Innovation & Entrepreneurship Hub for Educated Rural Youth (SURE Trust – IERY)

Clean and Green Technology

The domain of the Project:

DSA in Java

Team Mentors (and their designation):

Mr. Karthik R

(Instructor – SURE Trust / Software QA Engineer – Jio Platforms Ltd)

Mr. Lijo Joseph

(Technical Mentor – SURE Trust / SE 3 – Amazon)

Team Members:

Mr. Sukanta Kumar Pradhan
Mr. Jeetendra Singh
Ms. Haneefa Shaik
Ms. Mansi Kharb

Period of the project

July 2025 to December 2025

Declaration

The project titled **"Clean and Green Technology"** has been mentored by **Mr. Karthik R** and **Mr. Lijo Joseph**, organised by SURE Trust, from July 2025 to December 2025, for the benefit of the educated unemployed rural youth for gaining hands-on experience in working on industry relevant projects that would take them closer to the prospective employer. I declare that to the best of my knowledge the members of the team mentioned below, have worked on it successfully and enhanced their practical knowledge in the domain.

Team Members:

Mr. Sukanta Kumar Pradhan

Mentor's Name: Mr. Karthik R
Designation—Company Name:
Instructor – SURE Trust / Software QA Engineer – Jio Platforms Limited

Mentor's Name: Mr. Lijo Joseph
Designation—Company Name:
Technical Mentor – SURE Trust / SE 3 – Amazon

Prof. Radhakumari Challa
Executive Director & Founder
SURE Trust

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Executive Summary

Clean and Green Technology is a web-based project developed to address the increasing problem of plastic waste pollution in our surroundings. Improper disposal of plastic waste causes environmental pollution, harms animals, blocks drainage systems, and affects human health. The main objective of this project is to promote responsible waste management by actively involving citizens using a technology-driven and reward-based approach.

The project provides a digital platform where users can participate in cleanliness and sustainability activities and earn **Green Coins** as rewards. The municipality collects the waste reported by users and divides it into two parts: **recyclable plastic** and **biodegradable compostable waste**. The recyclable plastic is sent to recycling centers, and the revenue earned from selling it is used to buy plants. The biodegradable waste is processed in compost tanks and converted into natural compost. Both plants and compost are listed on the platform, where users can redeem their Green Coins. This ensures a **win-win system** — citizens are rewarded, municipalities generate funds, and the environment becomes cleaner and greener.

The application includes modules like user authentication, Green Coin management, an eco-friendly marketplace, educational content on sustainability, and order management. The system is developed using modern full stack technologies. **React** is used for building a user-friendly frontend interface, **Spring Boot** is used for backend logic and API handling, and **MySQL** is used for secure and structured data storage. The platform is designed to ensure transparency, usability, and scalability.

Overall, Clean and Green Technology demonstrates how technology can be used to encourage community participation, promote environmental awareness, and support sustainable practices. This project also provided valuable hands-on experience in full stack application development and real-world problem solving.

Introduction

Plastic waste pollution is a growing environmental problem caused by the excessive use of plastic and improper disposal methods. Plastic waste is commonly found on roads, water bodies, and public places, leading to environmental degradation, blockage of drainage systems, and harm to animals and human health. Since plastic takes hundreds of years to decompose, effective waste management has become essential. This project is developed to address these issues by using technology to promote cleanliness and environmental responsibility.

The major problem addressed by this project is the improper disposal and poor management of plastic waste. Lack of public awareness, absence of an easy reporting system, and no reward-based motivation result in low citizen participation.
The goal of this project is to encourage responsible waste management by involving citizens through a digital platform that rewards positive environmental actions and promotes sustainability.

The scope of the project includes user registration, Green Coin management, an eco-friendly marketplace, educational content on sustainability, and order management. The system is designed to support waste reporting and reward distribution in a structured manner.
However, the project is limited to a web-based platform and depends on user participation and municipal support for effective operation.

The innovative aspect of this project lies in combining waste management with a reward-based digital system. By introducing Green Coins, the project motivates citizens to actively participate in environmental protection. The integration of education, rewards, and marketplace features creates a unique approach to building long-term sustainable habits using technology.

Project Objectives

The main objectives of the **Clean and Green Technology** project are as follows:

- To develop a web-based application that promotes cleanliness and environmental sustainability.
- To encourage citizen participation in waste management through a reward-based system using Green Coins.
- To create awareness about proper waste disposal and sustainable practices through educational content.
- To provide an eco-friendly marketplace where users can utilize earned Green Coins.
- To design a structured and user-friendly system for managing orders, rewards, and user activities.
- To support long-term environmental responsibility by motivating users with digital incentives.

Methodology and Results

Methods / Technology Used

The **Clean and Green Technology** project was developed using modern web technologies and a modular development approach.

