Scrap link

A Conceptual Approach of Smart Waste Management with Integrated Web Base System

Denit D Binny
BTech Computer Science and Engineering 2022-26
denitdbinny2026@cs.ajce.in

Cymil Sara Easow
BTech Computer Science and Engineering 2022-26
cymilsaraeasow2026@cs.ajce.in

Geo George
BTech Computer Science and Engineering 2022-26
geogeorgejoseph2026@cs.ajce.in

Blessy Mariam Babu
BTech Computer Science and Engineering 2022-26
blessymariambabu2026@cs.ajce.in

Anu Rose Joy
Faculty of Computer Science and Engineering
anurosejoy@gmail.com

***Abstract*—In the modern era, efficient and sustainable waste management has never been more imperative than it is now.The project proposed presents a novel web application that serves as a platform for matching people or organizations with scrap materials to available scrap dealers in the vicinity. Through geolocation technology, the site reduces transportation expenses and the carbon footprint by facilitating transactions within the vicinity. ScrapLink provides an easy-to-use interface, secure payment options and live communication to provide transparent and hasslefree transactions. By providing a platform to bridge scrap material sellers and buyers, the system hopes to minimize waste, encourage resource efficiency and develop a circular economy.The core features provided are user authentication, a strong rating and review system, real-time alert options and secure payment interfaces. Buyers and sellers can make contact via a built-in chatting system to establish terms and finalize deals**

***Index Terms*—Scrap Link, recycling, waste management, geolocation, circular economy, market trends, sustainable solutions.**

I. Introduction

Technology growth has assisted in waste management, recycling included. Recycling entails gathering waste materials and reforming them for the production of new products. To do that, it's essential to comply with the 3R (Reduce, Reuse, Recycle) approaches. The accumulation of scrap, including electronic waste and other recyclable materials, has significant consequences for the environment, leading to soil, air, and water contamination. Addressing this issue requires innovative and sustainable approaches to organize and manage the scrap sector [1]. ScrapLink web application assists by linking scrap material sellers with local buyers. It applies geolocation to minimize transportation expenses and lower environmental footprints. The application is userfriendly, provides safe payments, and has real-time communication for hassle-free transactions. In India, the scrap management sector is predominantly unorganized, with informal practices that lack efficiency and proper regulation[2] By enabling recycling and responsible waste disposal, ScrapLink aids in a more sustainable future for companies and the planet. Building a powerful and comprehensive waste management system such as ScrapLink is only possible with strong technology stacks. Its use is widespread for backend service development because it is often combined with cloud services and is simple to implement fully-fledged non-blocking event-driven architecture infrastructure. Many real-time apps use WebSockets so that buyers and merchants can communicate instantly and transactions can proceed accordingly. React.js is widely implemented in many companies because it supports user interfaces to be more dynamic and interactive as well as improving performance with the use of virtual DOM.

NoSQL databases such as MongoDB and Postgres relational databases are preferable for most applications that process unstructured and structured data, respectively. Since ScrapLink has geolocation modules, it is necessary to use Google Maps API or OpenStreetMap for precise position detection and route construction. Furthermore, services like AWS, Firebase and DigitalOcean facilitate growing businesses by providing easy-to-use scalable hosting, safe user authentication and data storage for web applications and mobile platforms.

Transaction services need to guarantee safety to the end users, which is why Razorpay, Stripe and Paypal APIs are the best options opted for payment transactions. Machine Learning tools are additional improvements that can be added to a platform for better forecasting waste pile-ups and improving logistics on

II. AWARENESS

Despite the availability of recycling facilities, many individuals remain unaware . ScrapLink helps to fill this gap by making recycling more accessible and rewarding. This platform connects the sellers and the local dealers, motivating participation through rewards and gamification. advanced geopositioning system has enabled users to easily find nearby buyers, reducing transport costs and carbon emissions. in addition to transactions, ScrapLink encourages a circular

economy, reducing landfill waste and promoting sustainable resource management. By integrating OLX with eco-conscious commerce, it optimizes waste management on the same hand it benefits individuals and the environment [3].

III. PROPOSED SYSTEM

The proposed system intensify recycling efficiency by: Enhancing recycling participation between ease of use and incentives. Limitations in the use of transportation costs using geolocations. Supporting safe transactions to the verified dealers. This system gives a better structured and accessible platform while ensuring convenient and responsible scrap disposal [4].

1) User Registration and Profile Management: Seller and Dealer Accounts: Businesses or individuals can sign up as sellers of scrap materials like metals, plastic, paper, or electronics, inputting the items they've collected along with quantities and prices[5]. Local dealers may also register to purchase scrap, specifying the types they buy and their preferred delivery regions. To ensure trust and authenticity, all users must complete a verification process, providing their name, email, phone number, location, and password, along with business details and credentials (if applicable). They can also upload a profile image or business logo before completing registration with the "Sign Up" button.

2) Geolocation-Based Matching System : Geolocation: Geolocation technology is employed by the application to match dealers with nearby sellers. This Post Scrap Materials: Sellers may post available scrap such as quantity, quality, and price, with or carbon footprints from terms, location, and scrap type.

