A Project Report on

EnviroWatch: A Comprehensive Environmental Monitoring Web Frame and Cleanup Coordination System

Submitted in partial fulfillment of the requirements for the award of the degree of

Bachelor of Engineering

in

Information Technology

by

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Under the Guidance of

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UNIVERSITY OF MUMBAI

Academic Year 2023-2024

Approval Sheet

This Project Report entitled ***"EnviroWatch: A Comprehensive Environmental Monitoring Web Frame and Cleanup Coordination System"*** Submitted by ***"Madhu Gage"(20104037),"Rohan Ahire"(20104133),"Chirag Kadam"(20104105),"Darpan Mhatre"(20104019)***is approved for the partial fulfillment of the requirenment for the award of the degree of ***Bachelor of Engineering*** in ***Information Technology*** from ***University of Mumbai***.

Ms. Neha Deshmukh
Guide

Dr. Kiran Deshpande
HOD, Information Technology

Place: A.P. Shah Institute of Technology, Thane
Date:

CERTIFICATE

This is to certify that the project entitled ***"EnviroWatch: A Comprehensive Environmental Monitoring Web Frame and Cleanup Coordination System"*** submitted by ***"Madhu Gage"(20104037),"Rohan Ahire(20104133), "Chirag Kadam"(20104105),"Darpan Mhatre"(20104019)*** for the partial fulfillment of the requirement for award of a degree ***Bachelor of Engineering*** in ***Information Technology***,to the University of Mumbai,is a bonafide work carried out during academic year 2023-2024.

Ms. Neha Deshmukh
Guide

Dr. Kiran Deshpande
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External Examiner(s)

1.

2.

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Place: A.P.Shah Institute of Technology, Thane
Date:

Acknowledgement

We have great pleasure in presenting the report on **EnviroWatch: A Comprehensive Environmental Monitoring Web Frame and Cleanup Coordination System.** We take this opportunity to express our sincere thanks towards our guide **Ms. Neha Deshmukh** for providing the technical guidelines and suggestions regarding line of work. We would like to express our gratitude towards his constant encouragement, support and guidance through the development of project.

We thank **Dr. Kiran B. Deshpande** Head of Department for his encouragement during the progress meeting and for providing guidelines to write this report.

We express our gratitude towards BE project co-ordinators, for being encouraging throughout the course and for their guidance.

We also thank the entire staff of APSIT for their invaluable help rendered during the course of this work. We wish to express our deep gratitude towards all our colleagues of APSIT for their encouragement.

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Declaration

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, We have adequately cited and referenced the original sources. We also declare that We have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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Abstract

Every year almost 300 million tons of plastic is generated all over the world and around 14 million tons of garbage is untreated all over the world. As the growth in garbage is never depicting, it leads to health issues, pollution, biodiversity loss, etc. A solution was needed to for collecting, managing, and segregating this garbage. "EnviroWatch" is an innovative web Frame designed to address the global challenge of increasing unprocessed waste. A multi-faceted solution to monitor environmental well-being and make it easier to organize cleanup events in collaboration with NGOs and governmental organizations. The User can join event or contact organization by accessing the events page. The mobile application allows users to capture and upload images of garbage, which are then displayed on a dashboard accessible to administrators. The dashboard facilitates actions such as visualization, interaction with a chatbot, and organizing or joining events related to waste management. Data analytics and real time monitoring system makes it easy for the organizations to reach out to people for help and organize cleanup events. The mobile application which can be used by anyone for uploading photos of waste is a convenient way for residents to reach out government and NGOs. The end user can click pictures of the spilled garbage using mobile application. The images clicked are scanned and analyzed by using CNN and ViT. The project uses a Convolutional Neural Network (CNN) architecture called the Vision Transformer (ViT) model for image recognition. It divides images into patches in order to identify and classify garbage. Government bodies and NGOs can access the platform to gather crucial data and coordinate cleanup initiatives, fostering a collaborative effort towards environmental well-being.

Contents

List of Figures

List of Abbreviations

IT:	Information Technology
ML:	Machine Learning
CNN:	Convolutional Neural Network
ViT:	Vision Transformer
NGO:	Non- Governmental Organization
FAQ:	Frequently Asked Questions

Chapter 1

Introduction

Growth in new technologies have made several developments in our world. A development with so many pros also come with several cons as well. The rapid growth in development has made human life easy but has affected nature. And one of the major issues is garbage. Garbage affects our lives in so many ways when garbage is burnt it causes air pollution, when the garbage is left openly in the environment it leads to bad odour, biodiversity loss, health issues, and also leads to several diseases in stray animals who search for food in that garbage [11]. This waste when directly thrown into lakes, rivers, sea, and other water bodies contaminates the water. The garbage thrown directly into water bodies also originates the crisis of water clogging.

As we walk by the road, we see loads of garbage beside the road. As the days pass the heap keeps growing, polluting the environment. Good waste management should be given priority where the waste is segregated separately into dry waste and wet waste, and further should be classified into e-waste, recyclable waste, biodegradable waste, etc [2]. To create a healthy society waste management is must. According to a survey conducted, 1.5 lakh metric ton of waste is produced everyday out of which almost 65 percentage is left untreated and exposed directly to nature. With the increasing population the waste generation has increased too [1]. This waste management has three factors which are collection, segregation and management. To combat these issues, it is essential to promote awareness about the importance of proper waste management practices. Educational campaigns and community initiatives can play a significant role in encouraging individuals to adopt responsible waste disposal habits [7]. Additionally, governments and local authorities must implement stringent regulations and policies to ensure compliance with waste management guidelines [8]. This includes incentivizing recycling efforts, promoting the use of eco-friendly products, and penalizing illegal dumping practices.

We have proposed a solution to address first factor i.e., Collection. To facilitate that "EnviroWatch" an innovative web framework created to monitor environmental well-being and cleanup coordination. A platform that helps residents to connect to government officials and other organizations to complaint about issues regarding garbage, with a dynamic dashboard that help the organizations in real time monitoring. So, we have come up with a solution which bridges the gap between government and residents to build a better future together for nature. A real-time monitoring system with dynamic dashboard will help the governmental bodies to look after the complaints regarding garbage spilling. In addition to this data analytics helps in analyzing the data about the garbage cleaned.

1.1 Motivation

The increasing amount of waste in the environment causes a number of concerns, including bad odours, a drop in biodiversity, health problems, and various diseases in stray animals who eat the trash. "EnviroWatch" is a cutting-edge web framework designed to track environmental health and facilitate cleanup efforts. A platform with a dynamic dashboard that assists organizations in real-time monitoring and connects citizens with government representatives and other groups to file complaints about garbage-related concerns [1]. EnviroWatch is to bridge the gap between the governmental bodies, NGOs and common people. To build a platform for betterment of the environment and to solve the global crisis of garbage [6]. EnviroWatch has been developed as a comprehensive web platform. To enhance environmental monitoring and streamlining cleanup coordination efforts. Additionally, to facilitate seamless interaction between end users, government bodies, and non-governmental organizations (NGOs), EnviroWatch offers a user-friendly mobile application. This integrated approach empowers individuals and organizations to collaboratively combat the escalating garbage crisis, thus fostering a cleaner and healthier environment for all.

1.2 Problem Statement

Escalating garbage issue presents an ever-growing crisis, wreaking havoc on public health, causing pollution, water blockages, and posing a pervasive threat to our environment. This mounting problem disrupts our daily lives and ecosystems, calling for immediate action [6]. To address this challenge, there's a pressing need for a platform that bridges the gap between ordinary citizens and cleanup organizations, government agencies, and various entities.

1.3 Solution Proposed

EnviroWatch is a robust and all-encompassing web platform designed to revolutionize environmental monitoring and streamline coordination for cleanup initiatives. It goes beyond traditional solutions by offering a user-friendly mobile application that promotes seamless interaction among end-users, government authorities, and non-governmental organizations (NGOs). This integrated approach empowers individuals and organizations to work together effectively in addressing the growing garbage crisis. With EnviroWatch, we aim to create a cleaner and healthier environment for all, fostering a sense of shared responsibility and collaborative action.

1.4 Objectives

- To model and design a comprehensive web framework that collects and presents data related to environmental well-being.

- To develop a dynamic dashboard for data visualization using tools such as charts, graphs, maps, and other techniques to offer a user-friendly and informative experience.

- To build a user-friendly mobile application for multiple stakeholders that allows individuals to report issues regarding garbage in their residential and nearby localities.

- To integrate a chatbot for assistance within the application to enhance user experience and provide support.

1.5 Scope

- Can provide a mobile application that allows users to take and upload pictures of waste dumped nearby.

- Can offer development of a dynamic dashboard that keeps track of photos uploaded by end users.

- Can facilitate the development of a dynamic web framework for data visualization.

- Can include implementing a user-friendly chatbot for answering simple queries from users.

Chapter 2

Literature Review

1. In paper[1], Geethamani R, Rakshana P, Raveena P, Ragavi R, titled "Garbage Management System" published in year 2021, proposed a waste management system where it states the information about the waste is generated in large amount from decades and piled up in different parts of the country. The Management system has proposed a technology-based solution with 5 kinds of users (admin, user, people, buyer, distributor). They have stated role of each user in the waste management system. The administrator has overall control of activities. The admin assigns the work for distributors. The Drivers 2 are the garbage collectors, they can post and view the status of their work through the driver dashboard. They have also introduced people dashboard for people to raise complaints and submit feedback. The buyers are people who need the garbage waste. They collect the garbage according to its segregation like e-waste, recyclable waste, biodegradable waste, etc. System proposed a cost-effective, web-based garbage waste management system. Here, they have created a Webpage and web application that aims to connect people to their workforce.

2. In paper[2], R.S.Sandhya Devi, Vijaykumar VR, M.Muthumeena, titled "Waste Segregation using Deep Learning Algorithm" published in year 2018 have proposed a system for waste segregation using deep learning.. They have proposed this system by considering the problem for manual segregation of garbage which is less efficient, time consuming, and not feasible. They have used CNN for classification of objects into biodegradable and nonbiodegradable. They have also implemented python libraries like Theano, Tensorflow, Numpy, Matplotlib, Pillow, OpenCV, etc. for training their model. By using Big Data and CNN they have created a real time fully automated waste segregation model without involving manual work. We have suggested a method that uses images to identify trash and separate it based on our analysis of their reference.

3. In paper[3], Rahul Chauhan, Kamal Kumar Ghanshala, R.C. Joshi, titled "Convolutional Neural Network (CNN) for Image Detection and Recognition" The use of deep learning algorithms more specially, Convolutional Neural Networks (CNNs) is covered in this paper. These methods are based on deep neural networks that have many hidden layers. Because of this, they can process massive datasets with millions of parameters, which are usually displayed as two-dimensional graphics. CNNs convolve input images

and generate desired outputs by using filters. For image detection and recognition applications, the study largely focuses on CNN model construction and performance evaluation. The CNN method is used to the MNIST and CIFAR-10 datasets in this work. The CNN model attains a 99.6 percent accuracy rate on the handwritten digits dataset known as MNIST. Real-time augmenting of data for CIFAR-10 is used to assess the CNN model's performance. This data likely includes images of objects in various classes.

4. In paper[4], Bo-Kai Ruan, Hong-Han Shuai, Wen-Huang Cheng, titled "Vision Transformers: State of the Art and Research Challenge" The study report demonstrates the effective use of vision transformers—which were first created for natural language processing—in a range of computer vision applications. Researchers have expanded the application of transformers to image identification, object detection, picture segmentation, posture estimation, and 3D reconstruction by utilizing the strong self-attention mechanism that these devices possess. The main goal of the study is to provide a comprehensive review of the literature that has already been written about various architecture designs and training approaches, such as self-supervised learning, that are unique to vision transformers. The ultimate goal is to provide a comprehensive assessment that not only describes the state of the field as it stands today but also points up areas for future study where computer vision and transformers converge.

