Enabling Sustainable Consumption: A Web Application for Waste Product Exchange Utilizing Shopper Engagement

C.Jenitha[1]A.Rohith[2]M.Umar farook[3]J.Mohamed yasar[4]S.Bharani[5]

Electronics &Communication Engineering

Mailam Engineering College, Mailam & post, Tindivanam Taluk, Villupuram DT

ABSTRACT—This study highlights the creation of a web application that uses the power of consumers to encourage the exchange of waste items in response to the rising concern about environmental sustainability and the need for creative solutions in trash management. In today's society, the pressing need for sustainable consumption practices has become increasingly evident. To address this urgency, a novel web application has been developed, harnessing the collective power of shoppers to facilitate the exchange of waste products. The platform that is being suggested functions as a marketplace where buyers—mostly people or businesses—can list their extra or wasted goods for sale. On the other hand, users of the online application may peruse and buy these things if they want to buy them for recycling or reuse. Through the utilization of the circular economy idea and the promotion of a community-driven approach, this platform seeks to address trash reduction while promoting sustainable consumption patterns. The online application's primary features and goal are summarized in the abstract, which also highlights the platform's role in facilitating the connection between customers and sellers in order to foster an eco-friendly marketplace.

I.   INTRODUCTION

In today's world, where environmental sustainability is paramount, our platform emerges as a beacon of change, offering a dynamic solution to the pressing issue of waste disposal. By leveraging the power of online connectivity, we connect individuals, businesses, and communities in a shared mission to reduce waste and promote responsible consumption habits.

At the heart of our platform lies a commitment to enhancing shopper engagement. We understand that meaningful participation is essential for driving lasting change. Therefore, we have integrated a range of interactive features and incentives designed to incentivize users to actively participate in the waste exchange process. From virtual badges and leaderboards to personalized recommendations and social sharing functionalities, we strive to make waste management not only efficient but also enjoyable and rewarding.

Moreover, our web application serves as more than just a marketplace; it's a vibrant community hub where like-minded individuals can come together to exchange ideas, share tips, and collaborate on sustainable initiatives. Through forums, chat features, and networking events, we foster a sense of belonging and camaraderie among users, empowering them to make a

tangible difference in their local and global environments.

The Problem of Waste Management: Introduce the pressing issue of waste management on a global scale, highlighting the environmental, economic, and social ramifications of inefficient waste disposal practices.

Emphasize the need for innovative solutions to address this multifaceted challenge.

The Potential of Digital Solutions: Discuss the role of   can be accessed from any device with an internet technology in transforming traditional waste management approaches. Highlight the advantages of digital platforms in facilitating communication, collaboration, and resource optimization.

PHP

PHP (Hypertext Preprocessor) is a versatile server-side scripting language renowned for its capability in web development. With its open-source nature, PHP empowers developers to create dynamic and interactive websites effortlessly. Its seamless integration with various databases like MySQL and PostgreSQL enables the creation of robust database-driven applications. Supported across multiple platforms, including Windows, Linux, and macOS, PHP ensures cross-platform compatibility, making it accessible to a wide range of users. The language boasts a vibrant community and an abundance of resources, from frameworks like Laravel and Symfony to extensive documentation, facilitating rapid development and troubleshooting. While PHP's evolution has brought performance enhancements and improved security measures, ensuring application security still relies on developers adhering to best practices. Nonetheless, PHP remains a cornerstone of web development, offering a perfect balance of simplicity, flexibility, and functionality for building innovative online experiences.

MYSQL

MySQL is a robust relational database management system renowned for its reliability, scalability, and performance. Developed under an open-source license, MySQL is widely adopted across various industries and applications, ranging from small-scale websites to large enterprise systems. Its flexibility allows for efficient data storage and retrieval, supporting complex queries and transactions while maintaining data integrity. MySQL's extensive features include support for multiple storage engines, replication for high availability, and comprehensive security mechanisms to safeguard data. With its active community, extensive documentation, and compatibility with various programming languages, MySQL continues to be a preferred choice for developers seeking a powerful and cost-effective solution for managing their data.