3) Scrap Listing and Transaction Process : saves transportation expenses and lessens environmental degradation through local transactions. Search Filters: Search filters can be used by dealers and sellers to discover the best possible match based on payment Transaction History: Sellers and dealers can see their transaction history in their respective profiles, which helps establish trust and credibility over time

4) Incentive System : Gamification: Features such as achievements or leaderboards may be provided by the platform to gamify the recycling experience and encourage people to recycle and gain more rewards

5) Advanced Analytics and Market Insights: Market Trends: Sellers and dealers have access to advanced analytics presenting market trends of different categories of scrap material. These statistics provide average price, demand, and material-related trends. Real-Time Data: The platform offers real-time data on material prices, enabling users to make informed decisions regarding when to sell or purchase scrap materials. Environmental Impact Tracker: Users are able to view how their actions help in reducing waste and ensuring sustainability, further motivating them to engage in the circular economy.

6) Sustainability and Environmental Impact : Circular Economy: Through its encouragement of recycling and reuse, the ScrapLink platform facilitates a circular economy where products are repeatedly reused, eliminating the demand for new raw materials.Reduction in Carbon Footprint: By applying geolocation transportation,to pair nearby sellers and dealers, the distances of transportation are reduced, and there is a decrease in materials, such as quantity, quality, and price, with or carbon footprints from terms, location, and scrap type

Fig. 1. Illustration of ScrapLink's Geolocation-Based Matching System

7) Support and Customer Service Page : Help Center: The platform will have a detailed help center with FAQs, tutorials, and troubleshooting advice for users. Customer Support: There will be a customer support team to help users with any problem, conflict, or question concerning the platform or transactions.

8) Security and Privacy: Data Protection: User data is kept safe through encryption techniques, and the platform complies with data privacy laws. Transaction Security: The payment system will be connected with secure payment gateways, providing fraud protection and secure financial transactions. User Ratings and Reviews: To maintain trustworthiness, buyers and sellers can rate one another after a transaction. This system of feedback keeps the platform transparent and accountable.

9) Integration with Local Authorities and Recycling Centers: Partnership with Authorities: The platform can partner with local authorities and waste management agencies to aid national recycling efforts and cooperate with government initiatives for waste reduction. Recycling Education: ScrapLink can also offer educational materials to users regarding the significance of recycling and how to segregate materials in a proper manner for improved recycling results.

IV. PROTOTYPE

1) Navigation Bar:

Logo: Positioned at the top-left corner, symbolizing the ScrapLink brand.

Menu Items:Navigation links to "Home", "How It Works", "Register", "Log In", "Contact Us"and "FAQ".

Search Bar:Enables users to search for scrap material, dealers, or locations using an intuitive search functionality powered by Elasticsearch for fast and accurate results.

2) Registration :

Grand Banner:A large banner with a short introduction: "Connecting scrap sellers with local dealers to promote recycling".

Call-to-Action Button:"Start Recycling Now" that redirects users to the registration page.

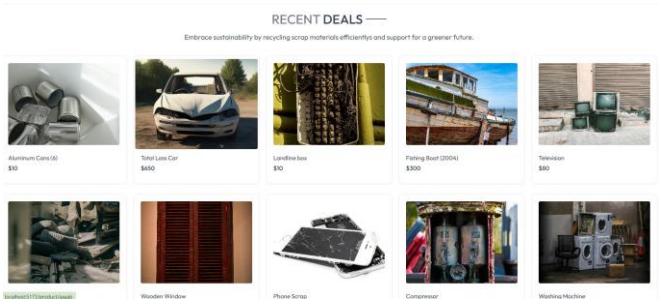

Fig. 2. Feature Selection for Optimized Scrap Trading.

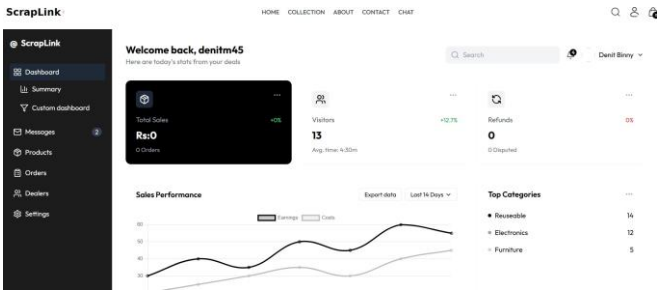

Fig. 4. ScrapLink User Dashboard Overview

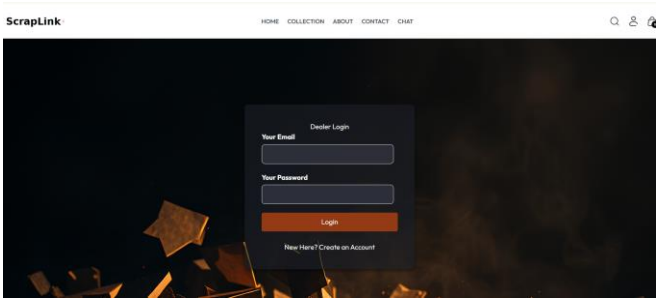

Fig. 3. Login Page

React.js Dynamic Form:The form utilizes React.js for an interactive and responsive registration process, integrating Firebase for real-time validation.