5. In paper[5], Galiveedu Shoaib, Somesh Nandi, titled "Power Bi Dashboard for Data Analysis", With an emphasis on SAP Cockpit, an online platform for tracking global accounts and sub-accounts, the research study explores the use of SAP, a well-known business 3 process management software. The report highlights the necessity of monitoring relevant data and monthly consumption and tackles issues with unauthorized service configurations under certain sub-accounts. In order to conduct the research, a contract sheet must be obtained from the internal team and used with the secure data export and import platforms, SAP Cockpit and SharePoint Online. Access is limited to examine the exported data in order to protect confidentiality. Making a SAP dashboard using Power BI is the main fix suggested in the paper. This dashboard is designed to find and track individuals who have illegally set up services within the sub-accounts. In general, the research focuses on how to utilize technology—specifically, SAP and Power BI—to improve data monitoring, identify unapproved activity, and enforce budgetary control in an organizational setting.

Chapter 3

Project Design

3.1 Existing System

The River Cleanup Website is a digital platform dedicated to coordinating and promoting efforts to clean up rivers worldwide. It provides information on ongoing cleanup projects, volunteer opportunities, and resources for organizing local initiatives. Through the website, individuals, organizations, and communities can connect, collaborate, and contribute to the restoration and preservation of river ecosystems. With its user-friendly interface and comprehensive database, the River Cleanup Website serves as a hub for environmental enthusiasts and activists committed to protecting our waterways for future generations. With its user-friendly interface and robust features, the River Cleanup Website empowers users to take meaningful action to protect and preserve our rivers. From educational materials and fundraising resources to real-time progress tracking and reporting tools, the platform offers a comprehensive suite of resources to support the cleanup process. However, the website currently lacks integration with AI and technology related to garbage waste management systems, such as tracking the amount of waste collected and establishing connections with relevant stakeholders. This limitation has led to underutilization, as users seek more comprehensive information and features from the application.

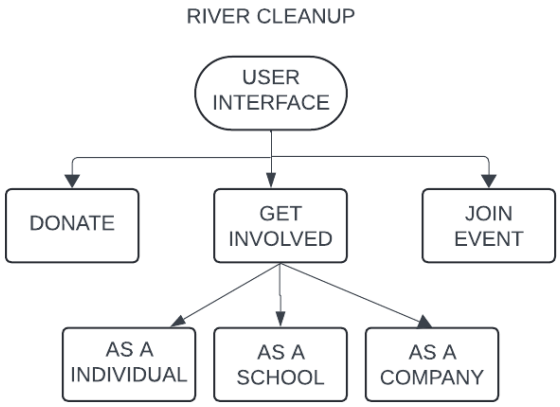


Figure 3.1: Existing System

3.2 Proposed System

The proposed system, EnviroWatch, offers an innovative approach to address the critical global problem of growing amount of unprocessed garbage. EnviroWatch provides a structured approach to monitoring environmental health by collaborating with governmental and non-governmental entities, using cutting-edge technology including realtime monitoring and data analytics. The flow of the project begins with the recognition of the garbage problem, highlighting the urgent need for sustainable waste management solutions. EnviroWatch is positioned as a proactive response to this challenge, offering a comprehensive platform for individuals and organizations to collaborate and address the issue collectively. Users, can use a mobile application to capture images of garbage, which are then uploaded to a dashboard. The dashboard allows users to view visualizations of waste accumulation and participate in cleanup events organized by NGOs and organizations. The system uses a convolutional neural network (CNN) architecture known as the Vision Transformer (ViT) model to evaluate photos that residents contribute using a user-friendly mobile application. With the ability to recognize images, garbage can be categorized effectively, leading to more efficient communication between local communities and the authorities.Users can also utilize the chatbot for their basic queries regarding the application and events. They can explore the organizations and participate by donating and becoming a part of them. By giving access to vital information for well-informed decision-making and well-coordinated cleanup activities, EnviroWatch aims to help NGOs and government agencies and promote a group effort towards environmental well-being.

3.2.1 Critical Components of System Architecture

The suggested system is a platform that runs on the cloud and is intended to effectively handle environmental cleaning drives. Real-time object detection in photos is achieved by combining Vision Transformer with Convolutional Neural Network (CNN) models. Through a smartphone app, users may post waste photographs, and the easily navigable web interface lets them view statistical data, take part in activities, and communicate with a chatbot. Administrators can examine user-uploaded photographs and take immediate action from a dashboard to which they have privileged access. Additionally, they can schedule cleanup tasks according on web interface insights, customizing them to meet certain environmental requirements for optimal efficiency. Using this strategy guarantees that cleanup efforts are environmentally conscious and optimized. By giving users, a direct way to report environmental issues and assisting with real-time data collecting, the system increases user involvement. It permits prompt responses to environmental problems, enabling administrators to take immediate action on particular situations. All things considered, the system is a useful instrument for organizing and maximizing cleanup operations, guaranteeing a proactive and successful strategy for environmental preservation.

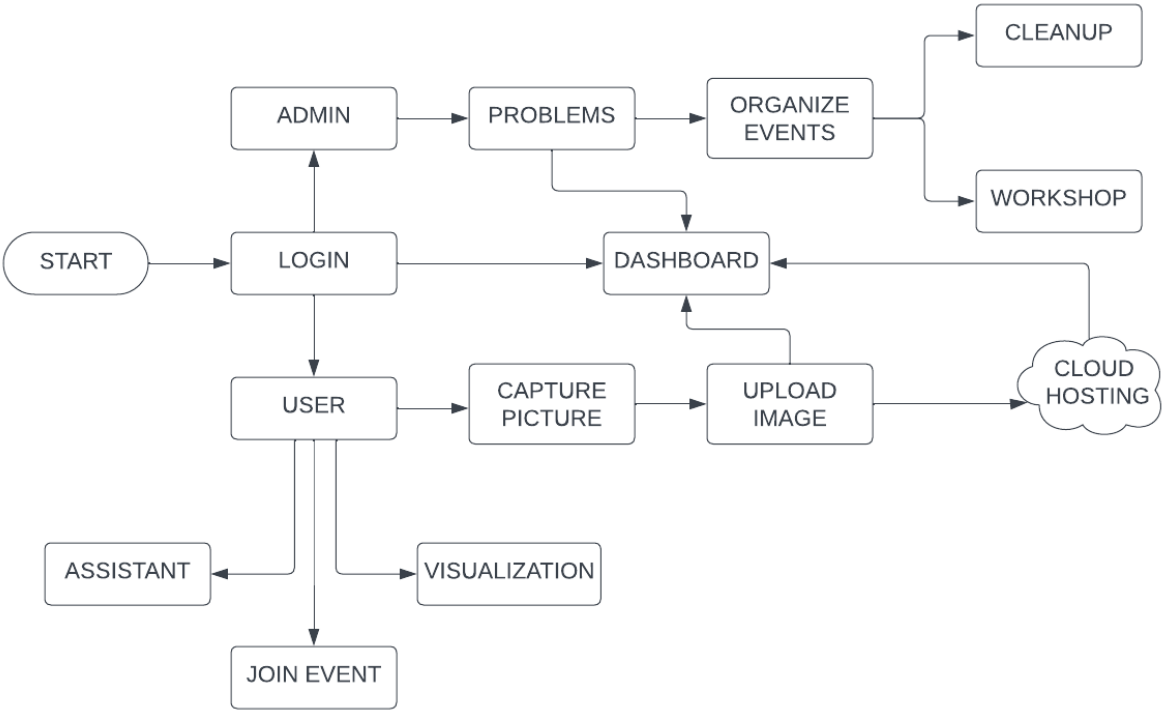


Figure 3.2: System Architecture

3.3 System Diagrams

3.3.1 Data Flow Diagram

A Data Flow Diagram (DFD) is a visual representation of a system that illustrates the flow of data through processes, data stores, data flows, and external entities. In the context of the proposed system, the web framework allows all users, including visitors, to access various features. Visitors can participate in events, view statistics data of cleanup drives, and interact with the chatbot for queries. Additionally, a smartphone application enables users to capture and upload images of garbage for reporting purposes.Government agencies, non-governmental organizations (NGOs), and administrators have access to a dashboard where they can view user-uploaded photographs and take necessary actions. Administrators can schedule cleanup tasks based on the cleanup's specifications, ensuring efficient management of cleanup operations. The DFD Level 1 provides an overview of how users and organizations can access and utilize the webpage's features. It outlines the main functions and interactions of the system. On the other hand, the DFD Level 2 offers a more detailed illustration of the system, depicting the flow of data and processes in greater depth, providing a comprehensive understanding of the system's operations.

