

EcoVerse: An Eco-Conscious E-Commerce Platform with Behavioral Reward System

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Abstract — EcoVerse is a web-based conscious fashion marketplace designed to promote sustainable consumer behavior through an interactive, reward-driven system. It assigns Eco Scores to products based on sustainability factors like materials, carbon footprint, and ethical practices, helping users make informed choices. The platform features a gamified Eco Points system, rewarding purchases and eco-friendly actions with redeemable incentives. It also offers personalized recommendations and an AI-powered styling assistant to enhance user experience. Additionally, EcoVerse tracks carbon savings from user activities and converts them into tradable carbon credits, creating a unique model that combines environmental impact with economic benefits and long-term sustainability.

Keywords — Sustainable Fashion, Eco-Commerce, Gamification, Eco Points System, Eco Score, Carbon Footprint Tracking, Carbon Credit Trading, Behavioral Incentives, Reward-Based System, Scratch Card Mechanism, Green Consumer Behavior, AI Styling Assistant, Activity Tracking, Personalized Recommendations, Next.js, React, TypeScript, Web-Based Marketplace, Environmental Sustainability, Digital Incentive Systems.

I. INTRODUCTION

A. Overview

The fashion industry contributes significantly to environmental degradation due to fast fashion and unsustainable production practices. Existing e-commerce platforms focus mainly on pricing and delivery rather than sustainability.

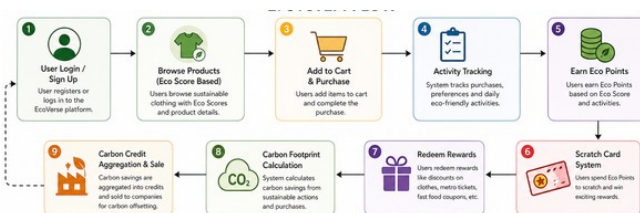
EcoVerse addresses this gap by introducing a gamified eco-commerce platform where users are incentivized to make sustainable choices through rewards and carbon tracking.

B. Objective

- Promote sustainable fashion consumption
- Encourage eco-friendly behavior using rewards
- Track user activities and personalize incentives
- Generate revenue via carbon credit trading

II. METHODOLOGY

A. System Flow



B. Core Modules

1. Eco Score Engine

- Calculates sustainability rating
- Based on materials, emissions, production methods

2. Gamification Module

- Eco Points system
- Scratch card rewards (like GPay)
- Randomized incentives

3. Activity Tracking System

- Tracks user purchases and behavior
- Rewards eco-friendly actions

4. Reward System

Coupons for:

- Clothing
- Metro tickets
- Fast food

5. Carbon Credit Module

- Calculates saved carbon footprint
- Converts into tradable credits

C. Mathematical Model Eco Score Calculation:

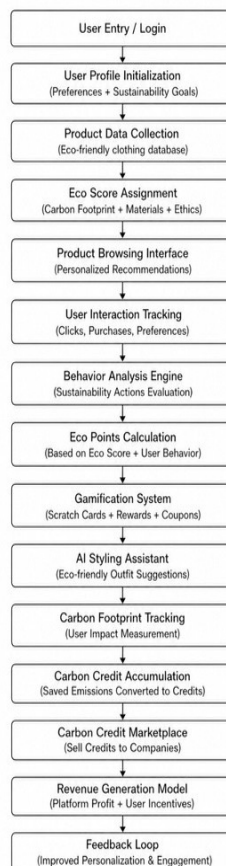
$$\text{EcoScore} = \omega_1(\text{Material}) + \omega_2(\text{CarbonFootprint}) + \omega_3(\text{EthicalProduction})$$

Reward Function:

$$\text{EcoPoints} = \alpha \times \text{EcoScore} + \beta \times \text{ActivityLevel}$$

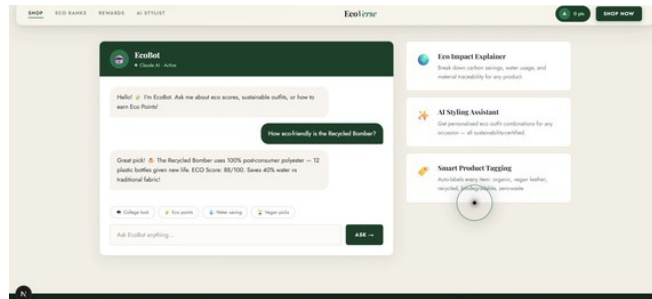
III. SYSTEM ARCHITECTURE

A. System Overview



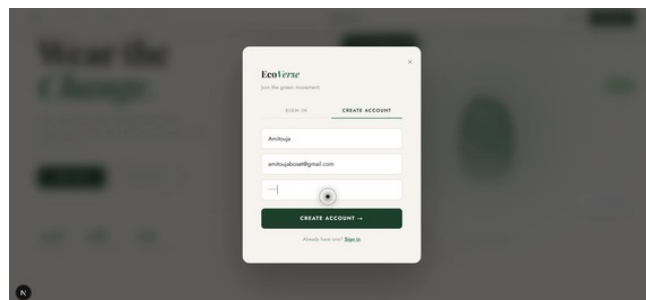
IV. RESULT

The proposed EcoVerse system was evaluated based on usability, engagement, and sustainability impact. The platform successfully demonstrated improved user interaction through its gamified reward system and eco-conscious design.