WEB APPLICATION

A web application is a software program that operates on web servers and is accessed through web browsers over the internet. Unlike traditional desktop applications, which are installed locally on a user's device, web applications are platform-independent and connection. They typically consist of a frontend, which is the user interface presented in the browser, and a backend, which handles data processing and business logic. Frontend technologies like HTML, CSS, and JavaScript are used to create the user interface, while backend technologies such as Node.js, Python, or Java manage server-side operations and interact with databases. Web applications often leverage APIs to communicate with external services or integrate with other systems. Security is a critical aspect of web application development, requiring measures like encryption, authentication, and input validation to protect against cyber threats. Deployment and hosting options range from cloud platforms to dedicated servers, depending on scalability and performance requirements. Overall, web applications offer flexibility, accessibility, and scalability, making them a popular choice for a wide range of use cases.

LITERATURE SURVEY

1. Vidumith Perera; Lakdinu Ekanayake; Ama Bandara; Dinithi Shakya; Udesh S. Oruthota et al proposed "IOT Based Smart Shopping System" IEEE- 2021

With the advancement of technology, the level of acceptance of people of all ages towards electronic accessories is increasing day by day. Electronic accessories such as smart card readers, bar code scanner, radio frequency identification are gaining more attention, specially in shopping malls. In Sri Lanka, cities with high population create a huge rush in shopping malls and super markets. Though they have several counters, only one customer can

be served at a time, rest should be waited in a queue until the whole billing process is completed. Such long queues in the shopping malls create unpleasant experience for the customers. In this study, a smart shopping system is introduced by addressing above mentioned issues and has attempted to overcome the discomfort that the customer would undergo during the current shopping process. The internet of things based smart shopping cart navigates the customer to the exact item location through the shortest path based on the customer purchasing list uploaded via his mobile. The cart itself can recognize radio frequency tagged consumables in the shopping mall and billing is automated accordingly.

2. Yuxin Li; Wenbin Gu; Xianliang Wang; Zeyu Chen et al proposed "Data-driven scheduling for smart shop floor via reinforcement learning with model-based clustering algorithm" IEEE-2020

Various information technologies provide the manufacturing system massive data, which can support the decision optimization of product lifecycle management. However, the lack of effective use for advanced technologies prevents manufacturing industry from being automated and intelligent. Therefore, this paper proposes the smart shop floor and implementation mechanism. Meanwhile, based on the clustering and reinforcement learning, the brain agent and scheduling agent are designed to determine the appropriate rule according to the shop floor state information, thus realizing the data-driven real-time scheduling. Experimental results show that the smart shop floor can effectively deal with disturbance events and has better performance compared with composite dispatching rules.

3. Sakorn Mekruksavanich et al proposed "Design and Implementation of the Smart Shopping Basket Based on IoT Technology" IEEE-2020

Currently, during holidays and weekends in urban areas, a huge number of shoppers can be seen crowding into shopping malls and supermarkets. When there are special offers and huge discounts, the number of people increases even more. In supermarkets these days, consumers need a shopping cart or basket when making their purchases of various items. In addition, the process of procuring the products is rather complicated as the shoppers must carry a basket every time in order to find the products they want and place them into the basket, followed by needing to deal with the calculation of the expenses. After completing their shopping list, the consumers must wait in a long line so that they can check out and pay the bill. As a result, in order to solve this problem, this research presents the development of a smart basket that is used for shopping. All of the products in the supermarket normally have a barcode tag. Therefore, a barcode reader of android smart phone will be included on the smart basket. In this way, the name and the cost of each item will be shown on the display of the mobile phone when the customer scans and places the products in the basket. The total bill will be added up to give the total cost of all of the purchases and stored to the memory of the microcontroller. The product information regarding the items contained in the basket will be transferred to the main computer via a transmitter. Moreover, validation of the accuracy of the shopping process will be performed by a weight sensor system built into the basket. Thus, waiting in line to check out and pay the bill while having to estimate the total cost will be avoided.

