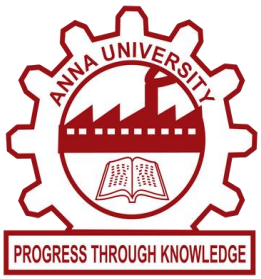

AQUASAVE APP: EMPOWERING SUSTAINABLE WATER USAGE THROUGH DIGITAL INNOVATION

A PROJECT REPORT

Submitted by

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DHIVYA PRIYA.K	**20202015**
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in partial fulfilment for the award of the degree

of

BACHELOR OF TECHNOLOGY

IN

INFORMATION TECHNOLOGY

PAAVAI ENGINEERING COLLEGE

(AUTONOMOUS)

ANNA UNIVERSITY : CHENNAI 600 025

MAY 2024

ANNA UNIVERSITY : CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report **"AQUASAVE APP: EMPOWERING SUSTAINABLE WATER USAGE THROUGH DIGITAL INNOVATION"** is the bonafide work of **"ANTONY JAYANELSON (20202003)", "DHIVYA PRIYA.K (20202015)"** and **"VIKRAM RAJA.S (20202060)"** who carried out the project work under my supervision.

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INTERNAL EXAMINER

EXTERNAL EXAMINER

DECLARATION

We, **ANTONY JAYANELSON.J (20202003), DHIVYA PRIYA.K (20202015) and VIKRAM RAJA.S (20202060),** hereby declare that the project report titled **"AQUASAVE APP: EMPOWERING SUSTAINABLE WATER USAGE THROUGH DIGITAL INNOVATION"** done by us under the guidance of **Dr.B.VENKATESAN, M.E.,Ph.D,** is submitted in partial fulfillment of the requirements for the award of Bachelor of Technology in Information Technology. Certified further that, to the best of our knowledge, the work reported herein does not form part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

1.

2.

DATE: **3.**

PLACE: PACHAL **SIGNATURE OF THE CANDIDATES**

ACKNOWLEDGEMENT

A great deal of arduous work and effort has been spent in implementing this project work. Several special people have guided us and have contributed significantly to this work and so this becomes obligatory to record our thanks to them.

We express our profound gratitude to our honourable **Chairman**, **Shri. CA. N.V.NATARAJAN, B.Com., F.C.A.,** and also to our **Correspondent**, **Smt. MANGAI NATARAJAN, M.Sc.,** for providing all necessary facilities for the successful completion of our project.

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ABSTRACT

The AquaSave application stands as a digital solution designed to address the critical issue of water conservation and sustainable usage. Water, a fundamental resource for life, is facing increasing stress due to factors such as population growth, climate change, and inefficient consumption patterns. In response to this, our team has developed AquaSave, a mobile application that empowers individuals and communities to make informed decisions about their water usage. The application leverages cutting-edge technologies such as Flutter, Firebase, Dart, and Bloc to provide a seamless and interactive user experience. AquaSave acts as a comprehensive platform, offering information on water consumption, water-saving practices, and personalised recommendations for minimising water footprints. This project is not merely about developing a mobile application; it represents a commitment to fostering sustainable habits and creating awareness about responsible water usage. By harnessing the power of digital innovation, AquaSave aims to contribute to a more sustainable and water secure future.

KEYWORDS: AquaSave, cutting-edge, fostering, harnessing

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CHAPTER 1
INTRODUCTION

1.1 General

Water scarcity has emerged as a critical global issue, threatening the sustainability of ecosystems and human societies alike. As populations grow and climate change accelerates, the demand for freshwater continues to rise, outpacing the available supply in many regions. The consequences of water scarcity are far-reaching, affecting agriculture, industry, health, and the environment. Addressing this challenge requires concerted efforts from individuals, communities, governments, and organizations worldwide.

1.2 Project Background

In response to the escalating water crisis, the AquaSave project was conceived as a digital solution to empower individuals in managing their water usage effectively. The project draws inspiration from the increasing role of technology in promoting sustainability and environmental stewardship. By leveraging the ubiquity of smartphones and the power of data analytics, the AquaSave App aims to provide users with actionable insights into their water consumption habits.

1.3 Problem Statement

Despite growing awareness of water scarcity, many individuals lack the tools and information needed to monitor and reduce their water usage. Traditional water meters offer limited visibility into daily consumption patterns, making it challenging for users to identify areas where conservation efforts could be improved. Moreover, the complex nature of water usage across different

activities, such as household chores, irrigation, and personal hygiene, adds to the difficulty of quantifying and managing water consumption effectively.

The AquaSave project seeks to address these challenges by developing a user-friendly mobile application that empowers individuals to track their water usage in real-time, set conservation goals, and receive personalized recommendations for reducing waste.

1.4 Objectives of the Project

- Develop a mobile application with intuitive interfaces for recording and analyzing water usage data.
- Implement features for setting personalized water conservation goals based on user preferences and local water availability.
- Integrate data visualization tools to present users with actionable insights into their water consumption patterns, trends, and potential savings.
- Raise awareness about water conservation through educational content, tips, and challenges within the app.
- Foster collaboration with local communities, water utilities, and conservation organizations to promote the adoption of the AquaSave App and facilitate collective action towards sustainable water management.

1.5 Scope of the Project

The scope of the AquaSave project encompasses the entire lifecycle of the mobile application development, from conceptualization to deployment and beyond.

Key components of the project include:

- Research and analysis of existing water usage tracking apps, technological trends, and user preferences.
- Design and prototyping of the AquaSave App's user interface and user experience (UI/UX).
- Development of backend systems and databases to support data collection, storage, and analysis.
- Implementation of data visualization features to present water usage data in an intuitive and informative manner.
- Testing and validation of the AquaSave App across different devices, operating systems, and user scenarios.
- Deployment of the app on major app stores (Google Play Store, Apple App Store) and ongoing support for updates, bug fixes, and user feedback.

