Harabhara – Gamified Sustainability Platform
A project Report

Submitted By

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In partial fulfilment for the requirements of the project

BACHELOR OF TECHNOLOGY IN COMPUTER SCIENCE AND ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING SRM UNIVERSITY-AP

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ANDHRA

PRADESH,INDIA

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CERTIFICATE

This is to certify that the project work entitled **" Harabhara – Gamified Sustainability Platform"** is a Bonafide record of project work carried out by the following students:

- **Anshu Shah(AP23110011260)**
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from the **Department of Computer Science and Engineering, SRM University-AP.** The students conducted this project work under my supervision during the period **August 2025 to December 2025**.It is further certified that, to the best of my knowledge, this project has not previously formed the basis for the award of any degree or any similar title to this or any other candidate.

This is also to certify that the project work represents the **teamwork** of the candidates.

Station: Mangalagiri
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1. Introduction

Climate change, pollution, and resource depletion are some of the defining challenges of our time. While awareness has grown significantly, sustaining eco-friendly habits remains difficult for individuals due to lack of motivation, lack of rewards, and no immediate sense of impact.

Harabhara emerges as an innovative solution to bridge this gap. It is a gamified sustainability platform built using Next.js that transforms everyday eco-friendly behaviour into an engaging, rewarding, and visually interactive experience.

Harabhara empowers users to take meaningful environmental actions through:

- Gamified quests and challenges,
- Daily eco-actions,
- Scan-to-earn recyclable detection,
- Green Credits (Gbits) as digital rewards,
- Leaderboards,
- Impact visualization dashboards,
- Reward redemption systems, and
- A playful game layer that motivates consistent participation.

Unlike traditional sustainability apps, Harabhara combines behavioural psychology, gamification, and modern web technologies to encourage long-term environmental commitment. Every interaction — whether it is recycling a plastic bottle, participating in an eco-challenge, or reducing waste — becomes part of a larger, meaningful journey toward creating a greener planet.

1.2 About the Project

Harabhara is designed using Next.js, a powerful full-stack React framework. This choice enables the platform to deliver fast performance, smooth navigation, dynamic rendering, and integrated backend functionality through API Routes.

Harabhara Focuses on Three Core Values:

1. Engagement

Users remain actively engaged through quests, streaks, levels, badges, and Gbit rewards.

2. Education

Users learn about the real environmental impact of their actions through charts, stats, and analytics.

3. Empowerment

Harabhara encourages users to build sustainable habits in a fun and rewarding manner.

The platform is optimized across devices, ensuring accessibility for users on mobile, tablet, or desktop. It creates a beautiful balance between gaming, sustainability, and technology.

1.2 Project Overview

Harabhara is a comprehensive eco-engagement system that motivates users to adopt environmentally responsible habits. It leverages interactive UI, gamified mechanisms, and data-driven insights to foster a community of conscious, active users.

Using Harabhara, users can:

- Complete eco-quests,
- Earn Gbits for verified sustainable actions,
- Scan product labels to validate recyclability,
- Unlock achievements,
- Track progress through intuitive graphs,
- Compete on leaderboards,
- And redeem Gbits for rewards.

This project demonstrates how Next.js can be leveraged to create a scalable, responsive, and immersive sustainability-focused application.

2. SCENARIO-BASED INTRODUCTION

2.1 A Real-World Scenario

Imagine you are a student committed to living more sustainably, but keeping track of eco-actions often becomes overwhelming. That's where Harabhara steps in.

You open the Harabhara app in the morning. A refreshing dashboard displays your Gbits, streak status, weekly actions, and current leaderboard position. Today's suggested quest challenges you to "Avoid Plastic for 24 Hours".

You begin the day by segregating your household waste. With a single tap, you log this eco-action. Instantly, your Gbits increase, your streak extends, and you unlock a new badge.

Later, you pick up a packaged item at the store. You open the Scan Page in Harabhara and scan its label. The system identifies whether the material is recyclable and rewards you accordingly. This small moment brings a sense of accomplishment.