3) Features Section:

Friendly Interface: - Simple and interactive UI built with React.js and Tailwind CSS.

- Secure payment gateways integrated via Stripe, Razorpay, or PayPal.

- Google Maps API enables location-based matchmaking for better user experience.

- Circular Economy: - Section explaining the benefits of recycling and fostering a sustainable environment. - Interactive data visualization powered by Chart.js to showcase environmental impact statistics

4) Dashboard:

User Profile: View and update personal details, address, phone number, and payment preferences.

Scrap Listings (For Sellers):

Post New Scrap:Users can add materials for sale with fields like type (plastic, metal, etc.), quantity, price, and condition.

Scrap Details:

Listings include material name, estimated weight, image, price, and status (e.g., available, sold). MongoDB stores the listing data for easy retrieval

Search Results (For Dealers): Dealers can browse available scrap materials within their vicinity, with filtering by material type, quantity, and price.

Location-based filtering using Google Maps API or Mapbox.

Transaction Overview: Displays current, completed, and pending transactions with details on payment and delivery status.

Rewards Section: Shows accumulated points earned through recycling.

Points can be redeemed for discounts or converted into rewards.

Market Trends:

Interactive graphs using Chart.js or D3.js to indicate average market prices of various scrap materials.

5) Messaging System (For Dealers and Sellers):

Live Chat: Powered by Firebase real-time database for instant communication.

Send Message: Text messaging and the option to send images of scrap material or documents.

Supports end-to-end encryption for secure communication.

Notifications:

Alerts when new scrap materials are listed, price changes occur, or new messages arrive

6) Secure Payment System :

Payment Integration: The billing page offers various payment methods to cater to vendor preferences and convenience, including cash, credit card, and UPI [6].

Payment can be made through cash or a secure payment gateway option that we provide, ensuring security and integrity for the customers [7].

A transaction summary will have the seller's details, item price, and buyer information.

Once a secure payment is made, the status will be updated to "Completed."

7) Rewards System :

Points are awarded per transaction based on the amount of recycled material.

Example: 1 kg of plastic earns 10 points.

Rewards Redemption:

Points can be used for discounts, vouchers, or donated to environmental causes.

8) Footer:

Earning Points:

Points are awarded per transaction based on the amount of recycled material.

Example: 1 kg of plastic earns 10 points.

Rewards Redemption:

Points can be used for discounts, vouchers, or donated to environmental causes.

V. CONCLUSION

In conclusion, the ScrapLink web application provides an innovative and efficient solution to improve recycling practices by connecting scrap material sellers with local dealers. In India, waste and scrap management is highly unorganized. The traditional kabadiwalas rarely visit urban areas nowadays. People who sell scrap to nearby vendors often receive unsatisfactory prices . We aim to address these issues through our website. Through its user-friendly interface, geolocation-based matching, and secure transaction features, the platform makes recycling more accessible, rewarding, and environmentally sustainable. By promoting the circular economy, ScrapLink helps reduce waste, minimize transportation costs, and contribute to a cleaner, more sustainable environment.

REFERENCES

[1] Diyasha Sengupta, I.M.S.K. Ilankoon, Kai Dean Kang, Meng Nan Chong "Circular economy and household e-waste management in India. Part II: A case study on informal ewaste collectors (Kabadiwalas) in India" Minerals Engineering, Volume 200, September 2023, 108154, DOI : https://doi.org/10.1016/j.mineng.2023.108154

[2] Prajwal Ratnaparkhe, Tushar Wagh, Sojwal Ingale, Chaitnya Shelke "METRO CITY SCRAP MANAGEMENT SYSTEM" in IJARIIE, Vol-9 Issue-1 2023

[3] Puneeth L Sankadal, A M Chandrashekhar, Prashanth Chillabatte "Network Security situation awareness system" International Journal of Advanced Research in Information and Communication Engineering (IJARICE), Volume 3, Issue 5, May 2015 .

[4] Koushik P, A M Chandrashekhar, Jagadeesh Takkalakaki, "Information security threats, awareness and cognizance" International Journal for Technical Research in Engineering (IJTRE), Volume 2, Issue 9, May 2015.

[5] Syed Tahseen Ahmed, A M Chandrashekhar, Rahul N, "Analysis of Security Threats to Database Storage Systems" International Journal of Advanced Research in data mining and Cloud computing (IJARDC), Volume 3, Issue 5, May

[6] Huda Mirza Saifuddin, A M Chandrashekhar, Spoorthi B S, "Exploration of the ingredients of original security" International Journal of Advanced Research in Computer Science and Applications (IJARCSA), Volume 3, Issue 5, May 2015

[7] Sowmyashree K K, A M Chandrashekhar, Sheethal R S, "Pyramidal aggregation on Communication security" International Journal of Advanced Research in Computer Science and Applications (IJARCSA), Volume 3, Issue 5, May 2015.