CHAPTER 2
LITERATURE REVIEW

2.1 Title: Virtual water trade: Proceedings of the International Expert Meeting on Virtual Water Trade

Author: A. Y. Hoekstra

Year: 2003

Hoekstra's seminal work on virtual water trade provides a comprehensive analysis of the concept and its implications for global water management. The proceedings of the International Expert Meeting on Virtual Water Trade offer valuable insights into the dynamics of virtual water trade, which involves the exchange of water embedded in traded goods and commodities. By examining the role of virtual water trade in addressing water scarcity and promoting international cooperation, this study underscores the importance of considering virtual water flows in global water governance strategies.

2.2 Title: Water footprints of nations: Water use by people as a function of their consumption pattern

Author: A. K. Chapagain, A. Y. Hoekstra

Year: 2004

Chapagain and Hoekstra's research on the water footprints of nations offers valuable insights into the relationship between consumption patterns and water use at a national level. By quantifying the water footprint of different countries, this study highlights the variations in water consumption patterns and their implications for water resource management. The findings underscore the

importance of understanding the water footprint of nations to develop sustainable water management strategies and policies tailored to specific national contexts.

2.3 Title: Strategic importance of green water in international crop trade
Author: M. M. Aldaya, J. A. Allan, A. Y. Hoekstra
Year: 2010

Aldaya, Allan, and Hoekstra's study focuses on the strategic importance of green water (rainwater stored in the soil) in international crop trade. By emphasizing the role of green water in supporting crop production, this research highlights its significance for global food security and agricultural trade. The findings underscore the need for integrating green water management strategies into international crop trade policies to ensure sustainable water use and enhance resilience to climate change impacts.

2.4 Title: The green, blue and grey water footprint of crops and derived crop products
Author: M. M. Mekonnen, A. Y. Hoekstra
Year: 2010

Mekonnen and Hoekstra's research provides a comprehensive assessment of the water footprint of crops and derived crop products, categorizing water footprints into green, blue, and grey components. By analyzing the environmental impact of crop cultivation and processing, this study highlights the need for sustainable water management practices in agriculture. The findings underscore the importance of considering different water footprint components to develop effective water-saving strategies and promote sustainable agriculture globally.

2.5 Title: The water footprint of the EU for different diets

Author: D. Vanham, M. M. Mekonnen, A. Y. Hoekstra

Year: 2013

Vanham, Mekonnen, and Hoekstra's study investigates the water footprint of the European Union (EU) for different dietary patterns, shedding light on the environmental implications of food consumption habits within the EU region. By analyzing the water footprint associated with various diets, this research underscores the importance of promoting sustainable dietary choices to reduce water consumption and environmental impact. The findings emphasize the need for policy interventions to encourage sustainable food production and consumption practices, contributing to water resource management efforts in the EU.

2.6 Title: Sustainable Development Goal 6: Ensure availability and sustainable management of water and sanitation for all

Author: United Nations

Year: 2018

The paper "Sustainable Development Goal 6: Ensure availability and sustainable management of water and sanitation for all" by the United Nations (2018) highlights the urgent need to achieve universal access to safe drinking water and sanitation by 2030. It underscores disparities in access and service provision, advocating for collective action to address water-related challenges. The paper emphasizes integrated approaches involving diverse stakeholders to promote sustainable water and sanitation management, offering valuable insights for advancing the global water agenda.

CHAPTER 3
SYSTEM REQUIREMENTS

3.1 Software System Configuration

- **Operating System**: The AquaSave app is compatible with both Android and iOS operating systems, ensuring broad accessibility across different mobile devices.
- **Development Framework:** The app is developed using the Flutter framework, allowing for cross-platform development and efficient codebase management.
- **Programming Languages:** Dart programming language is used for app development, providing robust performance and scalability.
- **Database Management System:** Firebase Realtime Database is utilized for storing and retrieving user data, ensuring seamless synchronization and data consistency across devices.
- **API Integration:** The app integrates with various APIs for functionalities such as geolocation services and real-time weather data, enhancing its accuracy and reliability.
- **Security Measures**: Stringent security protocols are implemented to protect user data, including encryption techniques and secure authentication mechanisms.

3.2 Hardware System Configuration

- **Mobile Devices:** AquaSave is designed to run on smartphones and tablets with minimum hardware specifications, including adequate processing power and storage capacity.
- **Location Services:** The app utilizes GPS functionality available on mobile devices to accurately determine the user's location and provide relevant water scarcity alerts.
- **Internet Connectivity:** Stable internet connectivity is required for accessing real-time data and receiving updates from the AquaSave server.
- **Battery Consumption:** Efforts are made to optimize app performance to minimize battery consumption and ensure prolonged usage without draining the device's battery excessively.

CHAPTER 4
FEASIBILITY STUDY

The feasibility study serves as a crucial step in the development process of the AquaSave app, evaluating its viability and potential success. This chapter examines various aspects of feasibility, including economic, social, technical, operational, and legal considerations.

4.1 Economic Feasibility

- **Cost-Benefit Analysis:** A comprehensive cost-benefit analysis is conducted to assess the financial viability of the AquaSave project. This analysis compares the projected costs of development, implementation, and maintenance against the anticipated benefits, including potential cost savings associated with water conservation efforts.
- **Revenue Model:** Various revenue generation strategies, such as in-app advertisements, premium features, and subscription plans, are evaluated to determine the app's revenue potential and sustainability.
- **Return on Investment (ROI):** The expected ROI is calculated based on projected revenues and investment costs, providing insights into the app's profitability and long-term financial prospects.