In the evening, you check your impact analytics:

- Water saved,
- Plastic reduced,
- Emissions lowered.

A graph visualizes your weekly contribution, reminding you that your small actions matter.

This immersive cycle of **action → reward → insight → motivation** is the foundation of Harabhara.

2.2 Use Case Scenarios

Scenario	Description	Solution Provided by Harabhara
Tracking eco-friendly habits	Users want to record waste-segregation, recycling, etc.	One-click Eco-Action Logging
Staying consistent	Users struggle with routine	Streaks, badges, and daily actions
Learning sustainability	Users want actionable eco-tips	Educational quests with real-world benefits
Recycling confusion	Users don't know if products are recyclable	Scan-to-Earn item identification
Staying motivated	Users lose interest quickly	Gbits, level-ups, and leaderboard ranking
Wanting rewards	Users expect tangible benefits	Reward Store + Gbit redemption
Understanding impact	Users want proof their actions matter	Dashboard with visual analytics

3. Problem Statement

The majority of sustainability-focused platforms face issues such as:

- No gamification to motivate users
- No reward mechanism
- Lack of visual impact metrics
- Complicated interfaces
- No community-driven engagement

As a result, individuals often lose interest in maintaining environmentally friendly habits because they cannot see any short-term benefits or sense of achievement.

Therefore, there is a need for a platform that:

- Makes sustainability enjoyable
- Rewards users for eco-friendly behaviours
- Offers analytics to visualize impact
- Provides structured activities
- Encourages consistency
- Engages users through gamification

Harabhara solves this with an end-to-end gamified sustainability ecosystem.

4. Target Audience

4.1 Primary Audience

- Eco-conscious youth and students
- Sustainability enthusiasts
- Individuals seeking a greener lifestyle
- People participating in zero-waste programs
- NGOs and environmental groups

4.2 Secondary Audience

- Recycling agencies
- Corporate CSR teams
- Brands promoting green initiatives
- Schools and colleges running eco-clubs

4.3 User Demographics

- **Age:** 12–60
- **Geography:** Global
- **Technical Skill:** Beginner to Intermediate
- **Devices:** All modern browsers supported

5. Project Goals and Objectives

5.1 Primary Goal

To design a digital platform that motivates environmentally sustainable actions through interactive gamification and reward mechanisms.

5.2 Specific Objectives

- Build an **intuitive UI** for eco-action tracking
- Implement **Gbit rewards** for tasks and verified actions
- Encourage participation through **quests and challenges**
- Provide meaningful insights using visual dashboards
- Enable **scan-based recyclable detection**
- Build a scalable **Next.js-based architecture**
- Promote long-term sustainability habits using playful design

6. Key Features

Below is a detailed, expanded feature list inspired by FitFlex's descriptive structure but fully tailored to Harabhara.

6.1 Core Features

Feature	Description	Technical Implementation
Eco-Action Logging	Users log daily green actions like recycling, using public transport, or saving water	Next.js pages + Context API for state management
Gamified Quests	Structured sustainability missions with difficulty levels	Dynamic rendering from db.json
Gbit Rewards System	Digital currency awarded for eco-actions	API route updates user Gbit count
Scan-to-Earn	Detect recyclable items by scanning labels	API-based item validation
Leaderboard	Ranks users based on Gbit accumulation	Server-side ranking
Dashboard Analytics	Graphs for impact: plastic reduced, emissions saved, water saved	Chart libraries + computed metrics
Rewards Store	Redeem Gbits for eco-friendly products or coupons	Reward redemption module
Game Layer	XP, levels, badges, streaks	Context-based user progression logic

6.2 Advanced Features

Advanced Feature	Description	Benefit
Streak Tracker	Daily activity streak encourages habit-building	Higher engagement & consistency
Achievement Badges	Special badges for milestones	Motivational boost
Impact Visualization	Converts Gbits into real environmental metrics	Educates users visually
Eco-Community Rankings	Compete with others globally	Adds social competition
Reward Points Ledger	Transaction history of earned/spent Gbits	Transparency