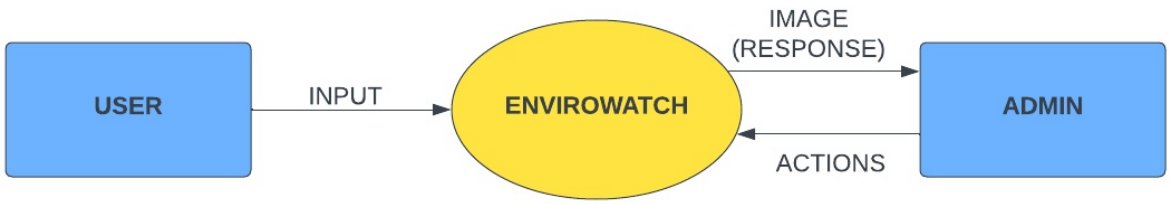


Figure 3.3: DFD Level 0

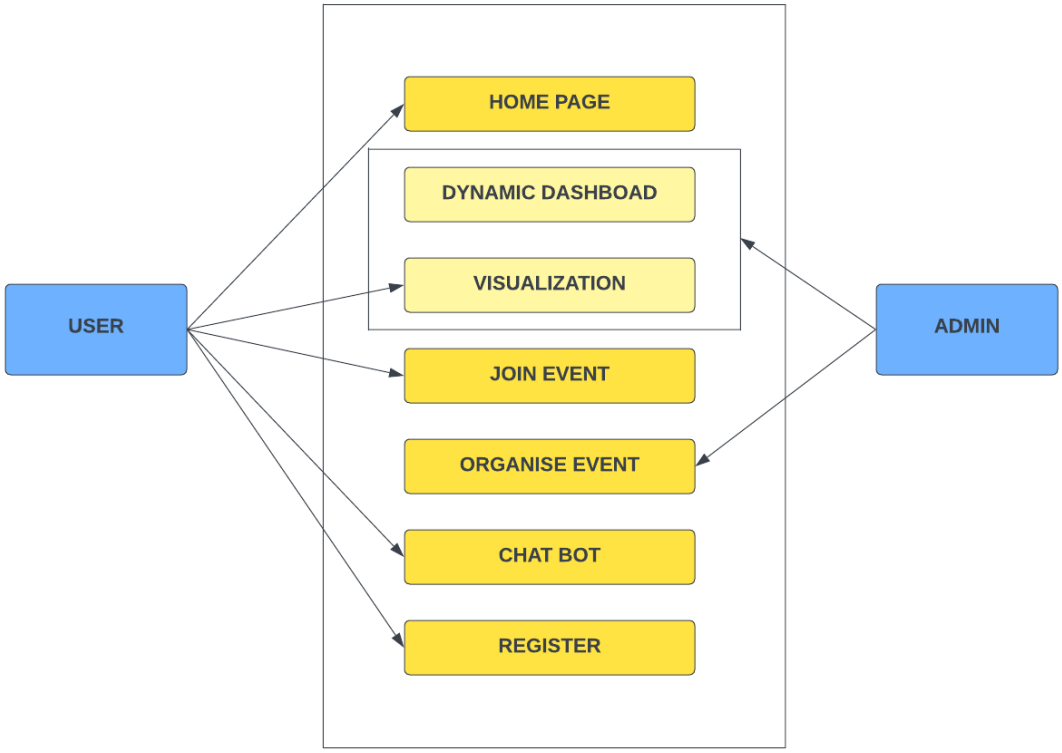


Figure 3.4: DFD Level 1

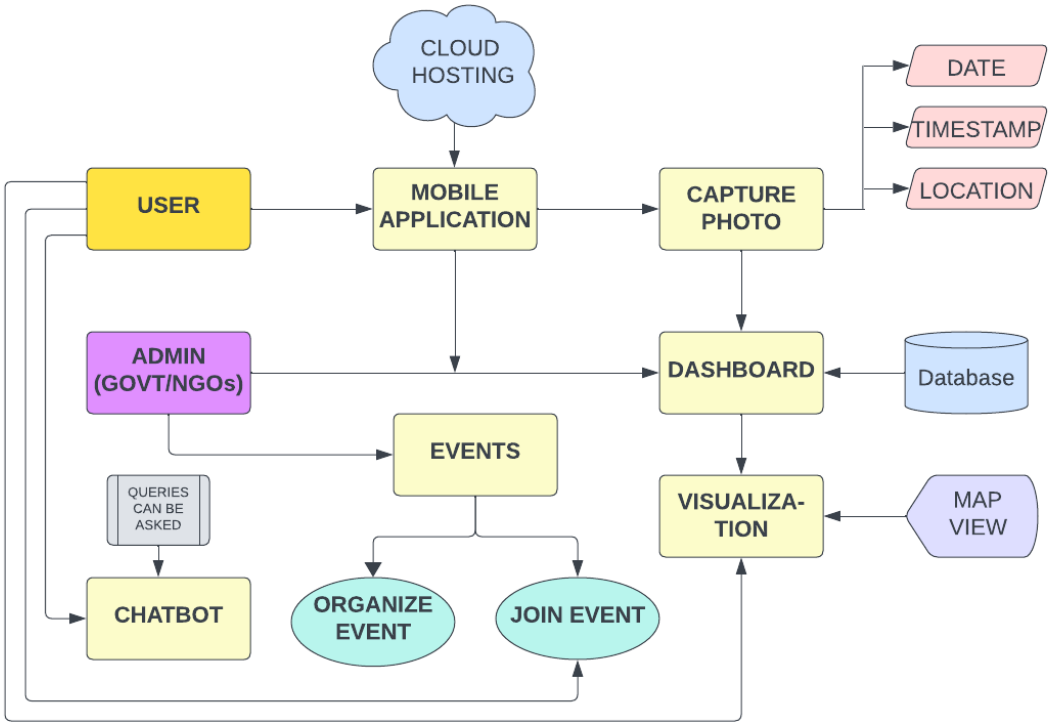


Figure 3.5: DFD Level 2

3.3.2 Activity Diagram

The activity diagram illustrates the operational flow of the proposed system, depicting the functions of the government, non-governmental organizations (NGOs), and users. Both end-users are connected to the database, ensuring seamless data access and management. The dashboard is accessible to organizations and administrators, facilitating event planning and data management. Users can actively participate in events or organize new ones through the system, enhancing user engagement and interaction. This diagram provides a clear visual representation of the system's functionality, showcasing the interactions between different entities and the database, thereby aiding in the understanding and development of the system.

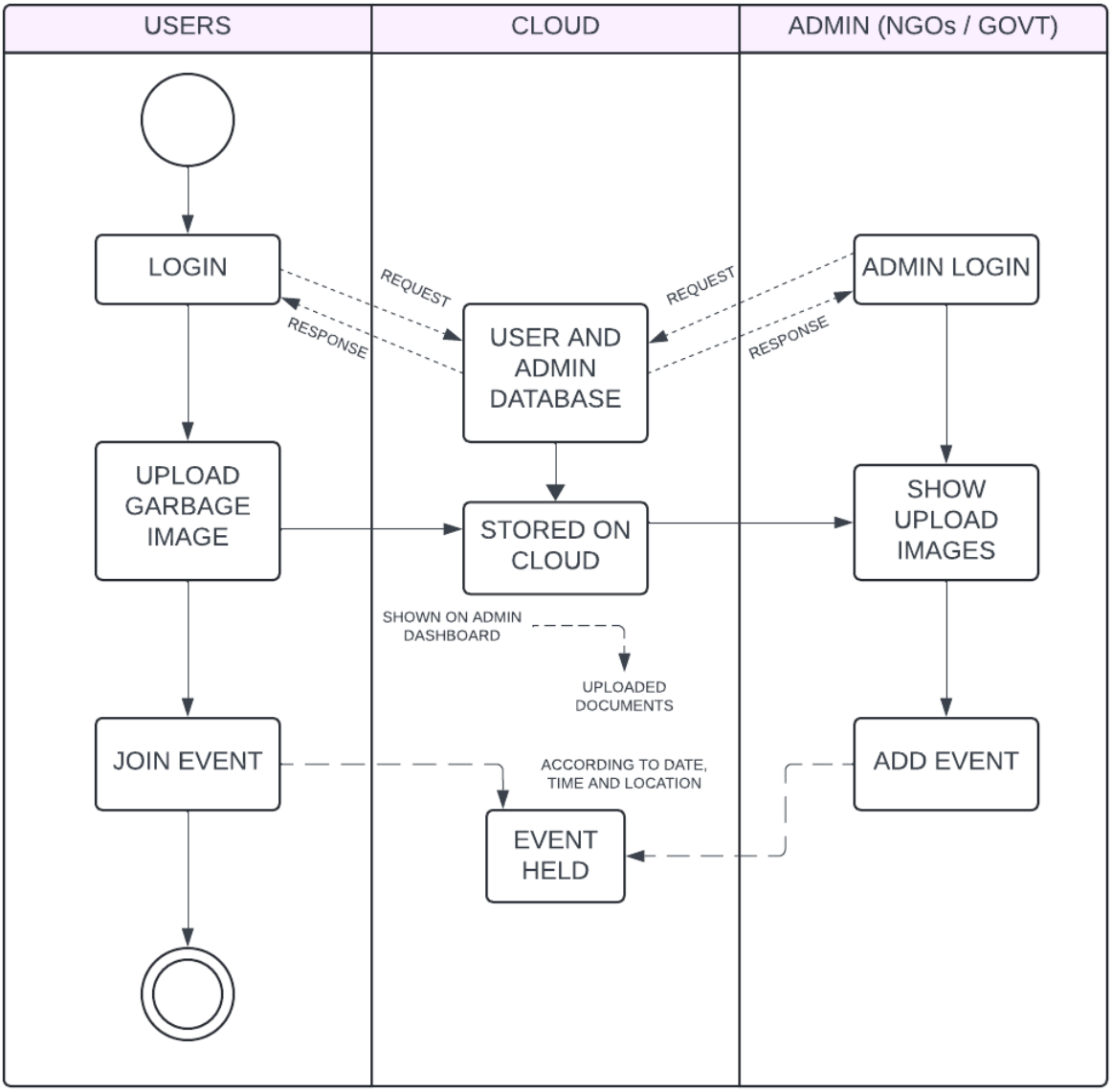


Figure 3.6: Activity Diagram

3.3.3 Use Case Diagram

Use case diagrams play a crucial role in system development by identifying and documenting system requirements, encompassing both internal and external factors. These requirements primarily focus on system design aspects and can be complemented by other types of diagrams. The use case diagram depicts various roles such as User, Government, NGOs, and Admin. Admin and organizations have access to the dashboard, enabling them to manage events and data efficiently. Users, on the other hand, can join or organize events through the system. This visual representation helps in understanding the system's functionality, interactions between different actors, and the flow of events, ultimately aiding in the development of a comprehensive and effective system.

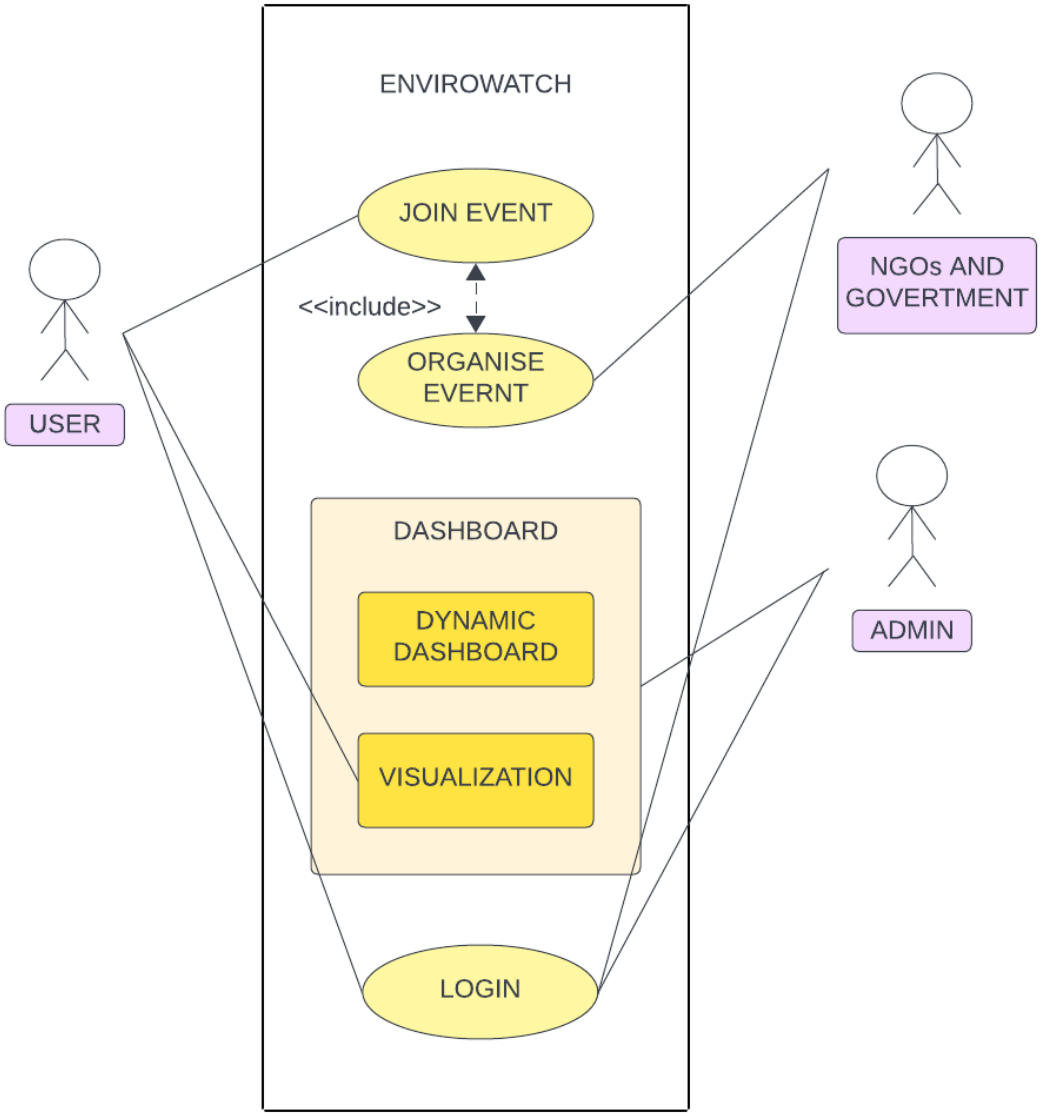


Figure 3.7: Use Case Diagram

3.3.4 Sequence Diagram

The project seamlessly integrates Convolutional Neural Networks (CNN) with a robust web framework to enhance user and administrator interactions. Users can securely log in to upload images, explore visualizations, and engage in various events. An intuitive assistant feature is available to address user queries effectively. Administrators and non-governmental organizations (NGOs) can efficiently organize events, store data in the cloud, and leverage the Vision Transformer (ViT) model for advanced image analysis. This comprehensive approach empowers users to interact with visual content, actively participate in events, and seek assistance, while offering administrators streamlined data management and analytical capabilities.