4.2 Social Feasibility

- **User Acceptance:** Surveys, focus groups, and user feedback sessions are conducted to gauge user acceptance and satisfaction with the AquaSave app. This feedback helps identify user preferences, needs, and pain points, ensuring that the app meets the expectations of its target audience.
- **Social Impact:** The potential social impact of the AquaSave app on water conservation efforts, public awareness, and community engagement is

assessed. This includes evaluating the app's ability to promote sustainable behaviors, empower users to make informed decisions, and foster a sense of collective responsibility towards water conservation.

- **Stakeholder Engagement:** Collaboration with relevant stakeholders, including government agencies, environmental organizations, and local communities, is essential to garner support and maximize the app's societal impact.

4.3 Technical Feasibility

- **Technology Stack:** The technical feasibility of the AquaSave app is evaluated based on its compatibility with existing hardware and software platforms. This includes assessing the app's compatibility with different mobile devices, operating systems, and network environments.
- **Scalability:** The app's scalability and performance under varying user loads and data volumes are examined to ensure that it can accommodate growth and expansion over time.
- **Data Security:** Measures to protect user data, ensure privacy, and comply with data protection regulations are implemented to address technical feasibility concerns. This includes encryption, secure authentication, data backup, and disaster recovery mechanisms to safeguard sensitive information.

4.4 Operational Feasibility

- **Operational Workflow:** The operational workflow of the AquaSave app, including user registration, data collection, analysis, and reporting, is mapped out to identify potential bottlenecks, inefficiencies, and process improvements. This ensures that the app's operations are streamlined, efficient, and user-friendly.

- **Resource Allocation:** The allocation of human, financial, and technological resources required for app development, deployment, and maintenance is assessed to ensure adequate support and sustainability. This includes identifying key personnel, budgetary requirements, and infrastructure needs to support ongoing operations.

4.5 Legal Feasibility

- **Regulatory Compliance:** The AquaSave app's compliance with relevant laws, regulations, and industry standards governing data privacy, consumer protection, and environmental conservation is evaluated. This includes conducting legal research, consulting with legal experts, and implementing measures to ensure compliance with applicable regulations.
- **Intellectual Property Rights**: The protection of intellectual property rights associated with the AquaSave app, including patents, trademarks, and copyrights, is addressed to prevent unauthorized use, reproduction, or distribution of proprietary assets.

CHAPTER 5
SYSTEM DESIGN

System design is a critical phase in the development of the AquaSave app, where the conceptual architecture is translated into a detailed technical blueprint. This chapter outlines the various components, modules, and subsystems of the app, along with their specifications and functionalities.

5.1 Architectural Design

- **Client-Server Architecture:** The AquaSave app follows a client-server architecture, where the client-side application runs on users' mobile devices (clients), interacting with a central server to access data, perform computations, and receive updates.
- **Three-Tier Architecture:** The app adopts a three-tier architecture, comprising a presentation layer (client interface), application layer (business logic), and data layer (database management). This modular structure ensures separation of concerns and facilitates scalability, maintainability, and extensibility.
- **Microservices Architecture:** The backend infrastructure of the AquaSave app is designed using microservices, with each functional component encapsulated as a standalone service. This approach enables flexibility, fault isolation, and independent deployment of individual services..

5.2 User Interface Design

- **Responsive Design:** The user interface (UI) of the AquaSave app is designed to be responsive, adapting seamlessly to different screen sizes,

resolutions, and device orientations. This ensures optimal user experience across various mobile devices, including smartphones and tablets.

- **Intuitive Navigation:** The UI features intuitive navigation patterns, clear visual hierarchy, and consistent design elements to facilitate ease of use and navigation. Users can access key features, view relevant information, and perform actions with minimal effort and cognitive load.
- **Accessibility Considerations:** Accessibility features, such as text alternatives for images, keyboard navigation, and screen reader compatibility, are incorporated into the UI design to ensure inclusivity and accommodate users with disabilities or impairments.

5.3 Database Design

- **Relational Database Model:** The AquaSave app employs a relational database model to organize and store structured data, ensuring data integrity, consistency, and relational integrity. Entities, attributes, and relationships are defined using entity-relationship diagrams (ERDs), and normalized to eliminate redundancy and improve efficiency.
- **Database Schema:** The database schema includes tables for storing user profiles, location data, water consumption records, environmental factors, and other relevant information. Indexing, constraints, and foreign key relationships are implemented to optimize query performance and maintain data integrity.
- **Scalability and Replication:** Measures to enhance database scalability and reliability, such as partitioning, sharding, and replication, are implemented to handle increasing data volumes, user loads, and ensure high availability and fault tolerance.

5.4 Security Design

- **Authentication and Authorization:** The AquaSave app implements robust authentication mechanisms, such as password-based authentication, OAuth, or biometric authentication, to verify user identities and prevent unauthorized access. Role-based access control (RBAC) is employed to enforce granular permissions and access privileges.
- **Data Encryption:** Sensitive data, such as user credentials, location information, and water consumption records, are encrypted using cryptographic algorithms (e.g., AES) to protect confidentiality and prevent data breaches. Transport Layer Security (TLS) is used to secure data transmission over network connections.
- **Secure Coding Practices:** Best practices for secure coding, such as input validation, parameterized queries, and output encoding, are followed to mitigate common security vulnerabilities, such as SQL injection, cross-site scripting (XSS), and injection attacks.

CHAPTER 6
SYSTEM IMPLEMENTATION

System implementation is the phase where the AquaSave app is developed based on the specifications outlined in the design phase. This chapter provides detailed insights into the implementation process, including the development environment, programming languages, frameworks, and tools used to build the app.