4. F. Piyush Raj Rouniyar; S. Prateek Saxena; T. Abhaya Kumar Sahoo et al proposed "SSAS: RFID- BASED Smart Shopping Automation System"IEEE- 2020

Shopping malls are the place where people get their basic daily requirements such as food items, clothing, fashion accessories, electrical appliances and so on. Nowadays we can find shopping malls every few meters in any developed or developing cities around the globe. Sometimes customers face the problem of having inadequate information about the products and have to lose their valuable time at the billing counters waiting for their turn to come. Constant enhancement is required in the traditional billing system to advance the quality of shopping experience for the customers. To overcome these difficulties and to advance the present existing system, we are putting up our approach on an RFID based Smart Shopping Automation System (SSAS) including automated bill calculator, this approach is carried by attaching RFID tags to the products or items and an RFID reader with a touch panel display at the EXIT gate along with some other important components. With this approach of shopping system, customers will have complete information about the price of every product that is scanned in by the reader, and the total price of the items at the end. SSAS will save the customer's time and labor required in malls and costs related to the products. Thus, this paper presents a preliminary development of the SSAS that can be integrated into the malls with smarts facilities to make shopping an automated experience

5. Ria Singh; Satyam Verma; Ms. Kriti et al proposed "RFID and IR based Smart Shopping Mart Management System"IEEE-2021

This paper outlines the development of smart shopping complex that deals with the placement and extraction of products in the most effective way in the rural areas of India. The goods placement is based on effective space and cost management that helps for both on-time and online shopping of products that eliminates the usual manual system of purchase in India shopping centers. The prototype uses an extended shelf system that can be used for on-time shopping at one side and another side for stock filling and takes up for online shopping booking. RFID code system is used to give identity to each product that defines its placement coordinate. Products are placed on a conveyer belt and the three motors get the Cartesian command from the RFID code read and move the product to the defined position. For the on-time shopping, users can use their shopping carts as an smart cart that can automatically calculate their bill and then the customer can select them desired product to add the selected product to the cart, the data from the cart would be saved in EEPROM and communicated wirelessly using Zigbee module to the biller for instant billing. Another facility provided to the customers during their offline shopping is that the stoke keeps on updating itself as the products will be placed on a conveyer belt that can move to update the products.

EXISTING SYSTEM

According to the Public Distribution System, a Ration Card is a document that the State Government issues to enable the purchase of necessities from stores with reasonable prices. To distinguish between households who are Above Poverty Line, Below Poverty Line, and Antyodaya, State Governments issue unique Ration Cards. They also periodically examine and check Ration Cards. For Indian nationals, a ration card is a highly helpful document. By facilitating the purchase of necessary goods at a discounted price, it aids in cost savings. These days, it is also a crucial instrument for identification. When asking for additional documents, such as a domicile certificate or having your name added to the electoral rolls, you can be asked to present a copy of your ration card as identification. Today, ration cards are crucial for every household and are utilised in a variety of fields, such as family member information, obtaining a gas connection, serving as residence verification for various purposes, etc. All individuals with ration cards are able to purchase a variety of goods from the ration shops, including sugar, rice, oil and kerosene. However, there are two drawbacks to this method. The first is that the weight of the material may be off due to human error, and the second is that if anybody does not purchase the materials, at the end of the month, they will be sold to others without notifying the government or the clients. Instead of using ration cards, this idea suggested an automatic distribution of rationed materials based on fingerprint scanning technology. To access the materials at ration stores, one must first scan their fingerprint on a fingerprint scanner. The controller will then review the customer codes and the amount details on their card. These systems display the quantity specifics following verification. The consumer must then enter their required documents via an Android application, and after receiving the materials, the controller sends the information to the government office and the customer by SMS message. This technology automatically provides materials without the assistance of people.