7. Prerequisites

To build Harabhara, the following tools and knowledge are essential:

Software Requirements

- Node.js
- Next.js
- Tailwind CSS
- Git

Knowledge Requirements

- React and Component Architecture
- Next.js File-Based Routing
- API Development
- JSON-based local database structure
- Responsive UI Design

8. Required Libraries & Packages

Package	Version	Purpose
next	Latest	Core framework
react	Latest	Component rendering
tailwindcss	3.x	Responsive UI styling
axios/fetch	—	API communication
chart libraries	—	Graphical analytics
zustand/context	—	State management
json storage	—	Quests, rewards, user data

9. Project Structure

```
ECO_Quest-main/
│
├── data/
│   └── db.json
│
├── public/
│   ├── homepage_ss.png
│   ├── jhad-pic.jpg
│   └── protect-earth.jpg
│
├── src/
│   ├── app/
│   │   ├── dashboard/
│   │   ├── daily-actions/
│   │   ├── quests/
│   │   ├── rewards/
│   │   ├── scan/
│   │   ├── game-layer/
│   │   ├── how-it-works/
│   │   ├── login/
│   │   └── api/
│   ├── components/
│   └── context/
```

10. Project Workflow

Step-by-step Flow

1. User opens Harabhara
2. Dashboard loads user Gbits and impact stats
3. User selects an eco-action or quest
4. API validates and updates data
5. Gbits increase, levels update
6. Leaderboard ranking recalculates
7. Dashboard visuals update in real-time

11. Component Implementations (Expanded)

11.1 Dashboard Component

- Displays total Gbits
- Shows completed quests
- Visual charts for weekly eco-actions
- Fetches user stats via API routes

11.2 Daily Actions Component

- Pre-defined daily tasks (e.g., saving electricity)
- Increment Gbits upon completion

11.3 Quests Module

- Long-term sustainability challenges
- Each quest gives XP and Gbits
- Listed using db.json

11.4 Scan Module

- Unique feature for recyclability detection
- Simulates scanning using API logic
- Rewards Gbits for valid recyclable items

11.5 Rewards Component

- Displays redeemable items
- Deducts Gbits upon redemption
- Updates user's Gbit ledger