6.1 Development Environment

- **IDE Selection**: The AquaSave app is developed using a suitable Integrated Development Environment (IDE), such as Android Studio for Android app development or Xcode for iOS app development. These IDEs provide comprehensive tools, editors, and emulators for building, testing, and debugging mobile applications.
- **Programming Languages:** The app is primarily developed using programming languages such as Java or Kotlin for Android development and Swift for iOS development. These languages offer robust support for mobile app development, along with extensive libraries, frameworks, and APIs.
- **Version Control:** Git is used for version control to track changes, collaborate with team members, and manage code repositories. Platforms like GitHub or Bitbucket are utilized for hosting repositories, managing branches, and facilitating code reviews.

6.2 User Interface Implementation

6.2.1 Main Page:

The main page serves as the landing page of the AquaSave app, displaying essential features, such as water consumption tracking, water footprint calculation, and water scarcity alerts. It features intuitive navigation elements, visual indicators, and interactive components to engage users effectively.

6.2.2 Create Account Page:

The create account page allows new users to register and create their AquaSave accounts by providing necessary details, such as username, email address, password, and location information. Input validation mechanisms are implemented to ensure data accuracy and completeness.

6.2.3 Login Page:

The login page enables existing users to authenticate and access their AquaSave accounts by entering their credentials (username/email and password). Authentication mechanisms, such as token-based authentication or OAuth, are implemented to secure user sessions and prevent unauthorized access.

6.2.4 User Details Page:

The user details page allows users to view and manage their profile information, including personal details, preferences, and settings. Users can

update their profiles, modify account settings, and customize app preferences as per their requirements.

6.2.5 Getting Location Page:

The getting location page utilizes device GPS or network-based location services to retrieve the user's current geographical location. This information is essential for calculating water scarcity levels and providing localized alerts and recommendations.

6.2.6 Calculating Water Scarcity Page:

The calculating water scarcity page performs real-time calculations to determine water scarcity levels based on user location, water consumption patterns, and environmental factors. It utilizes algorithms, models, or data analytics techniques to assess water availability and usage sustainability.

6.2.7 Results Page:

The results page presents the calculated water scarcity levels, water footprint analysis, and relevant insights to users in an informative and visually appealing manner. It may include graphical charts, statistics, and actionable recommendations to encourage water conservation efforts.

6.2.8 Feedback Page:

The feedback page allows users to provide feedback, suggestions, or report issues related to the AquaSave app's functionality, performance, or user

experience. Feedback forms, rating systems, or comment sections are implemented to gather user input and improve app quality.

6.2.9 Slide Menu Bar Page:

The slide menu bar page features a slide-out navigation menu or drawer that provides access to additional app functionalities, settings, and secondary screens. It enhances user accessibility, multitasking, and navigation efficiency by organizing app features into intuitive categories.

6.2.10 Discussion Page:

The discussion page facilitates user interactions, community engagement, and knowledge sharing by hosting discussion forums, Q&A sections, or social media integration. Users can ask questions, share insights, and participate in water conservation discussions with peers, experts, and stakeholders.

CHAPTER 7
CONCLUSION AND FUTURE ENHANCEMENTS

7.1 Conclusion

The AquaSave project aimed to address the critical issue of water scarcity and promote sustainable water usage through digital innovation. By leveraging mobile technology and data analytics, the AquaSave app offers users the ability to track their water consumption, assess water scarcity levels, and receive timely alerts and recommendations for water conservation. The successful implementation and deployment of the AquaSave app demonstrate its potential to make a significant impact on water conservation efforts worldwide.

Throughout the development process, extensive research, analysis, and collaboration were undertaken to ensure the effectiveness, reliability, and usability of the app. User feedback and testing played a crucial role in refining the app's features, improving user experience, and addressing any technical or usability issues. The AquaSave team is proud to contribute to environmental sustainability and empower individuals to make informed decisions about water usage.

7.2 Future Enhancements

While the AquaSave app has achieved significant milestones in its current state, there are several opportunities for future enhancements and advancements to further improve its functionality, reach, and impact.

Some potential areas for future development include:

- **Enhanced Data Analytics:** Integrate advanced data analytics techniques, machine learning algorithms, and predictive models to provide more accurate water scarcity predictions, personalized recommendations, and actionable insights tailored to individual user preferences and behavior.
- **IoT Integration:** Explore integration with Internet of Things (IoT) devices, smart meters, and sensors to enable real-time monitoring of water usage, detect leaks or anomalies, and automate water conservation measures, such as adjusting irrigation systems or controlling water flow in households.
- **Community Engagement Features:** Enhance community engagement features, social sharing capabilities, and gamification elements to encourage user participation, foster a sense of community, and incentivize collective water-saving initiatives through challenges, rewards, and competitions.
- **Expansion of Geographic Coverage:** Expand the geographic coverage of the AquaSave app to reach more regions, countries, and communities facing water scarcity challenges. Collaborate with local governments, organizations, and stakeholders to customize app functionalities and content based on specific regional needs and conditions.
- **Integration with Water Management Systems:** Establish partnerships with water utilities, government agencies, and environmental organizations to integrate the AquaSave app with existing water management systems, databases, and policy frameworks. Enable seamless data exchange, interoperability, and collaboration to support broader water conservation initiatives and policy reforms.

- **Educational Resources and Outreach:** Develop educational resources, tutorials, and outreach programs to raise awareness about water conservation, sustainable practices, and environmental stewardship. Provide users with access to educational content, interactive learning modules, and expert insights to empower them to take proactive steps towards water conservation and environmental sustainability.

