

**Harabhara – Gamified Sustainability Platform**  
**A project Report**

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*In partial fulfilment for the requirements of the project*

**BACHELOR OF TECHNOLOGY IN COMPUTER SCIENCE  
AND ENGINEERING**



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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:

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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

Date:09/12/2025

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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 Harabbara.

### 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	Educes 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

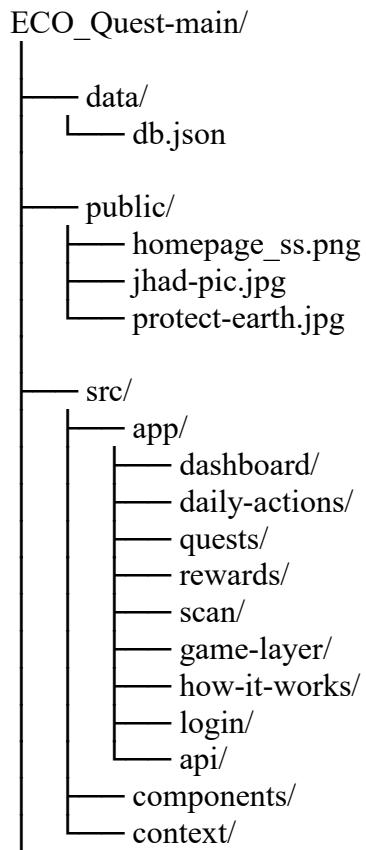
### Knowledge Requirements

- 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



## 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

The screenshot shows the Hara Bhara homepage with a dark green background. At the top, there's a navigation bar with links for Home, Dashboard, Action Scan, Rewards, How It Works, About, Contact, and a user profile section showing 'ram' and '140 GB'. A 'Logout' button is also present. Below the navigation, a banner reads 'Turn real-world eco-actions into Gbits'. The main headline is 'Save the planet. Level up your life.' followed by a subtext: 'Hara Bhara is a gamified sustainability platform that converts everyday eco-actions into green credits called Gbits. Log recycling, tree planting, energy saving and low-carbon commutes every action is tracked, rewarded and ranked.' There are three buttons: 'Open demo dashboard', 'How Hara Bhara works', and 'Daily actions'. Below these are statistics: 'VERIFIED ACTIONS 50k+', 'PARTNER CAMPUSES 120', and 'AVERAGE WEEKLY STREAK 9 days'. To the right, there's a large box for 'Live Gbits balance' showing '1,240' with a 'Green streak 26 days' badge. It contains sections for 'DAILY ACTIONS' (Log, repeat, grow) and 'GAME LAYER' (Quests, streaks & leagues). A 'Streak: 1 days' badge is also visible. At the bottom right of the box is a 'Open game layer' button.

### 13.2 Dashboard – Green Impact Summary

The screenshot shows the Hara Bhara dashboard with a dark green background. At the top, there's a navigation bar with links for Home, Dashboard, Action Scan, Rewards, How It Works, About, Contact, and a user profile section showing 'ram' and '140 GB'. A 'Logout' button is also present. Below the navigation, a banner reads 'MY DASHBOARD' and 'Hi ram, here is your green impact.'. Below this, a subtext says 'Track your Gbits, verify actions, and climb the leaderboard.' There are four main stats boxes: 'GBITS Total balance 140 GB', 'THIS WEEK Earned Gbits +40 GB', 'GREEN STREAK Active days 1 days', and 'IMPACT SNAPSHOT Key eco-actions 24 trees planted'. Below these are sections for 'Recent verified actions' (listing an entry: ACTION TREE\_PLANT, LOCATION Abudhabi, VERIFIED VIA App Log, WHEN Dec 09, 01:18 PM, GBITS +40) and 'Your latest sustainability actions.' At the bottom right, there's a 'LEVEL' section showing 'Level 7' with a progress bar at 9% completion, and a note: 'Keep your streak alive to unlock weekly multipliers and bonus Gbits.'