11.6 Game Layer

- Levels, XP bars, badges, achievements
- Increases user engagement

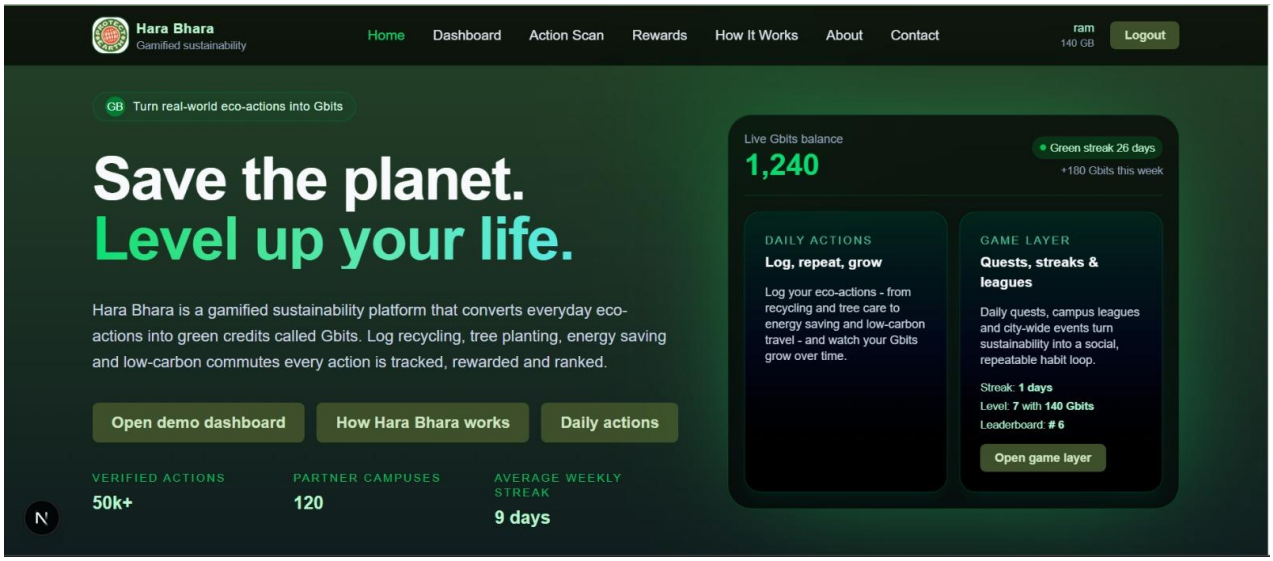
12. Running the Application

- npm install
- npm run dev

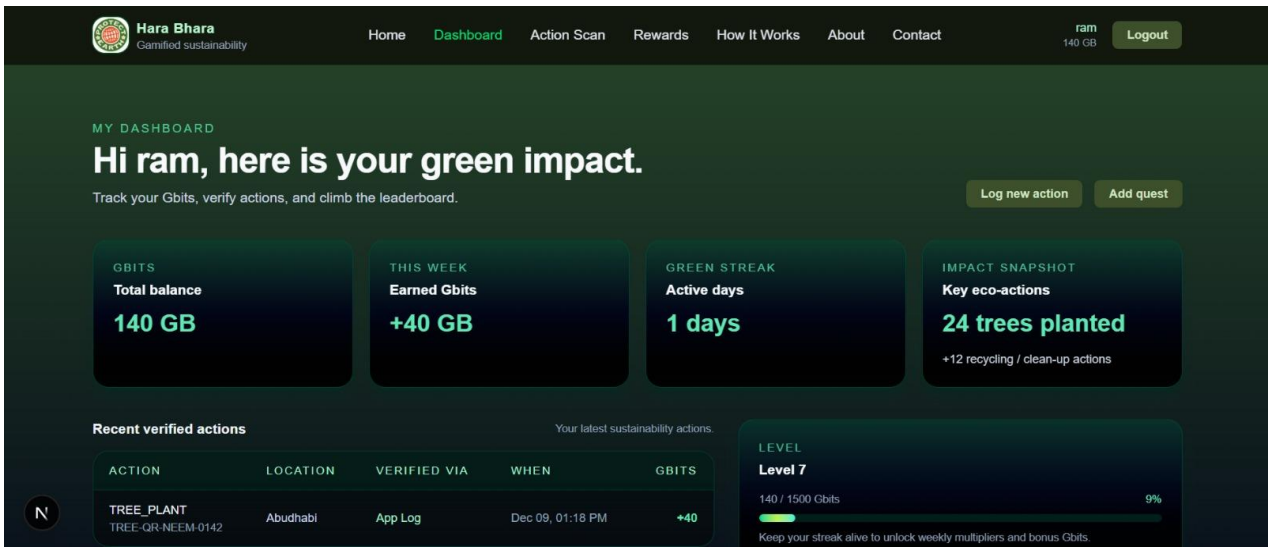
Next.js handles both frontend and backend operations.