By continuously innovating, iterating, and adapting to evolving user needs and technological advancements, the AquaSave project aims to remain at the forefront of water conservation efforts and contribute towards building a more sustainable and resilient future for generations to come.

CHAPTER 8

APPENDICES

8.1 Appendix 1: Sample Screenshots of AquaSave App

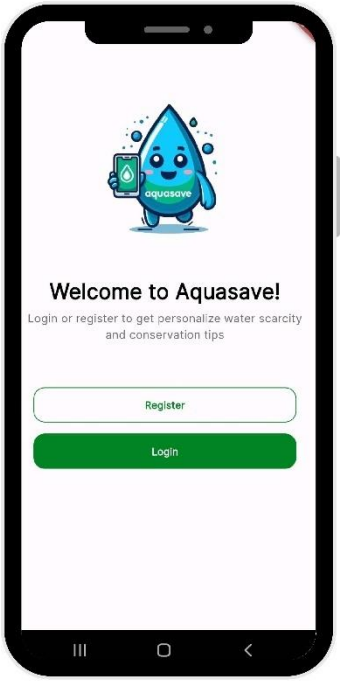

Figure No: 8.1 – Main Page

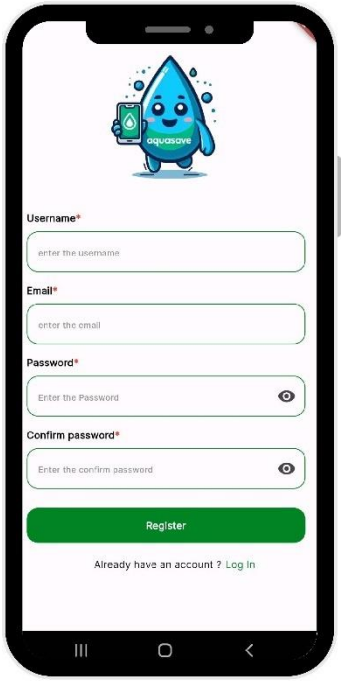

Figure No: 8.2 – Create Account Page

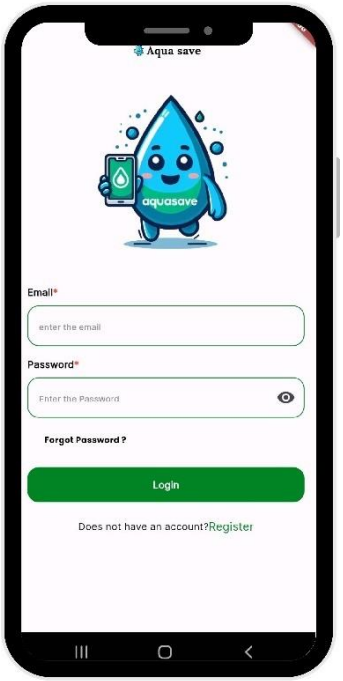

Figure No: 8.3 –

Login Page

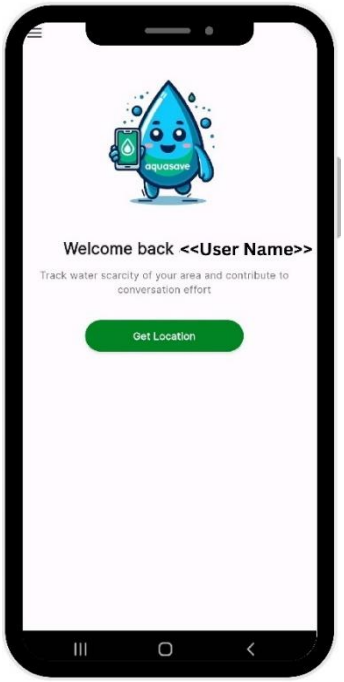

Figure No: 8.4 –

User Details Page

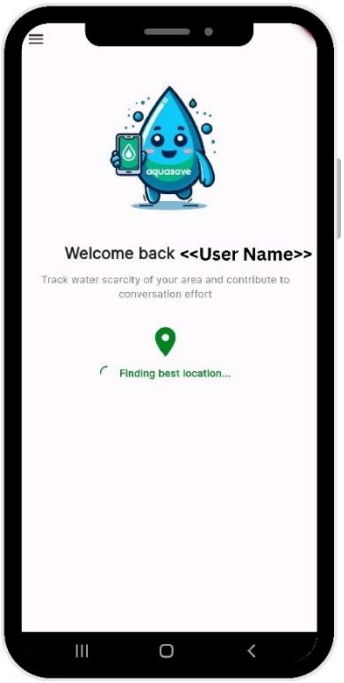

Figure No: 8.5 –

Getting Location Page

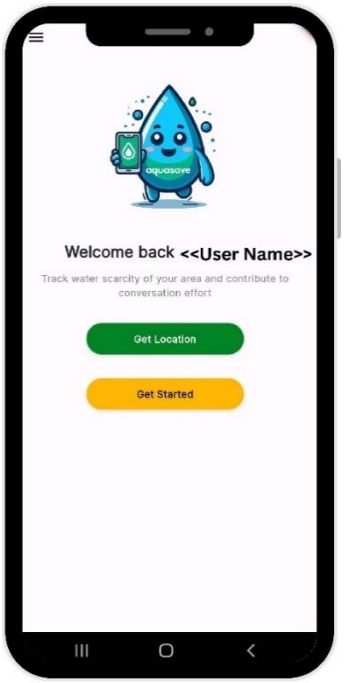

Figure No: 8.6 –

Calculating Water Scarcity Page

Figure No: 8.7 – Results Page

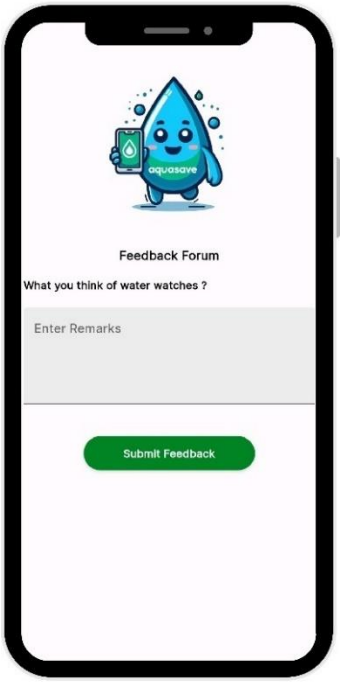

Figure No: 8.8 – Feedback Page

Figure No: 8.9 – Slide Menu bar Page

Figure No: 8.10 – Discussion Page

Figure No: 11.11 – Home Page

Figure No: 11.12 – Select Item Page