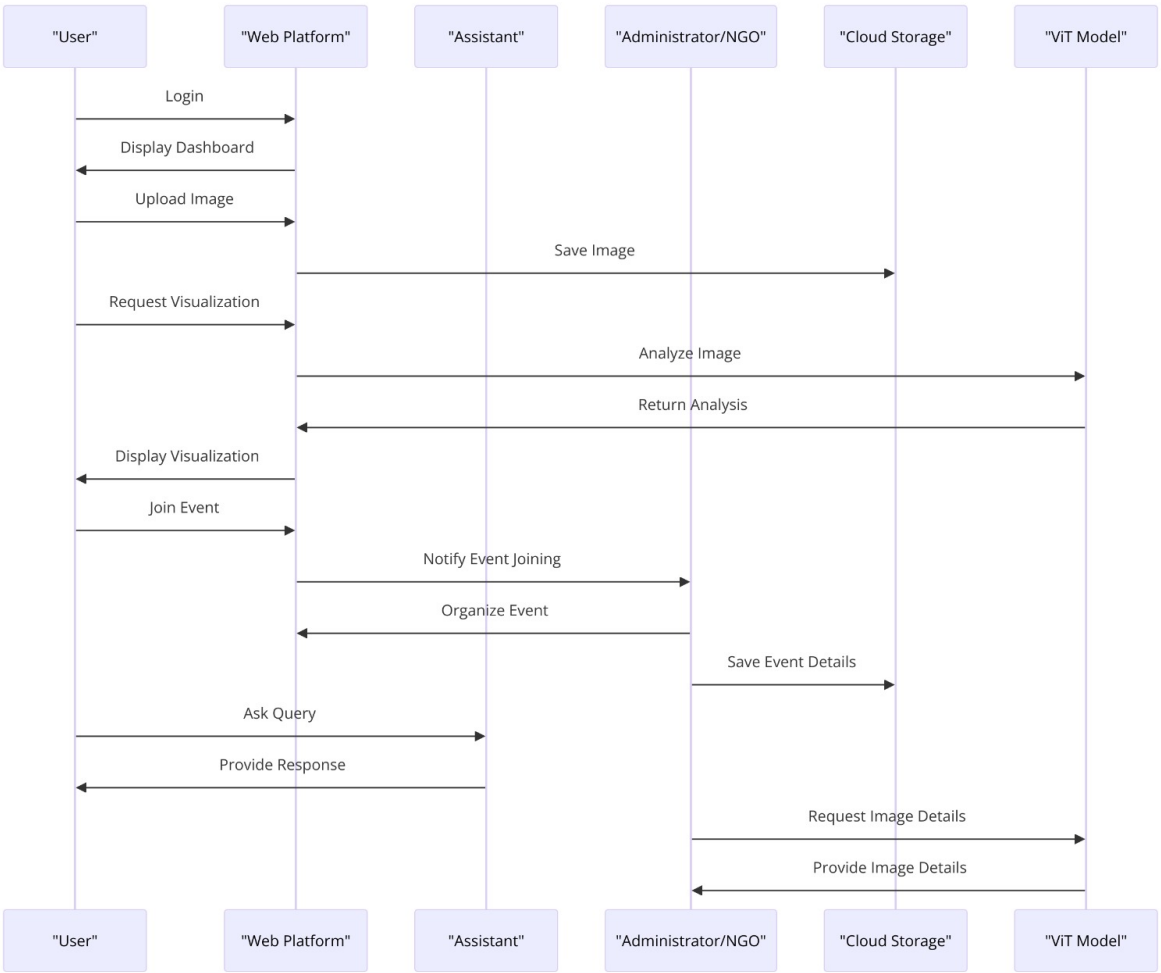


Figure 3.8: Sequence Diagram

Chapter 4

Project Implementation

4.1 Code Snippets

The below code displays the part of home page. The home page is built using html and css and connects all the modules of our project.

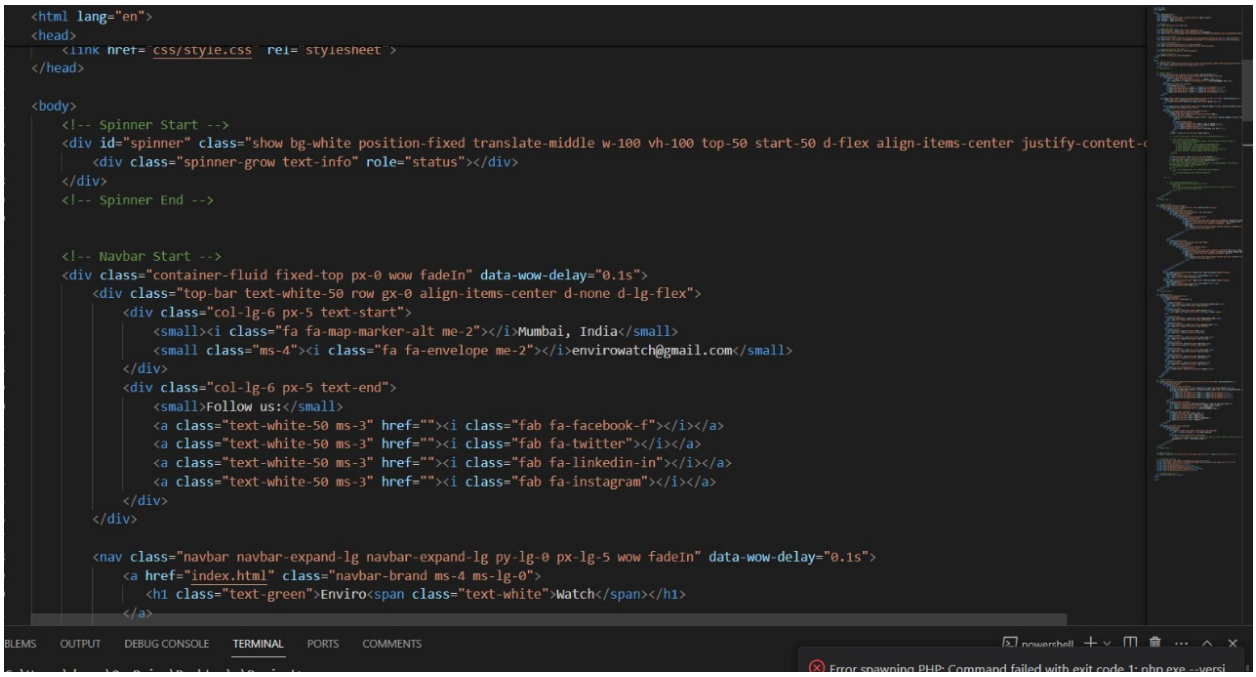


Figure 4.1: Code Snippet

Figure 4.2: Code Snippet

4.2 Steps to access the System

The system can be accessed directly by homepage. User can join events or organizations. Whereas the admin and the organization can access the dashboard by logging in. User can also access to events page, where all the details about events and NGOs is available. One can provide financial help to organizations by donating some amount with the help of our Donate page. For any basic queries the individual can seek help from the bot assistant.

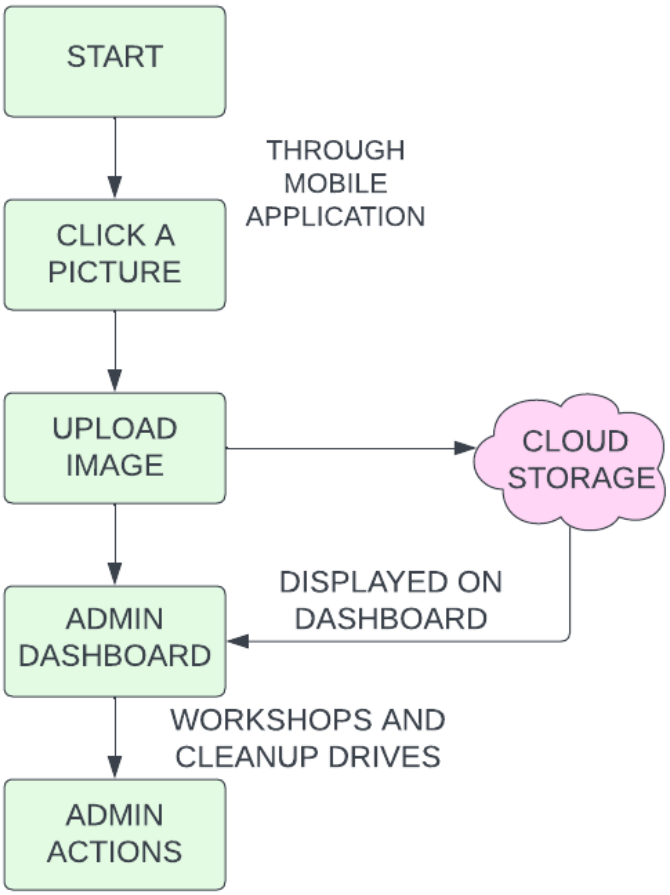
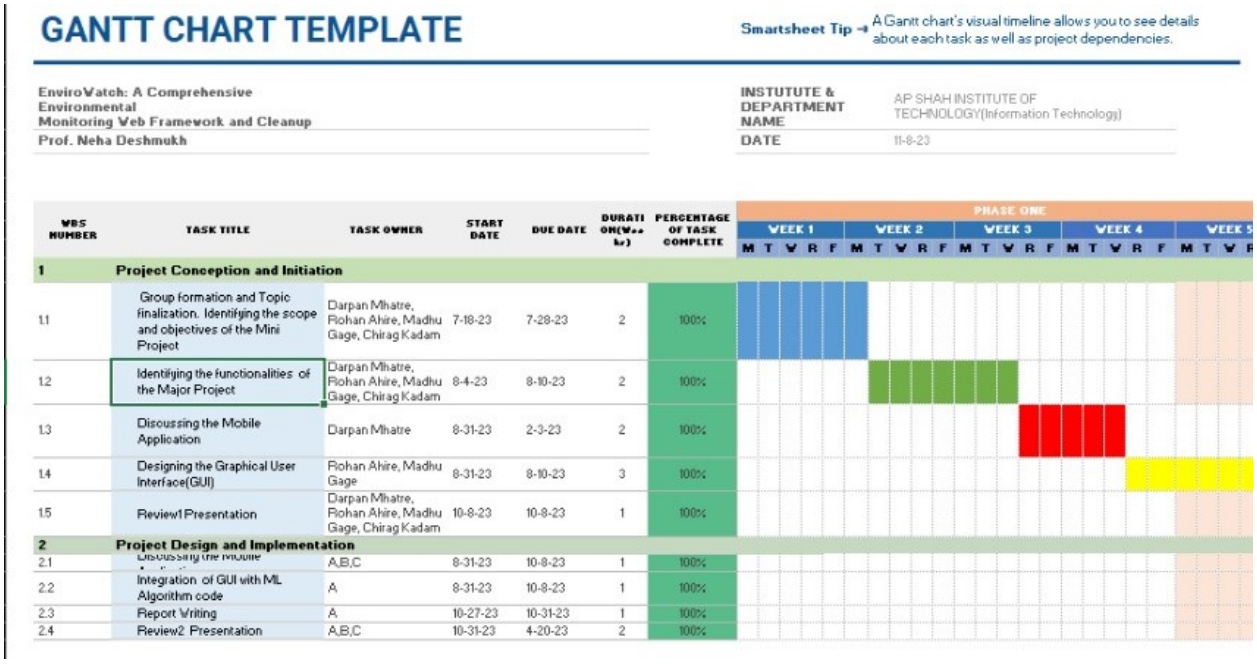


Figure 4.3: Flow Diagram

4.3 Timeline Sem VII



GANTT CHART TEMPLATE

Smartsheet Tip → A Gantt chart's visual timeline allows you to see details about each task as well as project dependencies.