PROPOSED SYSTEM

The proposed system represents a groundbreaking approach to addressing the growing concerns surrounding environmental sustainability and waste management. By leveraging the power of consumers through a user-friendly web application, this innovative platform aims to revolutionize the exchange of waste items. Acting as a marketplace for individuals and businesses to list their surplus or discarded goods, the platform facilitates their sale to interested buyers seeking to recycle or reuse these items. Embracing the principles of the circular economy and community- driven initiatives, the system seeks to not only reduce waste but also promote sustainable consumption practices. At its core, the platform serves as a bridge between buyers and sellers, fostering an eco-friendly marketplace where users can actively participate in the movement towards a more sustainable future.

BLOCK DIAGRAM   DFD DIAGRAM
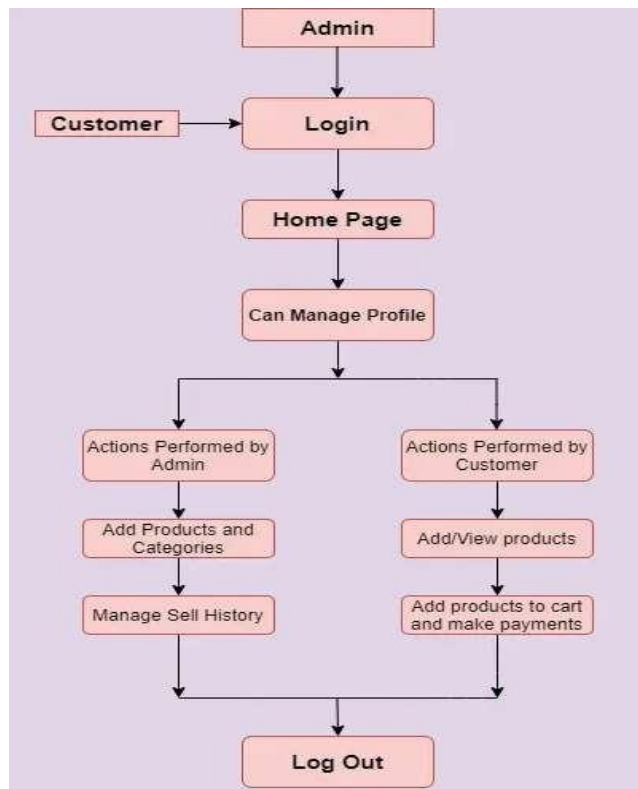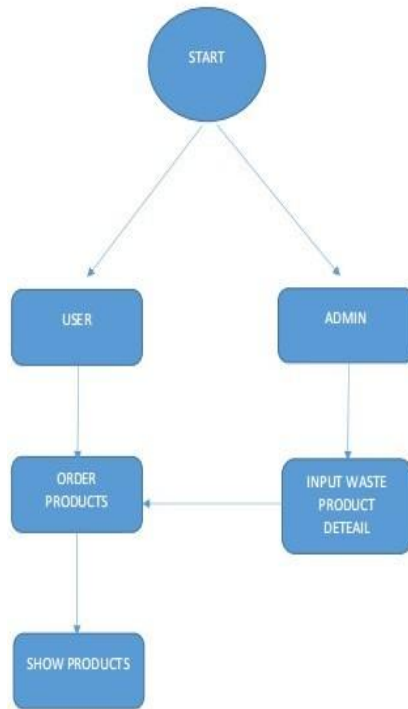
CLASS DIAGRAM

TECHNOLOGY

Waste Exchange Connect leverages cutting-edge technology to create an innovative platform for sustainable waste management. The application utilizes a robust web-based architecture built on modern technologies such as cloud computing, scalable databases, and secure communication protocols to ensure reliability, scalability, and data protection. Advanced search algorithms and geolocation services enable users to efficiently find and connect with nearby waste exchange opportunities, while real-time messaging features facilitate seamless communication and negotiation between parties. Additionally, the platform employs data analytics tools to generate actionable insights into waste exchange trends, user behavior patterns, and environmental impact metrics, enabling continuous improvement and informed decision-making. With its mobile-friendly interface and intuitive user experience, Waste Exchange Connect harnesses the power of technology to empower individuals and businesses to participate actively in sustainable waste management practices, driving positive environmental outcomes and fostering a sense of community engagement and collaboration.