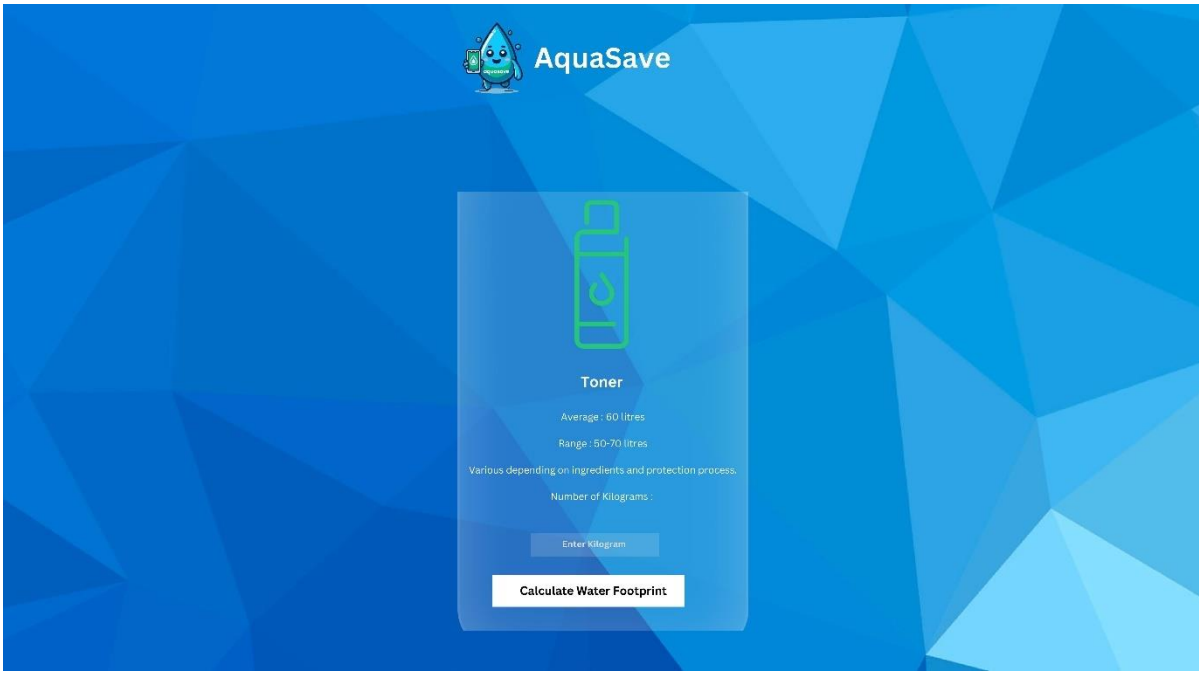

Figure No: 11.13 – Calculate Water Footprint Page

8.2 Appendix 2: Code Implementation

8.2.1 Web Development – search.ejs

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Water Footprint</title>

    <!-- Your CSS links -->
    <link href="https://cdn.jsdelivr.net/npm/bulma@0.9.3/css/bulma.min.css"
rel="stylesheet">
    <link rel="stylesheet"
href="https://cdnjs.cloudflare.com/ajax/libs/animate.css/4.1.1/animate.min.css">
```

```
    <style>
        /* Glassmorphic styles */
.glass-container {
    display: flex;
    justify-content: center;
    align-items: center;
    height: 100vh;
}

.glassmorphic-grid {
    display: grid;
    grid-template-columns: 1fr;
    gap: 20px;
}

.glassmorphic-item {
    text-align: center;
}

.glassmorphic-box {
    padding: 30px;
    border-radius: 20px;
    background: rgba(255, 255, 255, 0.1);
    backdrop-filter: blur(10px);
    box-shadow: 0 4px 8px rgba(0, 0, 0, 0.1);
    transition: all 0.3s ease;
<script src="/js/three.r134.min.js"></script>
<script src="/js/vanta.birds.min.js"></script>
```