EnviroWatch: A Comprehensive Environmental Monitoring Web Framework and Cleanup

Prof. Neha Deshmukh

INSTUTUTE & DEPARTMENT NAME: AP SHAH INSTITUTE OF TECHNOLOGY(Information Technology)

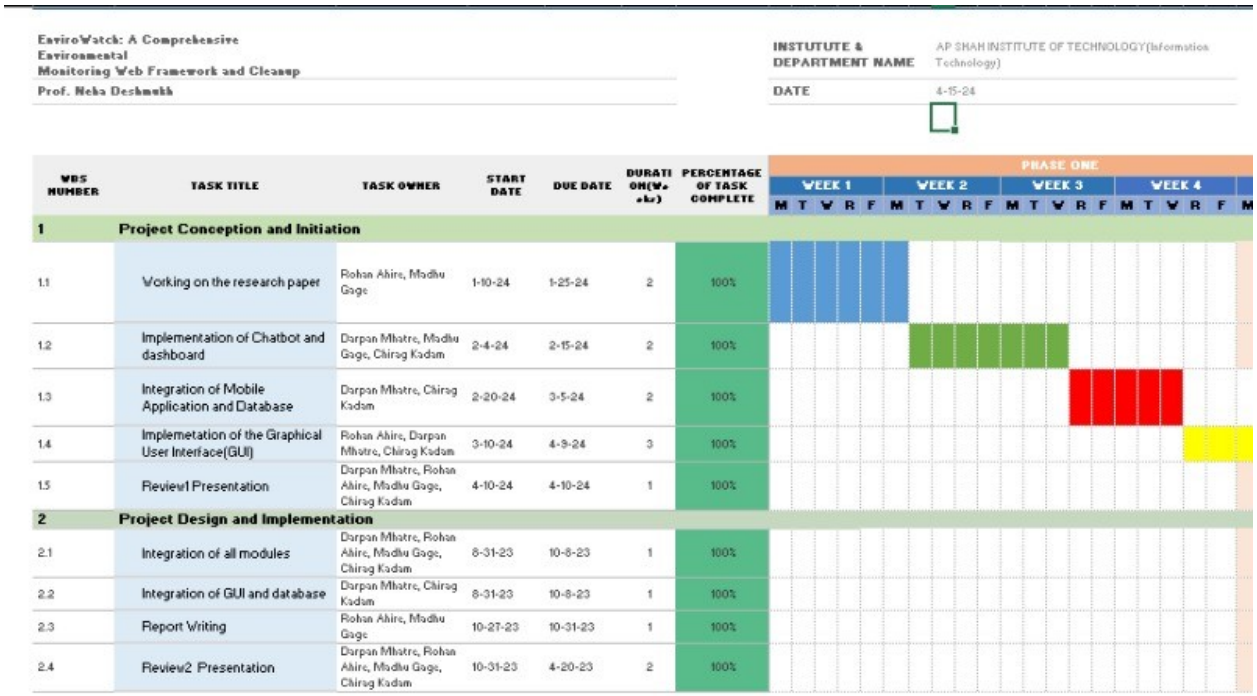
DATE: 11-8-23

PHASE ONE — WEEK 1 | WEEK 2 | WEEK 3 | WEEK 4 | WEEK 5 (M T W R F M T W R F M T W R F M T W R F M T W R)

WBS NUMBER	TASK TITLE	TASK OWNER	START DATE	DUE DATE	DURATION(Wo.. kr)	PERCENTAGE OF TASK COMPLETE
1	**Project Conception and Initiation**					
1.1	Group formation and Topic finalization. Identifying the scope and objectives of the Mini Project	Darpan Mhatre, Rohan Ahire, Madhu Gage, Chirag Kadam	7-18-23	7-28-23	2	100%
1.2	Identifying the functionalities of the Major Project	Darpan Mhatre, Rohan Ahire, Madhu Gage, Chirag Kadam	8-4-23	8-10-23	2	100%
1.3	Discussing the Mobile Application	Darpan Mhatre	8-31-23	2-3-23	2	100%
1.4	Designing the Graphical User Interface(GUI)	Rohan Ahire, Madhu Gage	8-31-23	8-10-23	3	100%
1.5	Review1 Presentation	Darpan Mhatre, Rohan Ahire, Madhu Gage, Chirag Kadam	10-8-23	10-8-23	1	100%
2	**Project Design and Implementation**					
2.1	Discussing the Mobile	A,B,C	8-31-23	10-8-23	1	100%
2.2	Integration of GUI with ML Algorithm code	A	8-31-23	10-8-23	1	100%
2.3	Report Writing	A	10-27-23	10-31-23	1	100%
2.4	Review2 Presentation	A,B,C	10-31-23	4-20-23	2	100%

Figure 4.4: Timeline VII

4.4 Timeline Sem VIII



EnviroWatch: A Comprehensive Environmental Monitoring Web Framework and Cleanup

Prof. Neha Deshmukh

INSTUTUTE & DEPARTMENT NAME: AP SHAH INSTITUTE OF TECHNOLOGY(Information Technology)

DATE: 4-15-24

PHASE ONE — WEEK 1 | WEEK 2 | WEEK 3 | WEEK 4 (M T W R F M T W R F M T W R F M T W R F M)

WBS NUMBER	TASK TITLE	TASK OWNER	START DATE	DUE DATE	DURATION(Wo.. kr)	PERCENTAGE OF TASK COMPLETE
1	**Project Conception and Initiation**					
1.1	Working on the research paper	Rohan Ahire, Madhu Gage	1-10-24	1-25-24	2	100%
1.2	Implementation of Chatbot and dashboard	Darpan Mhatre, Madhu Gage, Chirag Kadam	2-4-24	2-15-24	2	100%
1.3	Integration of Mobile Application and Database	Darpan Mhatre, Chirag Kadam	2-20-24	3-5-24	2	100%
1.4	Implemetation of the Graphical User Interface(GUI)	Rohan Ahire, Darpan Mhatre, Chirag Kadam	3-10-24	4-9-24	3	100%
1.5	Review1 Presentation	Darpan Mhatre, Rohan Ahire, Madhu Gage, Chirag Kadam	4-10-24	4-10-24	1	100%
2	**Project Design and Implementation**					
2.1	Integration of all modules	Darpan Mhatre, Rohan Ahire, Madhu Gage, Chirag Kadam	8-31-23	10-8-23	1	100%
2.2	Integration of GUI and database	Darpan Mhatre, Chirag Kadam	8-31-23	10-8-23	1	100%
2.3	Report Writing	Rohan Ahire, Madhu Gage	10-27-23	10-31-23	1	100%
2.4	Review2 Presentation	Darpan Mhatre, Rohan Ahire, Madhu Gage, Chirag Kadam	10-31-23	4-20-23	2	100%

Figure 4.5: Timeline VIII

Chapter 5

Testing

5.1 Software Testing

Software testing is a process of evaluating a software product to ensure that it meets the specified requirements and works correctly. The main goal of software testing is to identify defects or errors in the software and to ensure that the software meets the business and technical requirements, is reliable, and performs as expected. The testing process includes a series of activities that can be performed manually or using automated tools, and it typically involves testing the functionality, performance, security, usability, and compatibility of the software. The ultimate goal of software testing is to improve the quality of the software and to ensure that it meets the needs and expectations of the users. The following table describes the testing of login page for incorrect username and password and correct username and password.

Sr. No.	Test Scenario	Test Case	Expected Result	Actual Result	Status
1	Verify the login of the EnviroWatch	Enter a valid username and valid Password	Successful Login	Successful Login	Pass
2	Verify the login of the EnviroWatch	Enter a valid username and valid Password	A message "Enter Correct Email and Password"	A message "Enter Correct Email and Password"	Pass
3	Verify the login of the EnviroWatch	Enter a valid username and valid Password	A message "Enter Correct Email and Password"	A message "Enter Correct Email and Password"	Pass
4	Verify the login of the EnviroWatch	Enter a valid username and valid Password	A message "Enter Correct Email and Password"	A message "Enter Correct Email and Password"	Pass

Figure 5.1: Test Case (Login-in Page)

5.2 Functional Testing

Functional testing of the EnviroWatch platform is critical to ensuring its effectiveness in tackling the global challenge of mounting untreated waste. Every aspect, from user engagement to backend data analytics, undergoes thorough evaluation to validate functionality against predefined requirements. The testing process focuses on ensuring the seamless operation of features such as waste photo uploads via the mobile application, with particular emphasis on accurate identification and classification using the Vision Transformer (ViT) model.Furthermore, the platform's responsiveness and reliability in organizing cleanup events, gathering crucial data, and coordinating initiatives among governmental bodies and non-governmental organizations (NGOs) are extensively assessed. This comprehensive testing approach aims to optimize user experience, foster collaboration, and effectively combat the escalating issue of unprocessed waste. By rigorously testing the platform's functionality, EnviroWatch can ensure that it meets the needs of its users and stakeholders while effectively addressing the pressing environmental challenges associated with untreated waste.

Chapter 6

Result and Discussions

6.1 Home Page

The Home page of our website serves as the central hub, offering a dynamic and user-friendly interface that seamlessly connects all other pages. It is designed to cater to both new visitors and returning users, providing easy navigation and access to the various features and sections of the website. Unlike some platforms that require users to log in or register before accessing certain areas, our Home page is freely accessible to everyone, regardless of their status as a registered member. This accessibility ensures that users can quickly find the information they need and explore the website's offerings without any barriers to entry. Whether someone is browsing for the first time or returning to find specific content, our Home page welcomes them with a welcoming and intuitive layout that facilitates effortless interaction and exploration.

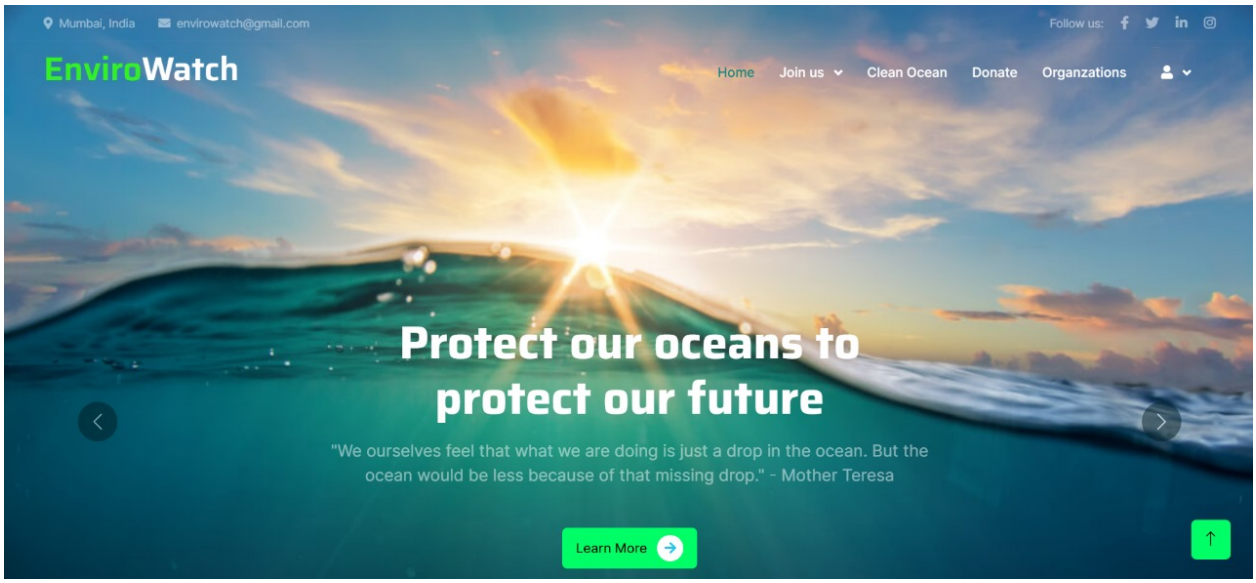


Figure 6.1: Home Page

6.2 Login Page

The login page on our website serves as a gateway for government bodies and NGOs, providing them with authorization to access specific features, such as the dynamic dashboard. Once logged in, these authorized users can leverage the dashboard to gain insights, monitor progress, and take necessary actions related to their environmental initiatives or regulatory responsibilities. This secure and tailored access ensures that relevant stakeholders can efficiently engage with the platform's resources and contribute to effective environmental management efforts.