- **Frontend:** React – for building a responsive and interactive user interface
- **Backend:** Spring Boot – handles authentication, business logic, API management, and data processing
- **Database:** MySQL – stores user information, Green Coin details, orders, and transaction history
- **APIs:** REST APIs – enable smooth communication between frontend and backend

This technology stack ensures scalability, security, and better performance.

Tools / Software Used

- **IntelliJ IDEA** – for backend development using Spring Boot
- **Visual Studio Code** – for frontend development using React
- **MySQL Workbench** – for database management
- **Postman** – for testing backend APIs
- **GitHub** – for version control
- **Google Chrome** – for testing and debugging the application

Data Collection Approach

The project primarily uses **system-generated data**:

- User data collected during **signup and login**
- Green Coin data generated based on user activity
- Order and transaction data recorded from the **Marketplace module**
- All data is securely stored in the MySQL database

No external surveys or manual data collection were required.

Project Architecture

The project follows a **three-tier architecture**:

1. **Presentation Layer (Frontend)**
    - Developed using React
    - Handles user interactions, forms, dashboards, marketplace UI, and order pages
2. **Application Layer (Backend)**
    - Developed using Spring Boot
    - Contains business logic, authentication, API handling, and validations
3. **Data Layer (Database)**
    - MySQL database
    - Stores user details, Green Coins, orders, order history, and transactions

This architecture improves maintainability, scalability, and security of the application.

Project Working

The working of the project includes the following modules:

- **Home Page**
  Provides an overview of the platform, highlighting key features like Green Coin rewards, marketplace, and sustainability initiatives. Users can easily navigate to other sections of the application from this page.
- **Login and Signup Page**
  Allows users to securely register and log in to the application.
- **Report Waste Module**
  Enables users to upload photos of waste, select the type of waste, and provide location details.
- **Green Coin Dashboard**
  Displays earned coins, pending coins awaiting verification, and transaction history. Provides transparency and motivates continued participation.
- **Courses Module**
  Provides educational content on waste management, recycling, and sustainability. Users can read materials and take quizzes to earn Green Coins for successful completion.
- **Marketplace Module**
  Users can view eco-friendly products like plants and compost and redeem them using Green Coins.
- **Checkout Page**
  Calculates the total amount based on selected quantity and displays the final order summary.
- **Order Success and Order History Pages**
  Confirms successful orders and allows users to track previous orders and redemption history.

Learning and Reflection

During this internship and project, I gained valuable hands-on experience in full stack web development and practical problem-solving.

- **Technical Skills:**
  I learned how to develop a complete web application using **React** for the frontend, **Spring Boot** for the backend, and **MySQL** for database management.
  I gained experience in creating REST APIs, integrating frontend with backend, and designing a structured database for user data, transactions, and orders.

- **Project Management:**
  I learned how to plan and implement different modules such as Green Coin management, marketplace, checkout, and order tracking.
  Working on multiple interconnected modules improved my ability to manage tasks and understand system flow.

- **Problem-Solving & Innovation:**
  While implementing features like Green Coin calculation and checkout logic, I developed solutions to real-world challenges.
  I also understood the importance of modular coding and testing to maintain a reliable application.

- **Soft Skills:**
  Through interaction with mentors and participation in weekly meetings, I improved my communication, teamwork, and professional skills.
  LST and SST sessions helped me develop a disciplined approach, time management, and ethical responsibility.

- **Reflection:**
  This project gave me confidence to apply theoretical knowledge in a practical scenario. It also highlighted how technology can be used to solve real-world environmental problems and encourage community participation.

Conclusion and Future Scope

Future Scope

The project has potential for further enhancements and expansion, including:

- **AI Waste Detection:**
  Using image recognition to automatically classify waste as biodegradable or recyclable.
- **Location-based Reporting:**
  Implementing live GPS tracking to verify waste location and improve municipal efficiency.
- **Mobile Application:**
  Developing a mobile version of the platform to reach more users and increase participation.
- **Expanded Rewards and Marketplace:**
  Adding more eco-friendly products and services to the marketplace to keep users engaged.
- **Data Analytics & Dashboard:**
  Introducing analytics for municipal authorities to monitor waste patterns, community engagement, and environmental impact.
- **Scaling to More Cities:**
  Deploying the platform in additional municipalities and regions for larger community impact.

Conclusion

The **Clean and Green Technology** project demonstrates how technology can be effectively used to address environmental challenges and promote sustainable practices.

By combining a **reward-based system** with community participation, this project encourages citizens to take responsibility for proper waste management.
The Green Coin system, marketplace, and educational modules together create a **motivated and informed user base**, while helping municipalities manage waste efficiently.

Overall, this project provided hands-on experience in **full stack development**, problem-solving, and project management.
It also showed the importance of **user-friendly design, backend logic, and database management** in building a real-world web application.