13. Screenshots

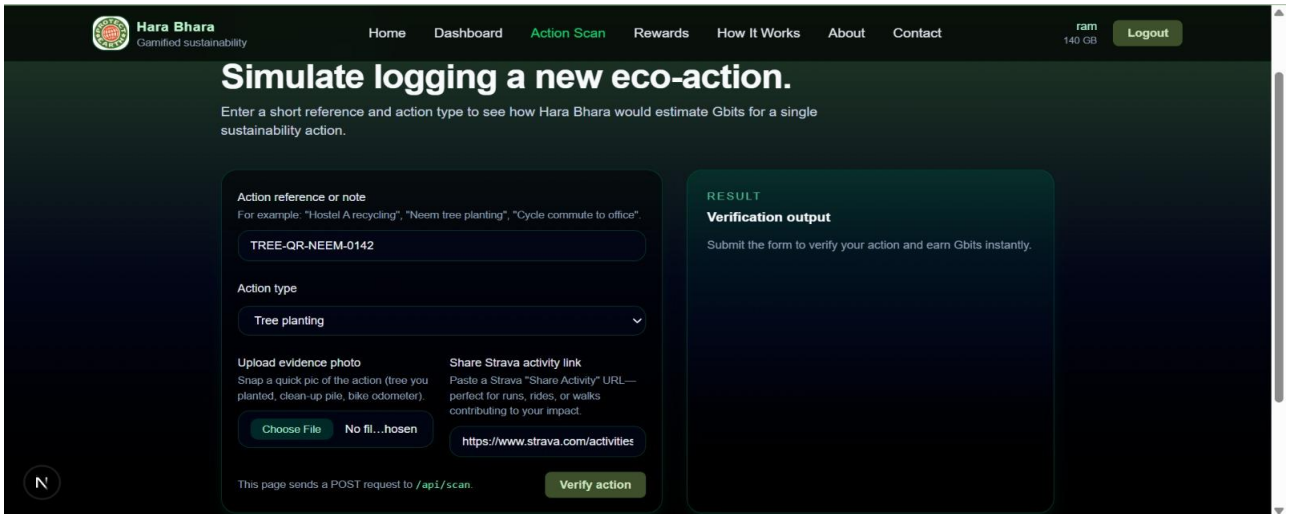
13.1 Home Page – Sustainability Overview Screen