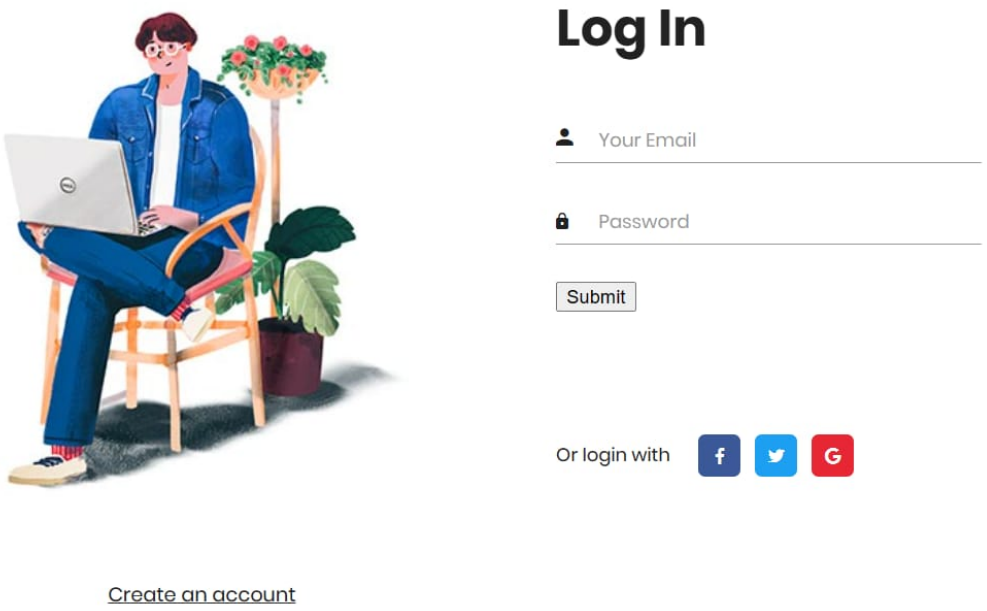


Figure 6.2: Login Page

6.3 ChatBot

The chatbot serves as a comprehensive knowledge resource, addressing general inquiries about events hosted by the organization and the functionality of EnviroWatch. Users can seek information about waste management practices within our society and global waste pollution issues. By responding to Frequently Asked Questions (FAQs), the chatbot facilitates user understanding of our programs and operations. Its ability to provide insights on various aspects of waste management enhances user engagement and promotes awareness about environmental challenges on both local and global scales.

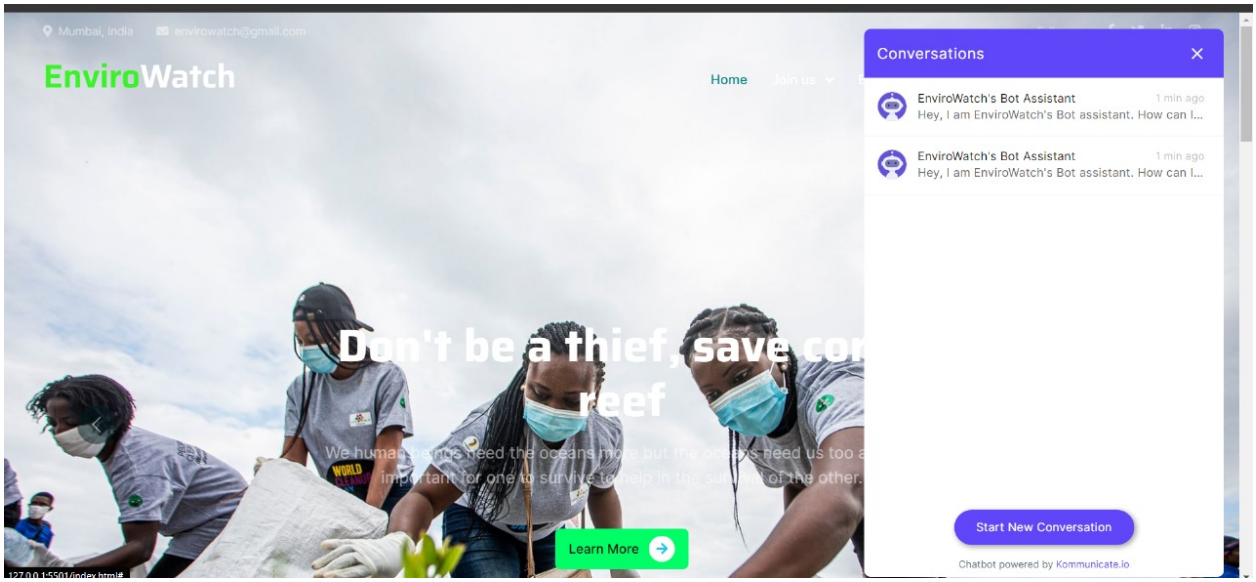


Figure 6.3: ChatBot

6.4 Events Page

The Events Page, accessible to all from the Home Page, enables users to register for cleanup events and drives organized by government bodies and NGOs. Users can easily navigate to this page to find information about upcoming events and sign up to participate. Through this platform, both organizers and participants can engage in collaborative efforts to address environmental challenges and promote community involvement in cleanup initiatives.

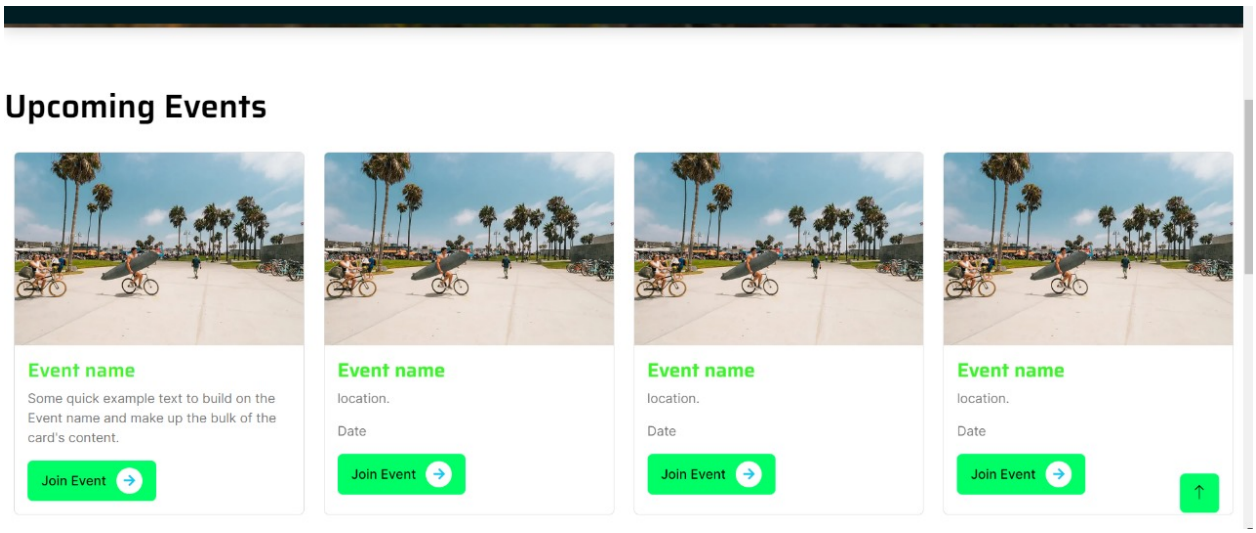


Figure 6.4: Events Page

6.5 Organizations Page

The Organizations page offers details about Non-Governmental Organizations (NGOs), including their contact information. Users can access this page to learn about the various

NGOs involved in environmental initiatives and connect with them for collaboration or support.

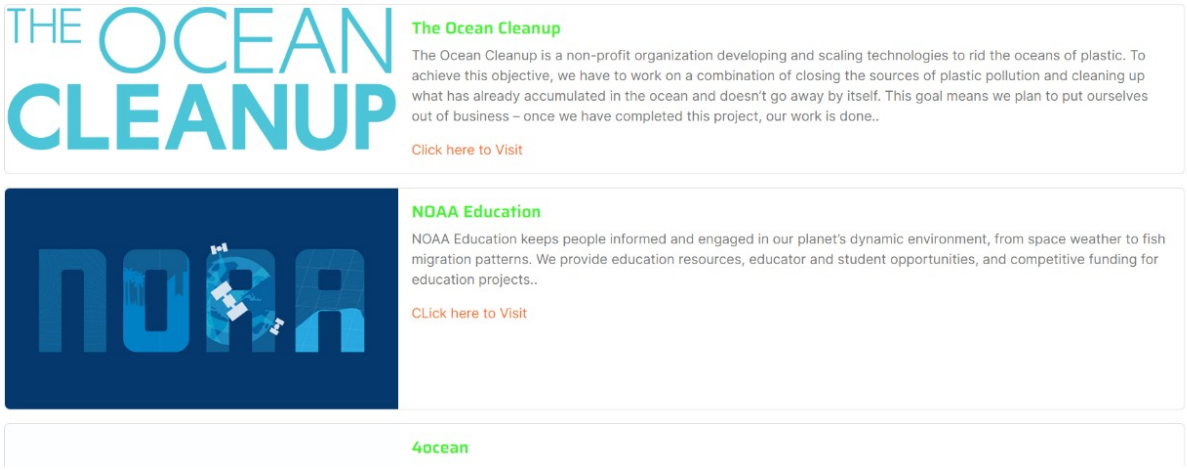


Figure 6.5: Organizations Page

6.6 Add Event Page

The Organize Event page allows administrators to input event details such as event name, organization name, start time, event date, and upload a cover page. Additional information pertinent to the event can also be provided.

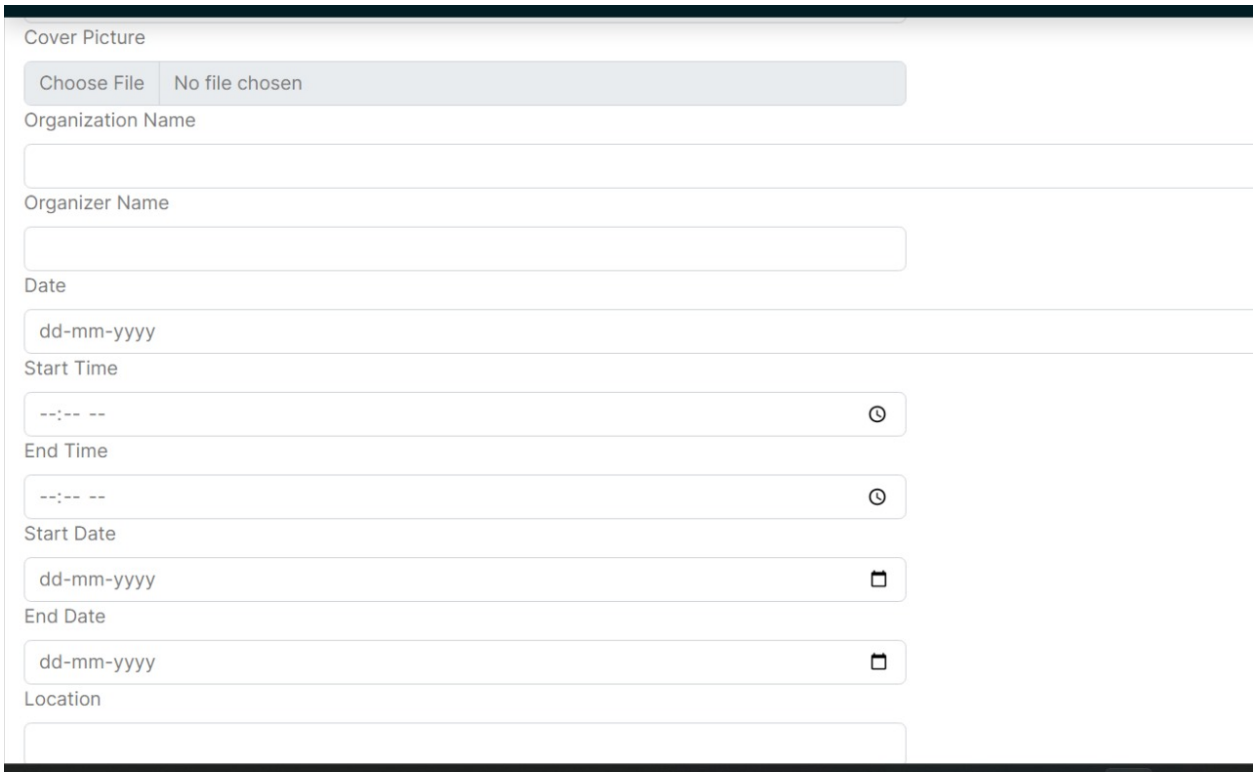


Figure 6.6: Add Event Page

6.7 Join Event Page

Users have the opportunity to join events organized and hosted by NGOs, allowing them to actively participate and contribute to these impactful initiatives. By joining these events, users can become an integral part of the NGO's mission and make a meaningful difference in the community.