### 13.3 Action Scan Page – Log and Verify Eco-Action

The screenshot shows the 'Action Scan' page of the Hara Bhara platform. At the top, there's a navigation bar with links for Home, Dashboard, Action Scan (which is highlighted in green), Rewards, How It Works, About, and Contact. On the right side of the header, there are status indicators for RAM (140 GB) and a Logout button. The main content area has a dark background with white text. It starts with a heading 'Simulate logging a new eco-action.' followed by a note: 'Enter a short reference and action type to see how Hara Bhara would estimate Gbits for a single sustainability action.' Below this are two main input sections. The left section is labeled 'Action reference or note' and contains a text input field with the value 'TREE-QR-NEEM-0142'. The right section is labeled 'Action type' and has a dropdown menu set to 'Tree planting'. Further down, there are fields for 'Upload evidence photo' (with a placeholder 'Choose File' and 'No file chosen') and 'Share Strava activity link' (with a placeholder URL 'https://www.strava.com/activities'). A note at the bottom of this section says 'This page sends a POST request to /api/scan.' To the right of these input sections is a 'RESULT' box titled 'Verification output' which contains the instruction 'Submit the form to verify your action and earn Gbits instantly.'

The screenshot shows the login page of the Hara Bhara platform. At the top, there's a navigation bar with links for Home, How It Works, About, and Contact. On the right side of the header, there are buttons for Login and Join the beta. The main content area has a dark background with white text. It starts with a 'Welcome back' message and a note: 'Sign in to track your green impact'. Below this are two input fields: 'Email' (containing 'you@example.com') and 'Password' (placeholder 'Enter your password'). A large green 'Login' button is centered below the password field. At the bottom of the form, there's a link 'New here? [Create an account](#)'.

### 13.4 Rewards Hub – Redeem Gbits for Vouchers and Products

The screenshot shows the 'Rewards Hub' page of the Hara Bhara platform. At the top, there's a navigation bar with links for Home, Dashboard, Action Scan, Rewards (which is highlighted in green), How It Works, About, and Contact. On the right side of the header, there are status indicators for RAM (140 GB) and a Logout button. The main content area has a dark background with white text. It starts with a heading 'REDEEM YOUR GBITS FOR PRODUCTS, VOUCHERS AND EXPERIENCES.' followed by a note: 'Inspired by the StepSetGo store flow, Hara Bhara lets you swap hard-earned Gbits for curated drops—from daily flash deals to limited edition impact bundles. Claims reset every evening so there is always something fresh to chase.' Below this is a 'Featured rewards' section with a 'VOUCHER · EARTHPULSE Carbon-neutral commute kit' offer. This offer includes a '800 GB' reward, a 'LIVE NOW' button, and a note: 'Transit pass + bike share credits for a greener trip to work.' To the right of this is a 'WALLET' summary showing '140 GB' and 'WEEKLY GAIN +40'. Further down is a 'FLASH DROPS' section with two items: 'Solar café voucher' (450 GB, 30 slots) and 'Metro ride credits' (300 GB, 60 slots). A note at the bottom of the page says 'Inventory refresh: 6:00 PM daily'.

## 13.5 Contact Page – User Inquiry and Support Form

The screenshot shows the Hara Bhara contact page. At the top, there's a navigation bar with links for Home, Dashboard, Action Scan, Rewards, How It Works, About, Contact, and Logout. A user profile icon indicates 140 GB of RAM. The main section features a heading "Talk to the Hara Bhara team." and a sub-instruction "Share a pilot idea, ask about integrations, or just tell us how you would like to use Gbits and eco-actions to nudge your community." Below this is a form with fields for Name (Aarav Sharma), Email (you@example.com), Organisation / community (optional) (Campus, society or company name), and a text area for "How would you like to use Hara Bhara?" containing placeholder text about tracking eco-actions. To the right, a "SUPPORT" sidebar titled "What happens in production?" explains that the form creates a ticket in helpdesk/CRM, messages can be routed by location, and pilots can pre-configure campaigns. It also mentions replacing the form with CRM workflows. A "Send message" button is at the bottom right of the form.

## 13.6 About Page – Platform Mission and Sustainability Approach

The screenshot shows the Hara Bhara About page. The top navigation bar is identical to the contact page. The main content area has a heading "ABOUT HARA BHARA" and a large sub-heading "Gamifying climate action for campuses, communities and companies." Below this is a paragraph explaining Gbit's unique value proposition: merging IoT hardware, gamified digital engagement, and real-world verification. Three callout boxes provide more detail: "MISSION" (Make green the default choice), "APPROACH" (Hardware + habit loops), and "IMPACT" (Dashboards for institutions). The "APPROACH" box includes a note about hybrid verification using IoT inputs and manual uploads to reduce fraud.

## 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>