```
<script>
    VANTA.WAVES({
        el: "#vanta-bg",
        mouseControls: true,
        touchControls: true,
        gyroControls: false,
        minHeight: 200.00,
        minWidth: 200.00,
        scale: 1.00,
        scaleMobile: 1.00
    });
</script>
</body>
</html>
```

8.2.2 Web Development – index.ejs

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Water Footprint</title>

    <link href="https://cdn.jsdelivr.net/npm/bulma@0.9.3/css/bulma.min.css"
rel="stylesheet">
    <link rel="stylesheet"
href="https://cdnjs.cloudflare.com/ajax/libs/animate.css/4.1.1/animate.min.css">
```

```
    <style>
        /* Resetting default styles */
body,
ul,
li {
    margin: 0;
    padding: 0;
    list-style: none;
    overflow-x: hidden; /* Add this line to prevent horizontal scrolling */
}

/* Custom navbar styles */
.custom-navbar {
    position: fixed;
    top: 0;
    left: 0;
    right: 0;
    background-color: #00ffd500;
    color: #fff;
    height: 3.5rem;
    display: flex;
    align-items: center;
    z-index: 1000;
}
.custom-navbar .custom-container {
    display: flex;
    justify-content: space-between;
    align-items: center;
/* Vanta.js background */
```

```
.vanta-bg {
    min-height: 100vh; /* Ensure at least 100vh height for proper scrolling */
    display: flex;
    justify-content: center;
    align-items: center;
    text-align: center;
    background-size: cover; /* Add this line to ensure background covers the entire viewport */
    background-attachment: fixed; /* Add this line to fix the background while scrolling */
}

/* Glassmorphic 3x3 Grid Layout */
<script>
    VANTA.WAVES({
        el: "#vanta-bg",
         mouseControls: true,
        touchControls: true,
        gyroControls: false,
        minHeight: 200.00,
        minWidth: 200.00,
        scale: 1.00,
        scaleMobile: 1.00
    });
</script>
</body>
</html>
```

8.2.3 Web Development – items.ejs

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Water Footprint</title>
    <link href="https://cdn.jsdelivr.net/npm/bulma@0.9.3/css/bulma.min.css"
rel="stylesheet">
    <link rel="stylesheet"
href="https://cdnjs.cloudflare.com/ajax/libs/animate.css/4.1.1/animate.min.css">

    <style>
        /* Resetting default styles */
        body,
        ul,
        li {
            margin: 0;
            padding: 0;
            list-style: none;
            overflow-x: hidden; /* Add this line to prevent horizontal scrolling */
        }

        /* Custom navbar styles */
        .custom-navbar {
            position: fixed;
            top: 0;
            left: 0;
            right: 0;
```

```
    background-color: #00ffd500;
    color: #fff;
    height: 3.5rem;
    display: flex;
    align-items: left;
    z-index: 1000;
}

.custom-navbar .custom-container {
    display: flex;
    justify-content: space-between;
    align-items: center;
    max-width: 1200px;
    margin: 0 auto;
    padding: 0 20px;
}

.custom-brand {
    font-size: 1.5rem;
    font-weight: bold;
    text-decoration: none;
    color: inherit;
}

.custom-menu li {
    display: inline-block;
    margin-right: 20px;
}
      width: 100%;
```

```
    transition: all 0.3s ease;
}

.glassmorphic-card {
    background-color: rgba(255, 255, 255, 0.1);
    border-radius: 20px;
    backdrop-filter: blur(10px);
    border: solid 1px #ffffff;
    padding: 20px;
    box-shadow: 0px 8px 15px rgba(0, 0, 0, 0.1);
    transition: box-shadow 0.3s ease-in-out;
    text-decoration: none;
    color: #ffffff;
    width: 100%;
}

.glassmorphic-card:hover {
    transform: translateY(2px);
}

.glassmorphic-card h3 {
    font-size: 18px;
    font-weight: bold;
    text-align: center;
    margin-bottom: 10px;
}

.glassmorphic-card p {
    font-size: 14px;
```

```
            color: #ffffff;
            text-align: center;
        }
    </style>

                <% }) %>
        </div>
    </div>
</section>
</div>
<script
src="https://cdnjs.cloudflare.com/ajax/libs/animate.css/4.1.1/animate.min.js"></
script>
<script src="/js/three.r134.min.js"></script>
<script src="/js/vanta.birds.min.js"></script>
<script>
    VANTA.WAVES({
        el: "#vanta-bg",
         mouseControls: true,
        touchControls: true,
        gyroControls: false,
        minHeight: 200.00,
        minWidth: 200.00,
        scale: 1.00,
        scaleMobile: 1.00
    });
</script>
</body>
</html>
```

8.2.4 Mobile Development – main.dart

```
import 'package:firebase_core/firebase_core.dart';
import 'package:flutter/material.dart';
import 'package:google_fonts/google_fonts.dart';
import 'Screens/splashscreen/splashscreen.dart';
import 'firebase_options.dart';
Future<void> main()async{
WidgetsFlutterBinding.ensureInitialized();
await Firebase.initializeApp(
options: DefaultFirebaseOptions.currentPlatform,
);
runApp(const MyApp());
}
class MyApp extends StatelessWidget {
const MyApp({super.key});
// This widget is the root of your application.
@override
Widget build(BuildContext context) {
return MaterialApp(
title: 'Aqua save',
theme: ThemeData(
textTheme: GoogleFonts.interTextTheme(
Theme.of(context).textTheme,
),
colorScheme: ColorScheme.fromSeed(seedColor: Colors.deepPurple),
useMaterial3: true,
),
home: const SplashScreen(),
```

```
);
}
}
```

8.2.5 Mobile Development – LoginPage.dart

```
import 'package:firebase_auth/firebase_auth.dart';
import 'package:flutter/material.dart';
import 'package:fluttertoast/fluttertoast.dart';
import 'package:google_fonts/google_fonts.dart';
import '../../color_const.dart';
import '../Register/RegisterPage.dart';
import '../home/homePage.dart';

class Loginscreen extends StatefulWidget {
const Loginscreen({super.key});

@override
State<Loginscreen> createState() => _LoginscreenState();
}

class _LoginscreenState extends State<Loginscreen> {
final emailIdController=TextEditingController();
final passwordController=TextEditingController();
final formKey = GlobalKey<FormState>();
bool visiblity = true;
@override
Widget build(BuildContext context) {
```