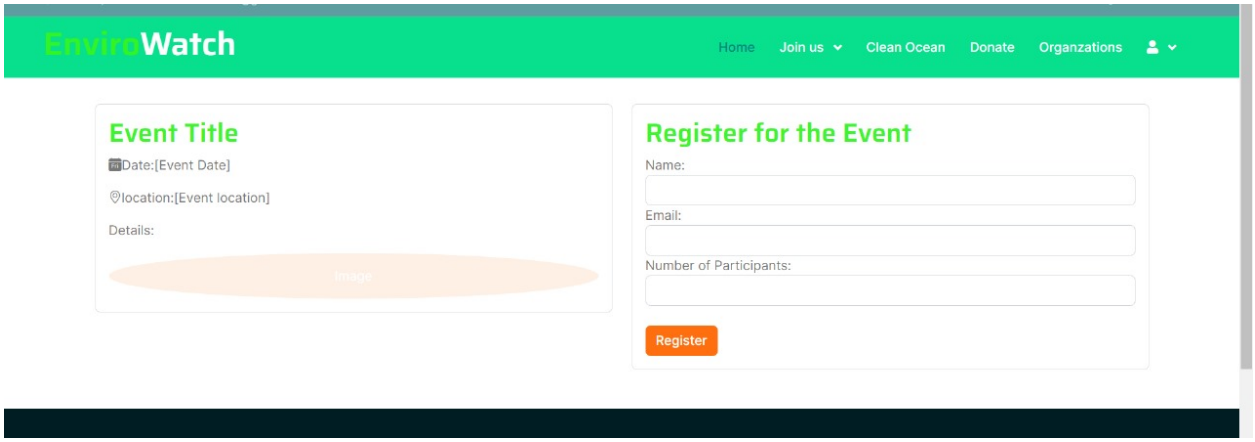


Figure 6.7: Join Event Page

6.8 Dashboard

The Dashboard presents visual representations of data related to cleanup drives and their outcomes, offering organizations clear insights into various metrics such as the quantity of plastics and recyclable garbage collected. Through intuitive graphs and charts, organizations can easily analyze trends, track progress, and make informed decisions to optimize their environmental initiatives.

Figure 6.8: Dashboard

6.9 Visualization

Using the ViT model, the system can detect various types of garbage waste, including plastic, cardboard, paper, metal, and glass. This allows for accurate identification and segregation of different waste materials, enabling efficient recycling and disposal processes.

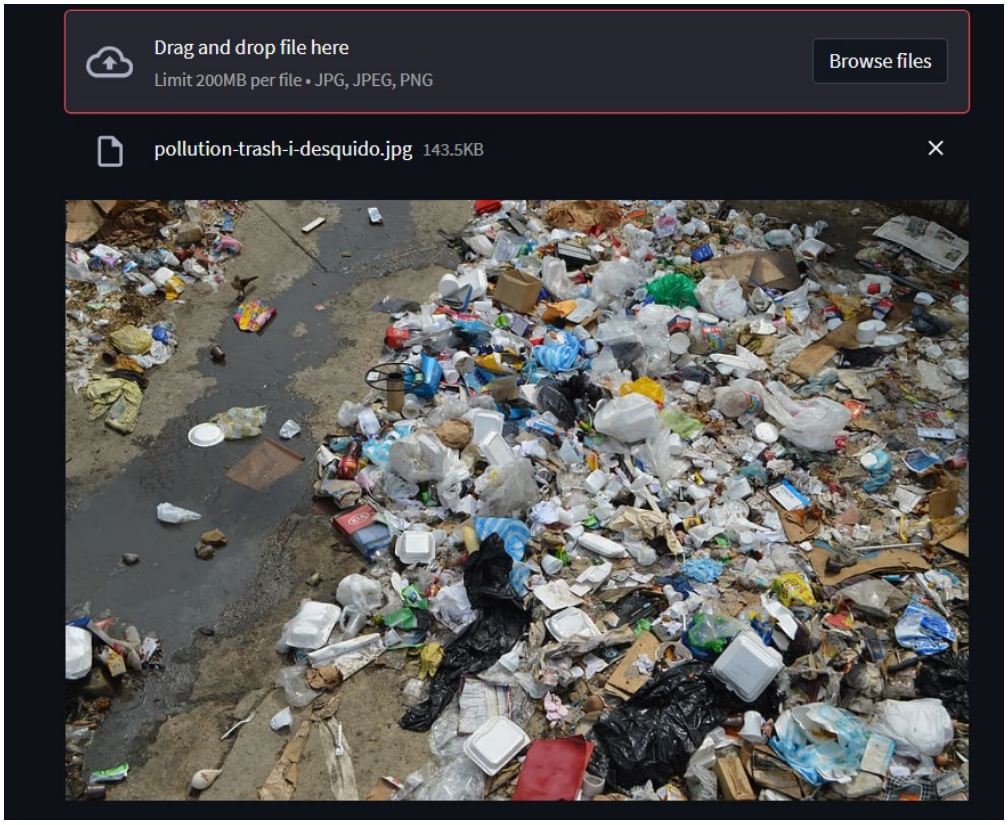


Figure 6.9: Upload Image

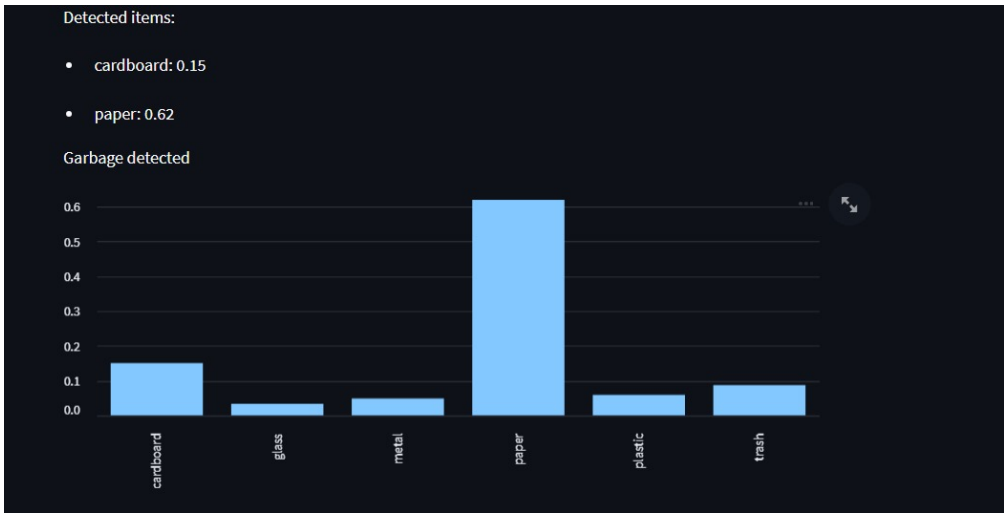


Figure 6.10: Accuracy Graph

The administrator has the ability to pinpoint the precise location from which an image is captured and can visualize it on a map view. This feature provides a comprehensive understanding of the geographic distribution of images, aiding in strategic decision-making and resource allocation for cleanup efforts.

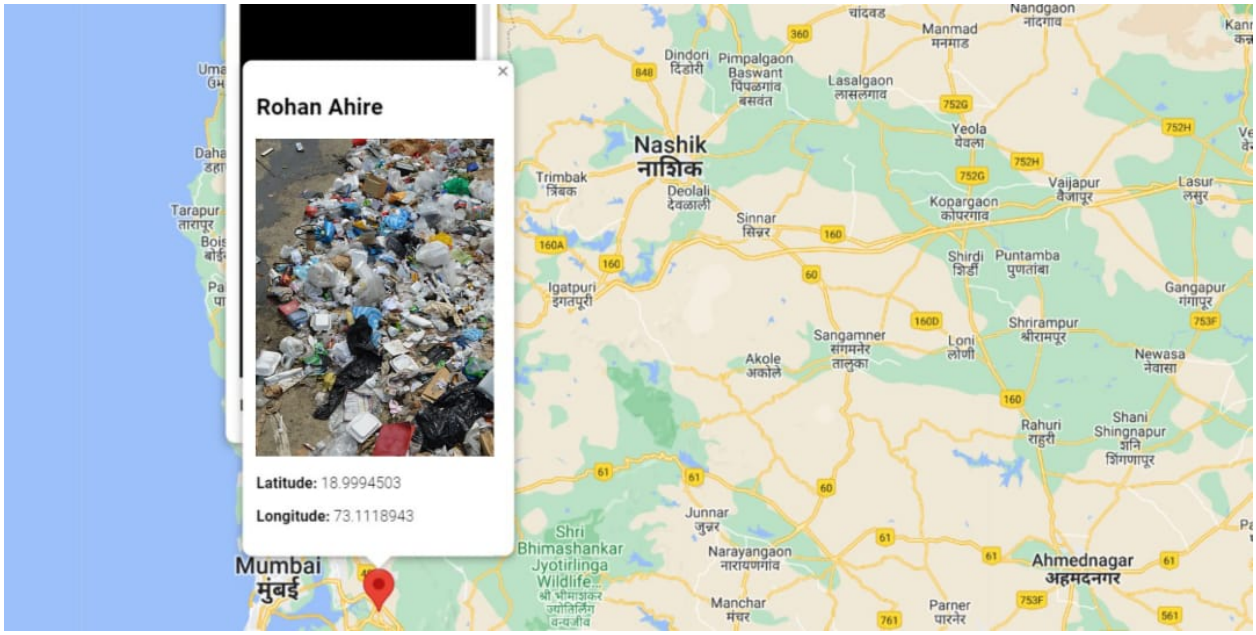


Figure 6.11: Map View

6.10 Mobile Application

The Mobile Application allows end users to capture, save, and post photos of waste found in nearby areas. Users can then submit these photos to governmental and non-governmental bodies for further action. This user-friendly interface empowers individuals to actively participate in waste management efforts by reporting litter and environmental hazards, facilitating timely intervention and cleanup initiatives by relevant authorities and organizations.

