Aparna Mote, 2025, 13:5
ISSN (Online): 2348-4098
ISSN (Print): 2395-4752

International Journal of Science, Engineering and Technology
An Open Access Journal

EcoXchange: AI-Powered Reuse & Thrifting Marketplace

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Abstract- This paper introduces EcoXchange, an AI-based platform with the goal of supporting sustainable practices through thrifting, gamification, and waste categorization. The platform stimulates reuse by allowing users to trade pre-owned products in a thrifting marketplace. Gamification tactics, including reward-based models, are incorporated to maximize user participation in sustainable activities. Moreover, artificial intelligence technologies such as image recognition are used for waste classification, enhancing the efficiency of recycling. The study examines user activity in the thrifting market, participation through gamified functions, and the operation of AI-based waste sorting. The results demonstrate the promise of integrating thrifting, gamification, and AI to enable environmental sustainability.

Keywords: Thrifting, gamification, artificial intelligence, waste classification, recycling behavior, sustainability.

I. INTRODUCTION

This paper presents EcoXchange, a new platform that incorporates thrifting, gamification, and artificial intelligence (AI) to facilitate sustainable waste management and reuse. Thrifting stimulates reuse of second-hand products, conserves resources, and prolongs product lifecycles. Gamification, use of game-design elements, maximizes user interaction with sustainable practices. Technologies based on AI, such as image recognition, facilitate precise waste classification for effective recycling.

II. METHODOLOGY

The study comprises three core components: a thrifting marketplace, gamification for user engagement, and AI-based waste classification.

Thrifting Marketplace

EcoXchange includes a digital marketplace where users can list, exchange, or purchase pre-owned items such as clothing, electronics, and household goods. The platform tracks user activity, including the number of items listed and exchanged, to assess the impact of thrifting on waste reduction.

Gamification Approach

Gamification features, such as points, badges, and leaderboards, were implemented within EcoXchange to motivate sustainable behaviors. Users earn rewards for actions like listing items for thrifting or recycling correctly.

AI-Based Waste Classification

An AI classifier was developed to identify and sort waste into categories such as plastic, paper, glass, and organic based on input data, such as images. This enables efficient recycling by streamlining the sorting process without manual intervention.

Table 1: Structure of EcoXchange Platform Components

Component	Description
Thrifting Marketplace	Platform for exchanging pre-owned goods
Gamification	Points, badges, and leaderboards for user engagement
Waste Classification	AI-based sorting of waste into categories

III. WORKFLOW

The thrifting marketplace facilitated the exchange of pre-owned goods, reducing the demand for new products. Gamification features within EcoXchange encouraged user participation in sustainable practices. The AI classifier effectively categorized waste, streamlining recycling processes. Figure 1 illustrates the workflow of the EcoXchange platform.

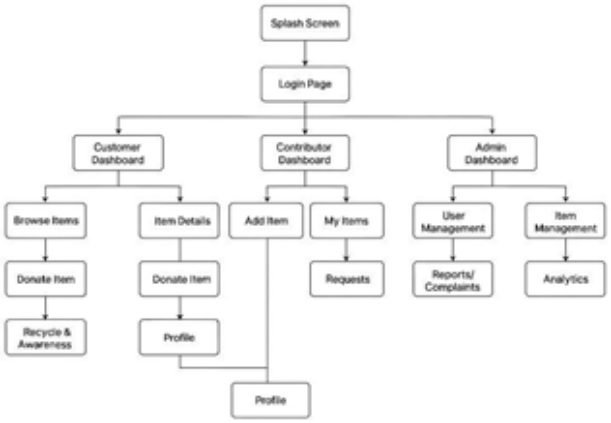

Figure 1: EcoXchange Platform Workflow

IV. CONCLUSION

EcoXchange shows that combining a thrifting marketplace, gamification, and AIdriven waste sorting promotes sustainable practices and effective waste management. The platform supports reuse as it improves recycling procedures. Additional work could extend the marketplace to cover additional product types and improve AI classification for more variety in waste items.

ACKNOWLEDGEMENT

The authors express gratitude to the Department of Computer Engineering at Zeal College of Engineering and Research for providing resources and support for this project.

REFERENCES

1. Lee, S. J., Kim, J. T., & Kim, H. S. (2022). Waste classification for sustainable development using image recognition with deep learning neural network models.Sustainability, 14(12), 7222.
2. Narayan, Y. (2020). DeepWaste: Applying deep learning to waste classification for a sustainable planet. NeurIPS 2020 Climate Change AI Workshop, arXiv:2101.05960.
3. Jain, R., Venturi, S., Biddick, M., & Richter, H. (2025). Trash to treasure: Gamification and informed recycling behavior. Resources, Conservation and Recycling, 215, 108108.
4. Kumar, R., Singh, S., & Sharma, V. K. (2021). Persuasive apps for sustainable waste management: A comparative systematic evaluation. Frontiers in Artificial Intelligence, 4.
5. Zhao, Y., Lin, H., & Wang, T. (2024). SpectralWaste dataset: Multimodal data for waste sorting automation. arXivpreprint,arXiv:2403.18033.