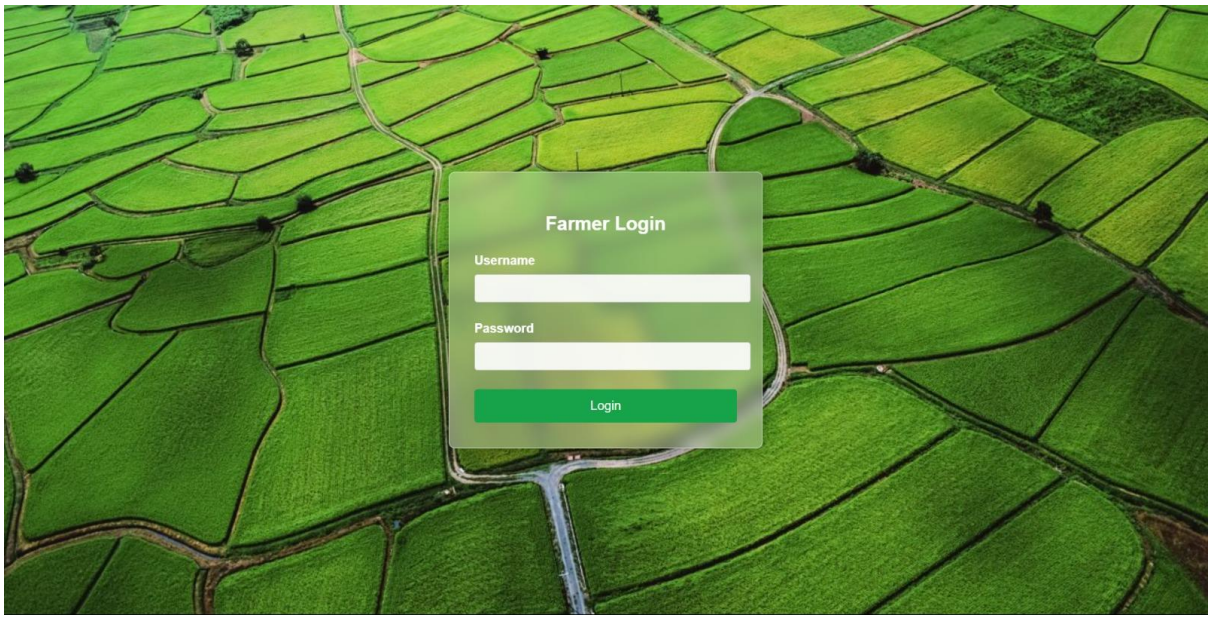


Fig.7.2 home page

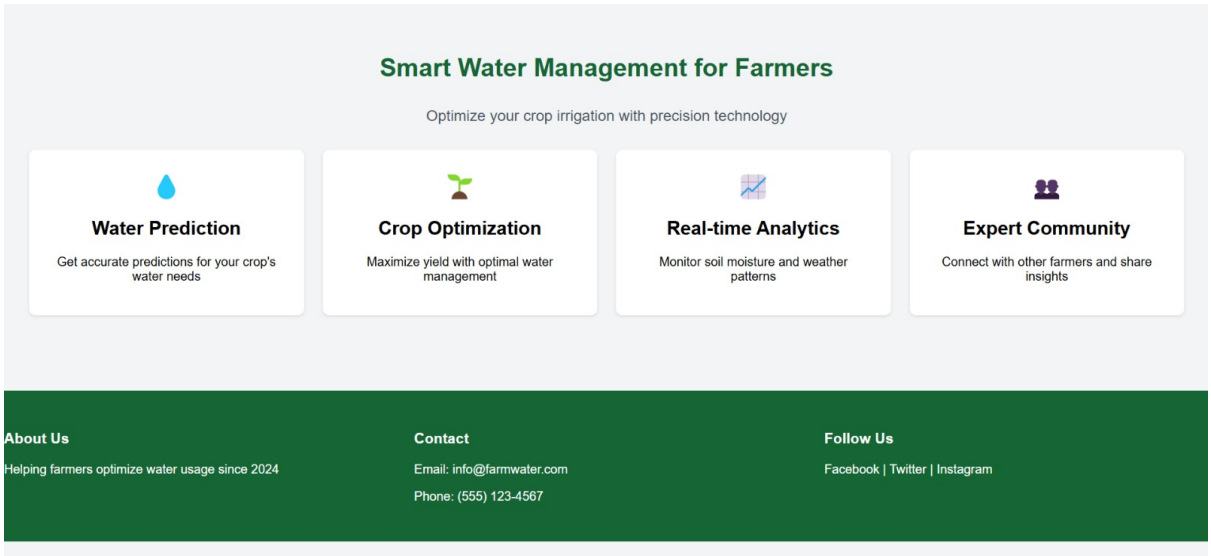


Fig.7.3 Water calculater

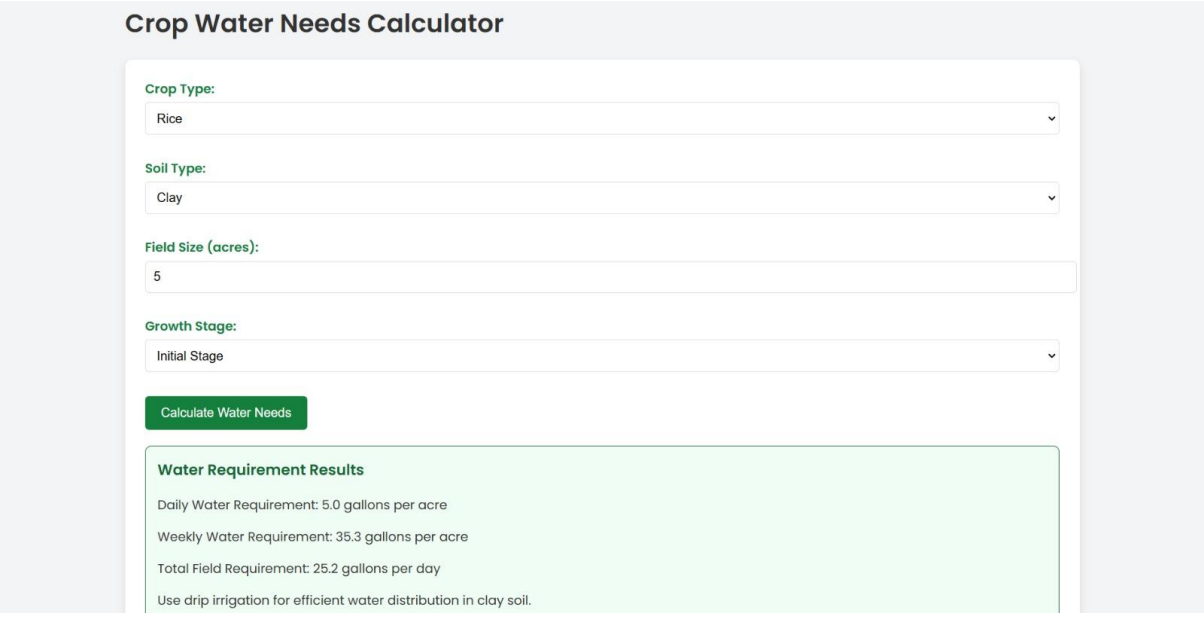
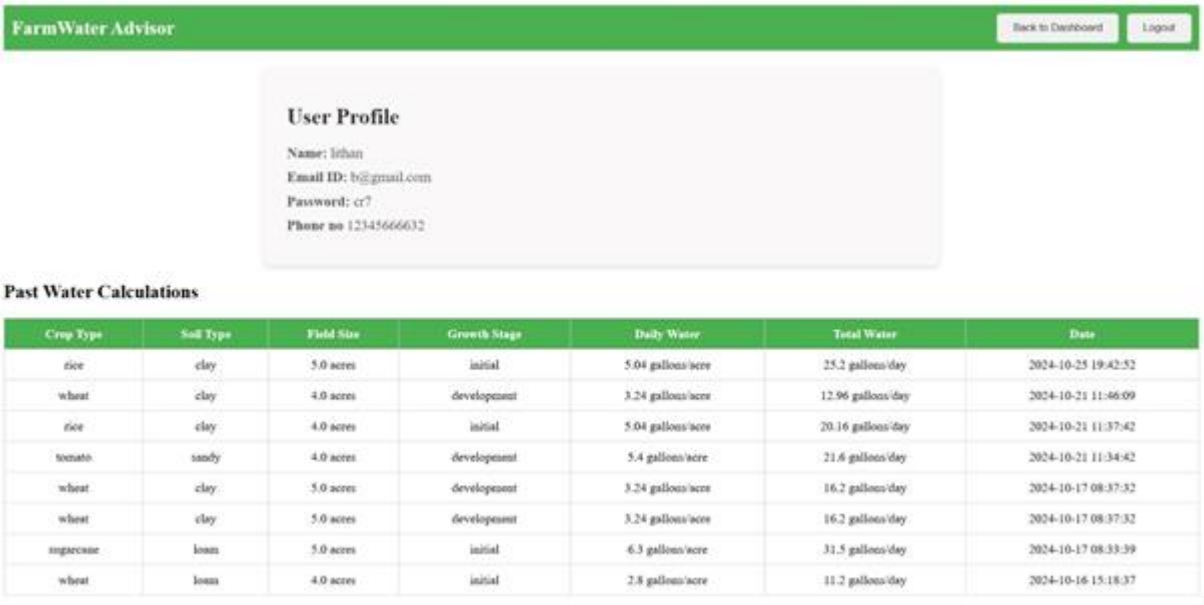


Fig.7.4 History of the previous calculation



CHAPTER 8
CONCLUSION

The **FarmWater Advisor** project effectively addresses a crucial need in modern agriculture: optimizing water management for crop irrigation. By leveraging data on crop types, soil characteristics, and growth stages, the application provides tailored water requirement calculations that empower farmers to make informed irrigation decisions. Its user-friendly interface, featuring user registration and a dedicated dashboard, enhances accessibility for individuals with varying levels of technical expertise. The integration of a MySQL database facilitates real-time data access, allowing users to adjust their irrigation practices based on current information.

Furthermore, the project's scalable architecture supports future enhancements, such as incorporating weather data or machine learning models to predict water requirements. Ultimately, by promoting efficient water usage, the FarmWater Advisor contributes to sustainable farming practices, aligning with global efforts to conserve water resources and improve food security. Overall, this project not only meets its primary goal but also lays a solid foundation for future innovations in agricultural technology, making a significant impact on the agricultural sector.

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