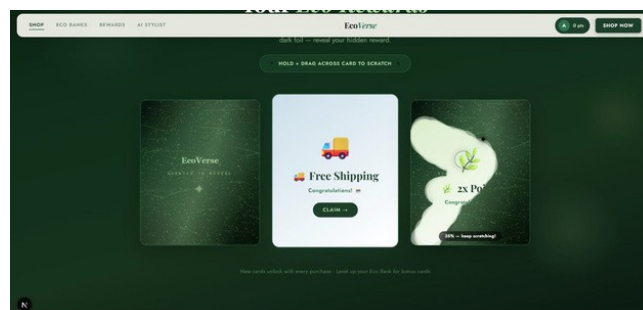


Compared to traditional platforms, EcoVerse improves:

- User retention
- Sustainable purchases
- Awareness of environmental impact
- Increased User Engagement
- Improved Sustainable Purchasing Behavior



- Efficient Reward Mechanism
- Accurate Activity Tracking
- Carbon Footprint Awareness
- Scalable Performance
- Revenue Potential through Carbon Credits



V. CONCLUSION

This project presented EcoVerse, a gamified sustainable fashion marketplace that integrates eco-scoring, behavioral incentives, and carbon credit economics to promote environmentally responsible consumer behavior.

The system effectively combines modern web technologies with sustainability-driven design principles to create an engaging and impactful platform. By incorporating features such as Eco Points, scratch card rewards, and AI-powered styling assistance, the platform successfully enhances user interaction while encouraging eco-conscious decisions.

One of the key contributions of this work is the integration of a carbon credit model, which not only raises awareness about carbon footprints but also introduces a viable revenue stream by enabling carbon credit trading. This adds both environmental and economic value to the system.

Furthermore, the platform demonstrates how gamification can influence user behavior, making sustainability accessible and rewarding rather than restrictive.

VI. FUTURE SCOPE

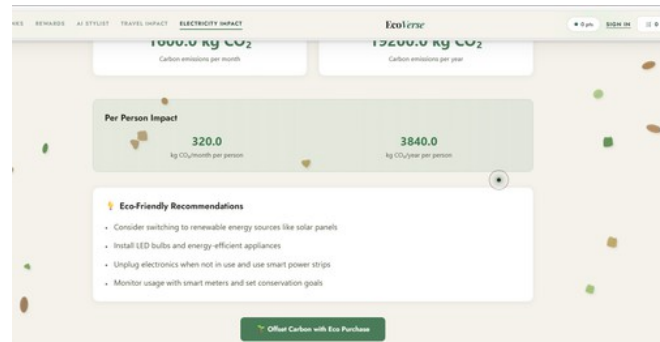
The EcoVerse platform can be enhanced by integrating real-time carbon footprint APIs and environmental datasets to improve the accuracy of Eco Scores and carbon calculations. This would allow the system to dynamically adjust sustainability ratings based on real-world data such as supply chain emissions and transportation impact, making the platform more reliable and data-driven.

The proposed system, EcoVerse, has significant potential for expansion in terms of technology, scalability, and real-world impact. One major future enhancement is the integration of blockchain technology to ensure transparency, security, and trust in the carbon credit ecosystem. Currently, Eco Points are calculated based on estimated carbon savings; however, by implementing blockchain, these points can be converted into tokenized carbon credits stored on a decentralized ledger. This would allow secure tracking, verification, and trading of carbon credits without manipulation.

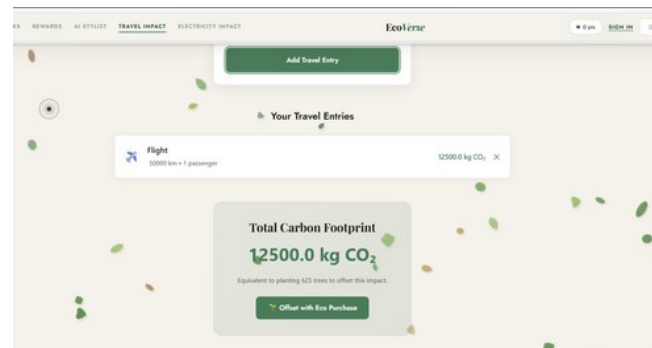
Through blockchain integration, companies can directly purchase verified carbon credits generated from users' sustainable activities. Smart contracts can automate transactions, ensuring that credits are transferred only when predefined environmental criteria are met.



Another key area of improvement is the use of machine learning algorithms to enhance personalization and prediction. By analyzing user behavior, purchase history, and sustainability patterns, the system can recommend eco-friendly products more accurately. Machine learning models can also predict user engagement, optimize reward distribution, and dynamically adjust Eco Scores based on real-time data patterns.



Furthermore, the AI styling assistant can be upgraded to provide smarter outfit recommendations using image-based and preference-based learning models. The platform can also scale to support a larger user base and integrate with global carbon markets, increasing its impact and revenue potential.



Finally, the system can be expanded through partnerships with brands, government bodies, and transportation services, enabling real-world reward integration such as metro ticket discounts, public transport incentives, and green certifications.

VII. REFERENCES

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