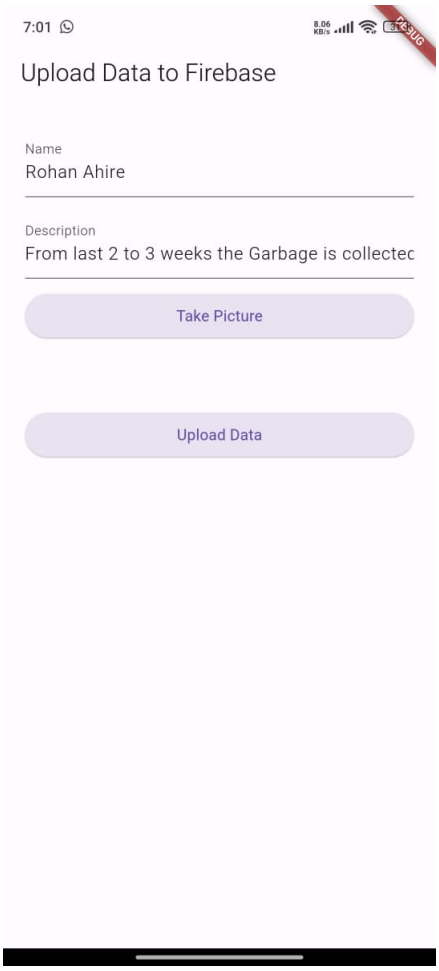


Figure 6.12: Home Page

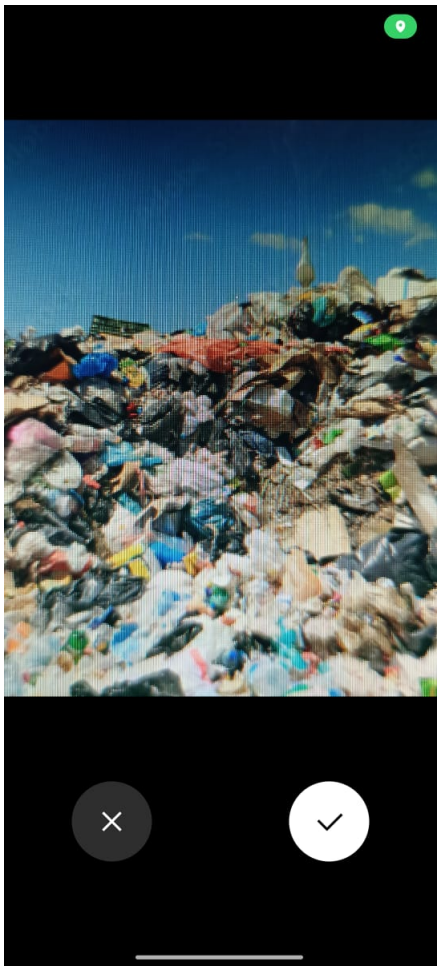


Figure 6.13: Open Camera

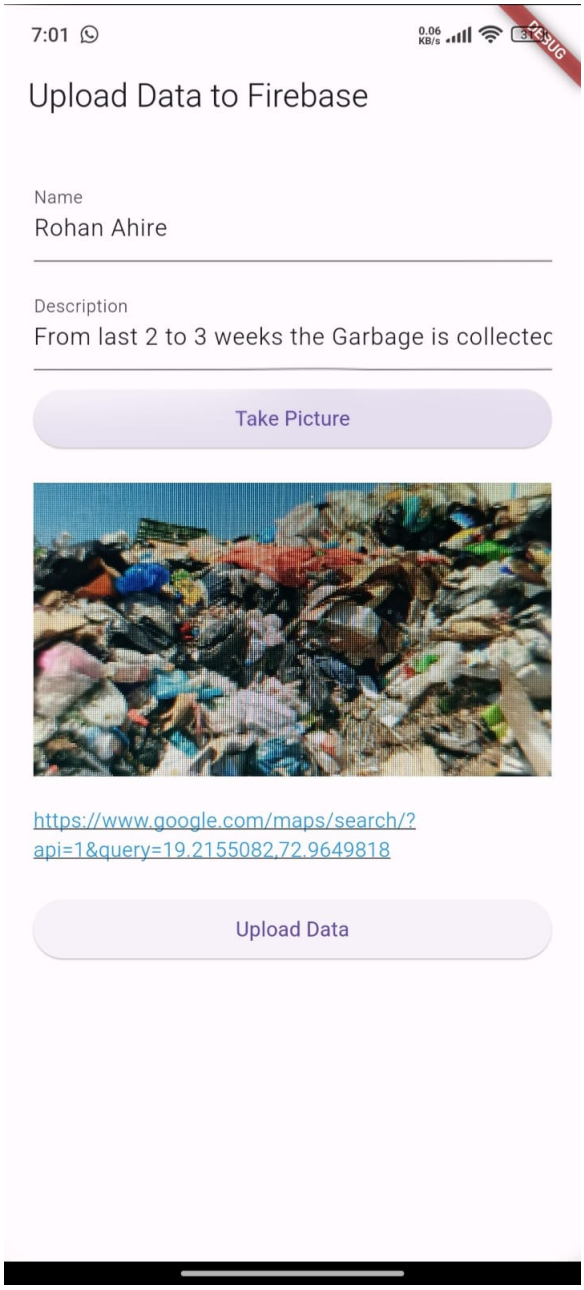


Figure 6.14: Location Link Generated

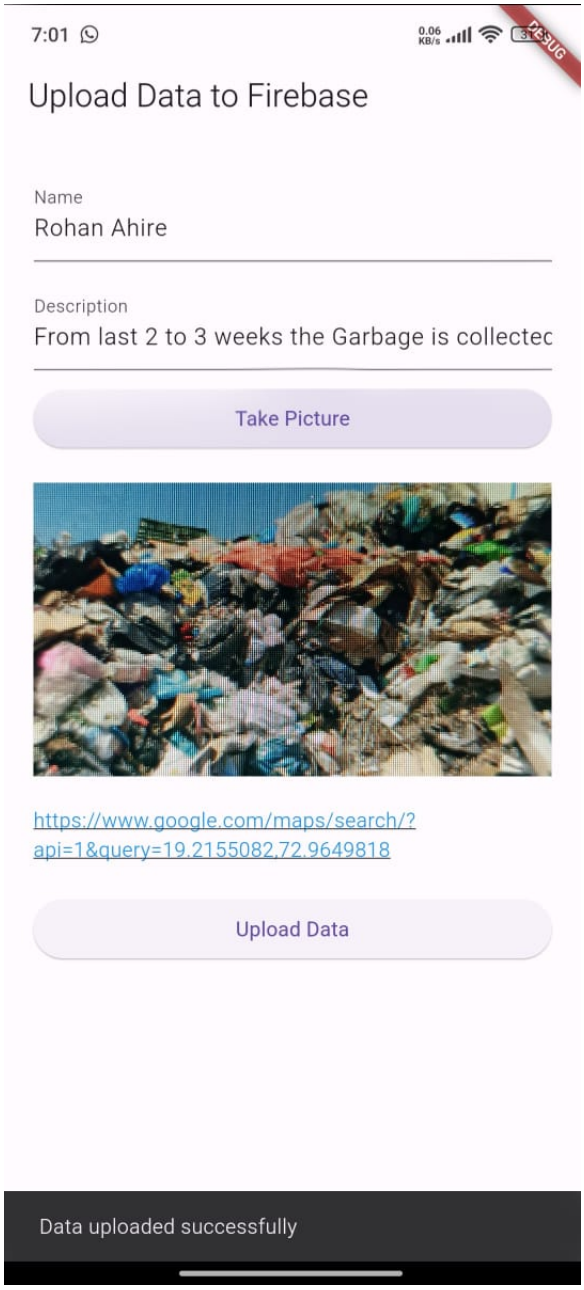


Figure 6.15: Data Uploaded Successfully

Chapter 7

Conclusion

As the growth in garbage is never depicting, it leading to health issues, pollution, biodiversity loss, etc. Plastic which takes more than 100 years to decompose is a poison for nature. A solution was needed to for collecting, managing, and segregating this garbage. We have proposed a solution for the first term i.e., Collection of garbage. "EnviroWatch" is an innovative web framework created to address issues like health and environmental crises brought on by garbage spilled everywhere, by a multifaceted solution to monitor environmental well-being and make it easier to organize cleanup events in collaboration with NGOs and governmental organizations. Data Analytics and real time monitoring system makes it easy for the organizations to reach out to people for help and organize cleanup events. The mobile application which can be used by anyone for posting photos of waste is a convenient way for residents to reach out government and NGOs. The framework improves the coordination of cleanup events through seamless integration with non-governmental organizations (NGOs) and government organizations, making it simpler for everyone to work together and effectively encourage resources. The platform encourages a collaborative approach to waste cleanup and data collecting by facilitating seamless communication between communities, NGOs, and government agencies through the use of a user-friendly mobile app and advanced image recognition using the Vision Transformer model. EnviroWatch promotes a proactive and group approach to responsible trash management while streamlining environmental health tracking through the use of data analytics and real-time monitoring. With a promising tool to address pollution, biodiversity loss, and health risks associated to common waste.

Chapter 8

Future Scope

EnviroWatch envisions expanding its capabilities to include a heat map and GPS tracking system, enhancing its ability to allocate resources efficiently and monitor cleanup activities effectively. Collaborations with government agencies will be further strengthened to streamline approval processes and ensure greater participation. Advanced data analytics will be employed to gain deeper insights into waste generation patterns, enabling more informed decision-making. Additionally, the platform plans to enhance community engagement through gamification features in its mobile app, encouraging greater public involvement in waste management efforts. Scaling operations to encompass more cities and integrating emerging technologies such as AI and IoT are also on the agenda to amplify EnviroWatch's impact on a larger scale. EnviroWatch facilitates seamless communication and real-time monitoring, empowering stakeholders to make informed decisions for a cleaner, healthier environment. With its potential to mitigate pollution, biodiversity loss, and health hazards linked to waste, EnviroWatch stands as a promising solution for sustainable waste management.

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Appendices

Appendix-A: Setting Up a Flutter Project in Android Studio

- **Install Android Studio and Flutter Plugin**

  1. Download and install Android Studio from the Android Studio website.
  2. Install the Flutter and Dart plugins by navigating to File >Settings >Plugins in Android Studio, searching for 'Flutter', and clicking Install. This should prompt the installation of the Dart plugin as well.

- **Download and Configure the Flutter SDK**

  1. Download the Flutter SDK from the Flutter website and extract it to a desired location on your computer.
  2. Configure the Flutter SDK path in Android Studio by going to File >Settings >Languages and Frameworks >Flutter, and setting the Flutter SDK path to the directory where you extracted the Flutter SDK.

- **Create a New Flutter Project**

  1. Start a new project by selecting Start a new Flutter project from the Android Studio welcome screen.
  2. Choose Flutter Application as the project type, then click Next.
  3. Configure the project details like project name, project location, and include a description if necessary.
  4. Complete project setup by selecting the target platforms (Android, iOS, etc.) and clicking Finish.

- **Run and Debug Your Flutter App**

    1. Open an emulator or connect a physical device via USB.
    2. Run the application by clicking the 'Run' icon in the toolbar or pressing Shift+F10. Choose your target device from the list.
    3. Use Flutter Inspector in Android Studio to debug and visualize the layout of your app.

Appendix-B: Using and Integrating a Web Application with HTML, CSS, JavaScript, Streamlit, and APIs

- **Set Up and Develop the Front-end**

    1. Install Required Software: Ensure Python is installed, along with Streamlit (pip install streamlit). Choose a code editor like Visual Studio Code for development.
    2. Create HTML, CSS, and JavaScript Files: Develop the interface using HTML and CSS for layout and styling. Add interactive features with JavaScript for dynamic content and client-side API integration.

- **Develop the Back-end with Streamlit**

    1. Create a Streamlit App: Develop a app.py file where you define the functionality of the app using Streamlit's widgets and Python logic.
    2. Run and Test Locally: Use the command streamlit run app.py to run your application locally and make adjustments as needed.

- **Integrate External APIs**

    1. Select and Configure APIs: Choose the APIs relevant to your application's functionality. Obtain necessary API keys and implement them within your JavaScript for front-end uses or Python for server-side data processing in Streamlit.

- **Deploy and Combine Components**

    1. Embed and Sync Front-end with Streamlit: Utilize Streamlit's capability to integrate front-end components. Use st.markdown() for HTML or components.v1.html() to incorporate complex HTML and JavaScript.
    2. Deploy Your Application: Select a hosting service like Heroku, AWS, or Google Cloud, and follow their guidelines to deploy your application ensuring secure and efficient operation.

Appendix-C: Creating and Setting Up Firebase Database

- **Firebase Project Setup**

  To create and set up a Firebase database for your project, follow these steps:

  1. Go to the Firebase Console at https://console.firebase.google.com/.
  2. Sign in with your Google account or create one if you don't have it.
  3. Click on the "Add Project" button to create a new Firebase project. Follow the prompts to configure the project name, region, and other settings.
  4. Once your project is created, you'll be redirected to the project dashboard.

- **Add Firebase to Your Web Application**

  To use Firebase in your web application, you need to add Firebase SDK scripts to your HTML files.

  1. In the Firebase Console, click on your project to access the project dashboard.
  2. Click on the gear icon (Project settings) in the left-hand menu.
  3. Scroll down to the "Your apps" section and click on the web app icon (</>).
  4. Follow the setup instructions to add Firebase to your web app. This will include adding the Firebase configuration object to your HTML files.

- **Firebase Realtime Database**

  Once Firebase is set up in your web application, you can use the Firebase Realtime Database to store and retrieve data. You can read the Firebase Realtime Database documentation to learn how to interact with the database.

- **Useful Resources**

  Here are some resources to help you learn more about Firebase and its services:

  Firebase Documentation: https://firebase.google.com/docs Firebase Realtime Database Documentation: https://firebase.google.com/docs/database

- **Project Deployment**

  When deploying your web application that uses Firebase, make sure to secure your Firebase configuration and implement the necessary security rules to protect your database. Firebase provides guidelines for deploying web apps securely.

Publication

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