```
) ,
enabledBorder: OutlineInputBorder(
borderSide:
BorderSide(width: 1, color: ColorSheet.mainColorGreen),
borderRadius: BorderRadius.circular(15.0),

),
border:OutlineInputBorder(
borderSide:
BorderSide(width: 1, color: ColorSheet.mainColorGreen),
borderRadius: BorderRadius.circular(15.0),

),
errorBorder: OutlineInputBorder(
borderSide:
BorderSide(width: 1, color: Colors.red),
borderRadius: BorderRadius.circular(15.0),
),
hintText:"Enter the Password",hintStyle: TextStyle(color:
ColorSheet.hintStyle,fontSize: 12),
contentPadding: const EdgeInsets.only(left: 15,top: 15,bottom: 15),
suffixIcon: IconButton(onPressed: (){
setState(() {
visiblity==false?(visiblity=true):(visiblity=false);
});
}, icon: Icon(visiblity?Icons.visibility:Icons.visibility_off_rounded),),
),
validator: (value) {
Container(
```

```
Fluttertoast.showToast(msg: "Network Issue Unable to
Login",backgroundColor: Colors.red);
}
}
},
child: Container(
height: 45,
decoration: BoxDecoration(
color: ColorSheet.mainColorGreen,
borderRadius: BorderRadius.circular(15)
),
child: Center(child:
Text("Login",style: TextStyle(color: ColorSheet.white,fontSize: 14,fontWeight:
FontWeight.w600),),
),
)
),
const SizedBox(height: 20,),
Row(mainAxisAlignment: MainAxisAlignment.center,
children: [
Text("Does not have an account?",style: TextStyle(color:
ColorSheet.black,fontSize: 14,fontWeight: FontWeight.w400),),],
),
),
),
),
);
}
}
```

8.2.6 Mobile Development – homePage.dart

```
import 'dart:convert';
import 'package:aquvasave/Screens/cubits/location_cubit.dart';
import 'package:aquvasave/color_const.dart';
import 'package:firebase_auth/firebase_auth.dart';
import 'package:flutter/foundation.dart';
import 'package:flutter/material.dart';
import 'package:flutter/services.dart';
import 'package:flutter_bloc/flutter_bloc.dart';
import 'package:geolocator/geolocator.dart';
import 'package:geocoding/geocoding.dart';
import 'package:google_fonts/google_fonts.dart';
import '../../dataset_class.dart';
import '../Dashboard/Forums/Communityforum.dart';
import '../Dashboard/Forums/Feedbackforum.dart';
import '../Dashboard/dashboard.dart';
import '../Login/LoginPage.dart';
import 'Page3.dart';
import 'package:fluttertoast/fluttertoast.dart';
class Homescreen extends StatefulWidget {
const Homescreen({super.key, this.currentUser});
final User? currentUser;
@override
State<Homescreen> createState() => _HomescreenState();
}
class _HomescreenState extends State<Homescreen> {
List<DataSet> dataSetList = [];
bool isClose = false;
```

```
offset: Offset(0,2),
color: Colors.black12
)]
),
child: const Align(
alignment: Alignment.center,
child: Text(
'Community Forum',
alignment: Alignment.center,
child: Text(
'Provide Feedback',
textAlign: TextAlign.center,
style: TextStyle(
color: Colors.black,
fontWeight: FontWeight.bold,
),
),
),
),
),
const SizedBox(
height: 30,
),
InkWell(
onTap: ()async{
await FirebaseAuth.instance.signOut();
Future.delayed(Duration.zero,(){
Navigator.pushReplacement(context, MaterialPageRoute(builder:
(context)=>Loginscreen()));
```

```
)
],),
],
):
InkWell(
onTap: () {
setState(() {
context.read<LocationCubit>().getCurrentPosition();
});
},
child: Container(
width: 200,
height: 40,
decoration: BoxDecoration(
borderRadius: BorderRadius.circular(25),
color: ColorSheet.mainColorGreen,
Thirdscreen(
particularDataSetList: particularDataSetList,currentAddress:currentAddress)),
).then((value) {
context.read<LocationCubit>().reset();
}) ;
},
child: Container(
width: 200,
height: 40,
decoration: BoxDecoration(
borderRadius: BorderRadius.circular(25),
color: const Color.fromRGBO(255, 183, 3, 1),
boxShadow: const [
```

```
BoxShadow(
blurRadius: 2,
offset: Offset(0, 2),
color: Colors.black12
)
]
),
child: const Align(
alignment: Alignment.center,
child: Text(
'Get Started',
textAlign: TextAlign.center,
style: TextStyle(
color: Colors.black,
fontWeight: FontWeight.bold,
),
),
),
)
);
}
return Container();
},
],
);
}
}
```

CHAPTER 9

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AQUASAVE APP: EMPOWERING SUSTAINABLE WATER USAGE THROUGH DIGITAL INNOVATION

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ABSTRACT

The AquaSave application stands as a digital solution designed to address the critical issue of water conservation and sustainable usage. Water, a fundamental resource for life, is facing increasing stress due to factors such as population growth, climate change, and inefficient consumption patterns. In response to this, our team has developed AquaSave, a mobile application that empowers individuals and communities to make informed decisions about their water usage. The application leverages cutting-edge technologies such as Flutter, Firebase, Dart, and Bloc to provide a seamless and interactive user experience. AquaSave acts as a comprehensive platform, offering information on water consumption, water-saving practices, and personalised recommendations for minimising water footprints. This project is not merely about developing a mobile application; it represents a commitment to fostering sustainable habits and creating awareness about responsible water usage. By harnessing the power of digital innovation, Aqua Save aims to contribute to a more sustainable and water-secure future.

KEYWORDS: AquaSave, cutting-edge, fostering, harnessing

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