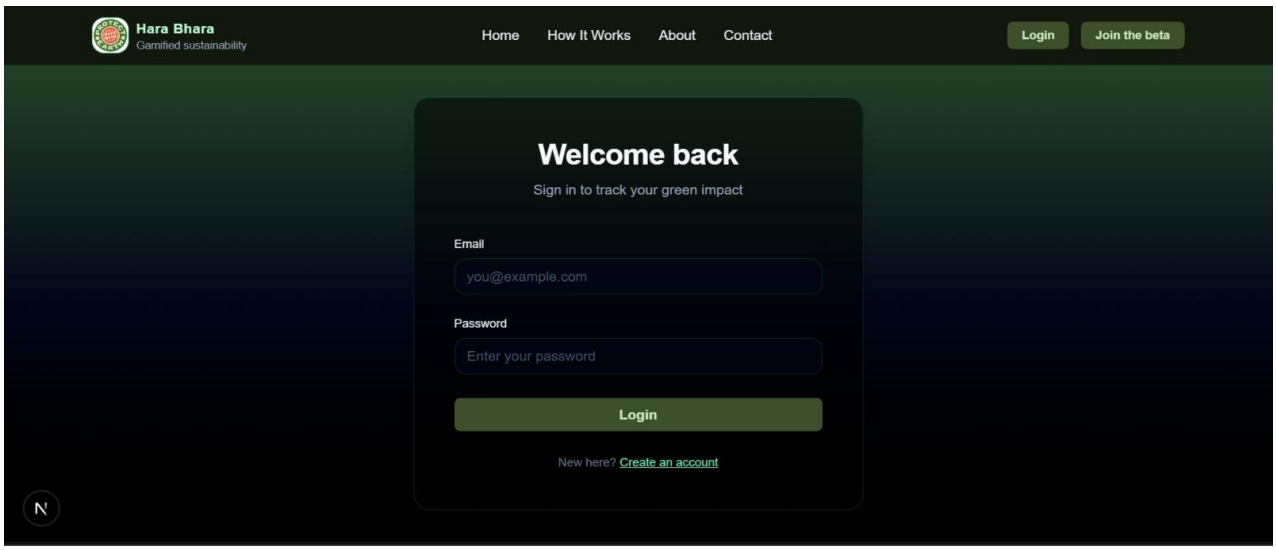


13.2 Dashboard – Green Impact Summary

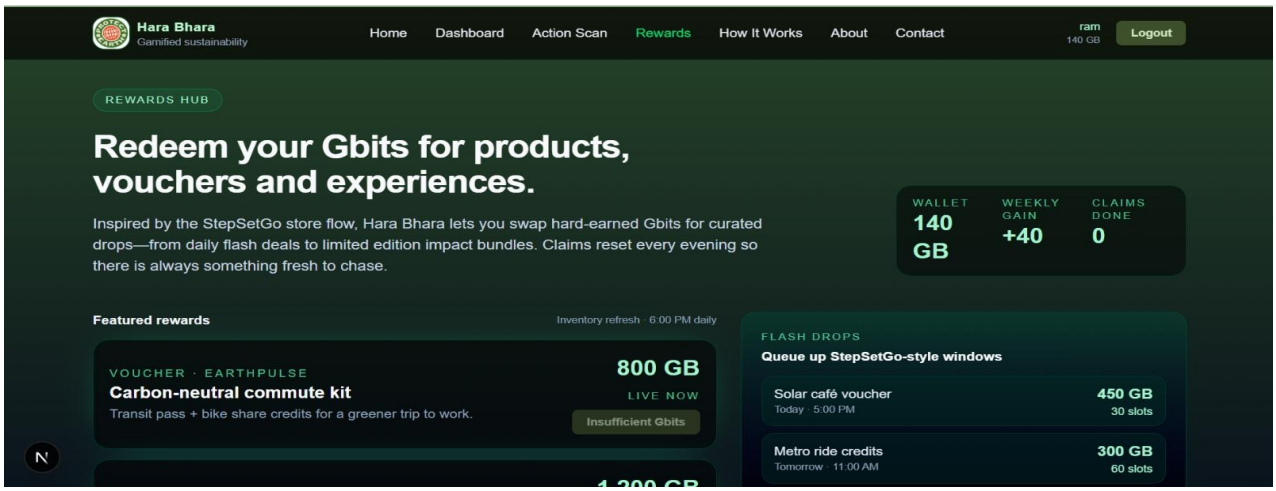


13.3 Action Scan Page – Log and Verify Eco-Action

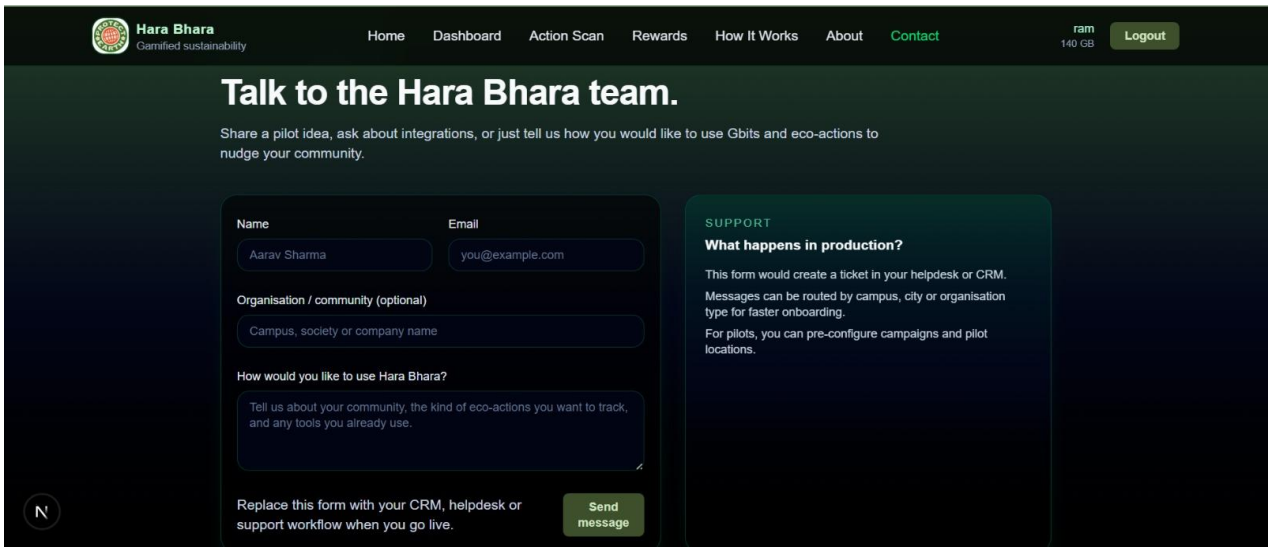




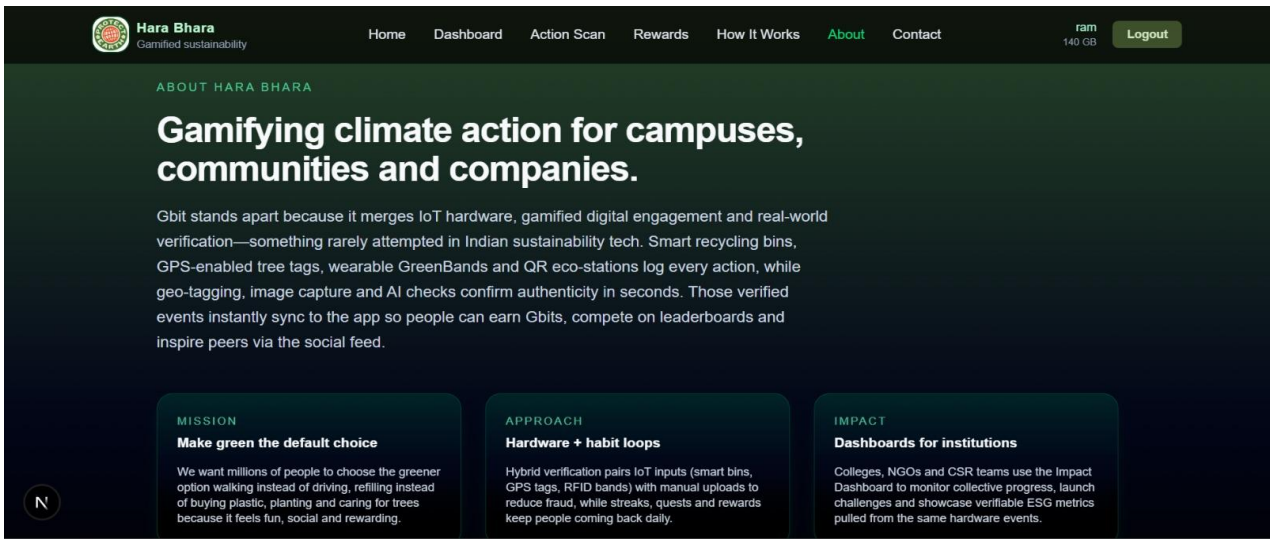
13.4 Rewards Hub – Redeem Gbits for Vouchers and Products



13.5 Contact Page – User Inquiry and Support Form



13.6 About Page – Platform Mission and Sustainability Approach



14. Conclusion

Harabhara demonstrates how modern web technologies, gamification frameworks, and sustainability principles can converge into a single, impactful platform. It encourages users not only to adopt eco-friendly habits but to stay committed through a playful, reward-driven ecosystem.

This project highlights the capability of Next.js as a full-stack solution and showcases the importance of experience design in behavioural change.

15. Future Enhancements (Expanded)

- Full user authentication with JWT
- Integration with real-world recycling centres
- AI-powered object detection during scanning
- Blockchain-based verification of eco-actions
- Marketplace for sustainable brands
- Carbon footprint calculator
- Mobile application version (React Native)

16. References

- Next.js Documentation – https://nextjs.org/docs
- React Documentation – https://react.dev
- Tailwind CSS – https://tailwindcss.com/docs
- MDN Web Docs – https://developer.mozilla.org
- Axios Documentation – https://axios-http.com/docs
- Recharts Documentation – https://recharts.org/en-US/
- Environmental Sustainability Guidelines – https://www.unep.org