RESULT AND DISCUSSION

Waste Exchange Connect has emerged as a beacon of hope in the realm of sustainable waste management, leveraging technology to address pressing environmental challenges. Through its user-friendly interface and advanced features, the platform has facilitated the exchange and repurposing of waste products on a scale previously unseen. Not only has it effectively diverted waste from landfills and incinerators, but it has also fostered a vibrant community of individuals and businesses committed to environmental stewardship. By providing valuable insights into waste exchange trends and environmental impact metrics, Waste Exchange Connect has enabled informed decision-making and continuous improvement efforts. As policymakers and stakeholders take notice of its success, the platform stands poised to catalyze broader initiatives and partnerships aimed at creating a more sustainable future for generations to come.

FUTURE ENHANCEMENT

Waste Exchange Connect is continuously evolving to meet the dynamic needs of its users and the ever- changing landscape of sustainable waste management. Looking ahead, the platform envisions a future where cutting-edge technologies play a pivotal role in revolutionizing waste exchange processes. By integrating artificial intelligence (AI) and machine learning algorithms, Waste Exchange Connect will enhance its recommendation system, providing users with tailored suggestions based on their preferences and behavior patterns. Moreover, AI-powered analytics will offer deeper insights into waste exchange trends, enabling more informed decision-making and strategic planning for waste reduction initiatives. This data- driven approach will not only optimize resource allocation but also foster a culture of innovation and continuous improvement within the waste management ecosystem.

In addition to AI advancements, Waste Exchange Connect recognizes the transformative potential of blockchain technology in enhancing transparency, security, and accountability. By implementing blockchain-based solutions, the platform aims to create an immutable ledger of waste exchange transactions, ensuring the integrity of data and fostering trust among users. Smart contracts powered by blockchain will automate transaction processes, reducing administrative overhead and streamlining exchange negotiations. Furthermore, blockchain-enabled traceability will enable stakeholders to track the lifecycle of waste products, from generation to repurposing, facilitating compliance with regulatory requirements and promoting circular economy principles. As Waste Exchange Connect continues to embrace these emerging technologies, it reaffirms its commitment to driving sustainable change and empowering communities to build a greener, more resilient future.

CONCLUSION

In conclusion, the future enhancements envisioned for Waste Exchange Connect represent a significant step forward in the journey towards more sustainable waste management practices. By harnessing the power of advanced technologies such as artificial intelligence, blockchain, and the Internet of Things, the platform is poised to revolutionize how waste is exchanged, repurposed, and tracked. Through personalized recommendations, transparent transactions, and real- time monitoring, Waste Exchange Connect will empower users to make

informed decisions that contribute to reducing waste and mitigating environmental impact. Moreover, by fostering partnerships, expanding globally, and prioritizing user engagement, the platform is well-positioned to catalyze positive change on a global scale. As we embark on this transformative journey, Waste Exchange Connect reaffirms its commitment to building a more resilient, equitable, and sustainable future for generations to come.

REFERENCES

[1] using SVPWM" Suraj Punj Journal for Multidisciplinary Research, 2021, Volume 11, Issue 4, pp:750-756

[2] G.Neelakrishnan, S.N.Pruthika, P.T.Shalini, S.Soniya, "Perfromance Investigation of T-Source Inverter fed with Solar Cell" Suraj Punj Journal for Multidisciplinary Research, 2021, Volume 11, Issue 4, pp:744-749

[3] C.Nagarajan and M.Madheswaran, "Analysis and Simulation of LCL Series Resonant Full Bridge Converter Using PWM Technique with Load Independent Operation" has been presented in ICTES'08, a IEEE / IET International Conference organized by M.G.R.University, Chennai.Vol.no.1, pp.190-195, Dec.2007

[4] M Suganthi, N Ramesh, "Treatment of water using natural zeolite as membrane filter", Journal of Environmental Protection and Ecology, Volume 23, Issue 2, pp: 520-530,2022

[5] M Suganthi, N Ramesh, CT Sivakumar, K Vidhya, "Physiochemical Analysis of Ground Water used for Domestic needs in the Area of Perundurai in Erode District", International Research Journal of Multidisciplinary Technovation, pp: 630-635, 2019Balekar Swati D, Kulkarni Rituja R, "Online Ration Card System by using RFID and Biometrics", International Journal of Advanced Research in Computer Science and Software Engineering, 2015.

[6] Yogesh Kumar Sharma, Dr. K. B. Shivakumar, "Multi-Modality Biometrics Assisted Smart Card Based Ration Distribution System",International Journal of Applicaton or Innovation in Engineering and Management (IJAIEM), 2014.

[7] Parvathy A, V.R. Raj, Venumadhav, Manikanta, "RFID Based Exam Hall Maintenance System", International Journal of Computer Applications (IJCA), 2011.

[8] S.Santhosh, "Design and Development of a Security Modulewith Inbuilt Neural Network Methodologies and anAdvanced Technique on FingerprintRecognition", International Conference on Circuit, Power and Computing Technologies (ICCPCT), 2014.

[9] M. Agarwal, M. Sharma, B.Singh, Shantanu, "Smart Ration Card Using RFID and GSM Technique", International Journal of Computer Application(IJAC), 2014

[10] Md. Wasi-ur-Rahman, Mohammad Tanvir Rahman, Tareq Hasan Khan and S. M. Lutful Kabir, "Design of an Intelligent SMS based Remote Metering System", Proceedings of the IEEE International Conference on Information and Automation(ICIA), 2009.

[11] K.Michael, L. Mccathie, "The Pros and Cons of RFID in Supply Chain Management", Proceedings of the IEEE International Conference on Information and Automation(ICIA), 2005.

[12] Bundesamt fur Sicherheit in der Information Stechink, "Advanced Security Mechanisms for Machine Readable Travel Documents-Extended Acces", IEEE International Conference on Information an Automation(ICIA), 2010.

[13] Jeff Brown, Bill Shipman, Ron Vetter, "SMS- The Short Message Service", IEEE International Conference on Information and Automation(ICIA), 2007.

[14] Chunming Rong, "RFID Security". Computer and Information Security Handbook, Morgan Kaufmann Inc, International Journal of Computer Application(IJCA), 2009.

[15] C.Nagarajan and M.Madheswaran - 'Experimental verification and stability state space analysis of CLL-T Series Parallel Resonant Converter' - Journal of ELECTRICAL ENGINEERING, Vol.63 (6), pp.365-372, Dec.2012.

[16] C.Nagarajan and M.Madheswaran - 'Performance Analysis of LCL-T Resonant Converter with Fuzzy/PID Using State Space Analysis'- Springer, Electrical Engineering, Vol.93 (3), pp.167-178, September 2011.

[17] C.Nagarajan and M.Madheswaran - 'Stability Analysis of Series Parallel Resonant Converter with Fuzzy Logic Controller Using State Space Techniques'- Taylor & Francis, Electric Power Components and Systems, Vol.39 (8), pp.780-793, May 2011.

[18] C.Nagarajan and M.Madheswaran - 'Experimental Study and steady state stability analysis of CLL-T Series Parallel Resonant Converter with Fuzzy controller using State Space Analysis'- Iranian Journal of Electrical & Electronic Engineering, Vol.8 (3), pp.259-267, September 2012.

[19] Nagarajan C., Neelakrishnan G., Akila P., Fathima U., Sneha S. "Performance Analysis and Implementation of 89C51 Controller Based Solar Tracking System with Boost Converter" Journal of VLSI Design Tools & Technology. 2022; 12(2): 34–41p.

[20] C. Nagarajan, G.Neelakrishnan, R. Janani, S.Maithili, G. Ramya "Investigation on Fault Analysis for Power Transformers Using Adaptive Differential Relay" Asian Journal of Electrical Science, Vol.11 No.1, pp: 1-8, 2022.

[21] G.Neelakrishnan, K.Anandhakumar, A.Prathap, S.Prakash "Performance Estimation of cascaded h-bridge MLI for HEV