Archives available at journals.mriindia.com

International Journal on Advanced Computer Engineering and Communication Technology

ISSN: 2278-5140

Volume 14 Issue 03s, 2025

A Secure Digital Marketplace for Second-Hand Goods: Improving Trust, Transparency, and Sustainability in E-Commerce

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Peer Review Information

Submission: 05 Nov 2025

Revision: 25 Nov 2025

Acceptance: 17 Dec 2025

Keywords

Trust and Verification in Online Commerce, Secure E-commerce, Peer-to-Peer Marketplace, Digital Resale Platforms, Secure Transactions, User Authentication, Sustainable E-commerce.

Abstract

The sharp increase in electronic commerce resulted in the implementation of safe, transparent, and easy-to-access channels that facilitate the exchange of popular products [1]. The project presents "A Secure Digital Marketplace for Second-Hand Goods" as a web application that provides a platform for confidence building, facilitation ease, and efficiency in peer-to-peer exchanges in second-hand goods. The proposed system includes a role-based authorization system for customers and sellers, thus ensuring the protection of data, secure transaction, and authenticated interaction by the users. With existing technologies in the web, the site allows sellers to present second-hand goods online to more customers, and customers have real listings and simple buying experiences [2]. Moreover, advanced security technologies such as fraudulent detection technologies and authenticated user profiles build confidence and minimize the risks involved in the usual second-hand trading mechanisms. This work outlines the architecture of the system, the implementation method, and the possible socio-economic impacts, thus making the solution a scalable model for a secure and sustainable online store platform in the second-hand market.

Introduction

Secure Second-Hand Marketplace is a revolutionary second-hand marketplace that aims to change the dynamics of buying and selling second-hand items through trust, transparency, and access to e-commerce. The marketplace brings together the buyer, the seller, and the administrator under a single ecosystem using the simplest issues of security, reliability, and convenience that are otherwise associated with conventional second-hand buying and selling habits.

After the completion of the process of registering, the users are offered access to a personalized interface that can cater to their distinctive roles. Sellers are offered the opportunity to develop comprehensive product descriptions accompanied by images, descriptive writings, and competitive pricing and thus making their marketplace highly noticeable to potential consumers. Buyers, on the other hand, are offered a safe and easy-to-use platform with which they can view, compare, and purchase second-hand goods with ease. Administrators are in charge of the marketplace for the purpose of ensuring compliance with regulations, controlling the moderation process of the marketplace's content, and ensuring a safe and credible trading platform. In addition to the facilitation of simple transactions, Secure

Second-Hand Marketplace includes robust features which enhance usability and credibility. Some such features are role-based verification for authenticated interaction, secure payment mechanisms which assist in the security of monetary transactions, and real-time communication features such as chat and notice that facilitate seamless negotiations between buyer and seller. The platform also includes data-oriented insights such as demand models and price models, making it easier for the users to make informed decisions. Some other embedded systems such as verification of the users, fraud-proofing, and transparent rating mechanisms are used for the purpose of validating confidence and risk reduction [3].

By marrying the convenience of e-commerce and enhancing security controls, the Secure Second-Hand Marketplace shows a sustainable commerce model. Not only can the marketplace facilitate the efficient use of second-hand merchandise, but also environmental sustainability through the promotion of the reuse of objects and the reduction in the production of wastes [4]. The marketplace ultimately aims at fashioning a saleable and secure platform for second-hand commerce that bridges the technology and consumer confidence gap in the digital economy.

Literature Survey

Several industry studies and reports point out the opportunity and the pitfalls generated by second-hand marketplace websites [5]. Even though websites like OLX, Quikr, and Facebook Marketplace have gained popularity in popularizing peer-to-peer business, research repeatedly points to latent loopholes in such websites which compromise the confidence and security of users in transactions [6]. The most prevalent concerns in such sites are the absence of identification verification, which typically manifests in the form of fake accounts and fraudulent profiles [7]; lack of secure payment processing, which augments the possibility of monetary frauds; ineffectual moderation facilitating fraudulent postings and spam [8]; and the absence of defined mechanisms for settling disputes, leaving customers and traders at risks in the advent of disputes. Moreover, low buyer and trader security in current systems also causes uncertainty in the quality and originality of the articles. E-commerce security studies point out that the users shall be more likely to put faith in sites with characteristics such as human-in-the-loop moderated profiles for users, verified reviews, KYC authentication, human-in-the-loop moderated postings, and escrow-based secure payment processing [9].

Such attributes significantly add to the reliability, enhance security, and promote confidence among customers. Further research suggests that the lack of trust stands as the greatest hinderance in the second-hand marketplace, with anonymous trade, fraudulent advertisements, and risky transactions discouraging the use of digital resale marketplaces [10]. Additionally, research relating to communication structures suggests that enabling real-time interactions among customers and vendors enhances openness and reduces misinterpretations, thus augmenting confidence [11]. Websites which have adopted in-built chat functions realize increased participant interaction and swift conversion rates, owing to the fact that such functions allow negotiation and clarification without the use of external programs. Similarly, advancements in e-commerce suggest that geolocation technology and product discovery through interactive maps immensely enrich the experience, spur hyperlocal commerce, reduce shipping costs, and enable secure in-person transactions [12]. On the technology front, advanced full-stack development practices, especially utilizing React.js, Node.js, and MongoDB, integrate scalability, flexibility, and advanced data handling [13], while Clerk structures enhance role-based authorization and access control.

From these findings, the proposed project, "Secure Platform for Buying and Selling Second-Hand Goods", utilizes KYC-driven verification, manual monitoring, payment mechanisms based on escrow, in-app communication, and interactive map in the MERN stack structure. These functionalities directly address the weaknesses cited in the current literature, thus creating a secure, clear, and easy-to-navigate marketplace that bolsters confidence, prevents fraud, and provides an efficient experience for both consumers and sellers.

Problem Statement

In the current digital economy, platforms for second-hand goods often face issues associated with trust, transparency, and the security of transactions, which hinder both the acceptance by users and the overall satisfaction of those users [14].

Customers are threatened with spurious postings of their products, wrong descriptions of products, and no assurance regarding the product quality, while sellers are threatened with spurious customers, unreliable payments, and few redressal options.

Established marketplaces like Quikr, OLX, and Facebook Marketplace, though well-recognized, lack satisfactory resolution of the key concerns of

insufficient identity proofing, unsecure payment mechanisms, and lack of support for dispute resolution [15]. The endeavour supports the creation of a safe marketplace committed to second-hand products, with the goal of filling these gaps. By establishing stringent identity proofing processes, making use of secure encrypted payment processing mechanisms, and providing transparent communication channels, the exercise aims at facilitating a trustworthy and secure platform for peer-to-peer exchanges. Additionally, the incorporation of functions such as fraud detection mechanisms, verified product offerings, and a trust system based on ratings improves the responsibility and also enhances the confidence in the platform among users [16]. In such ways, the platform aims at developing a sustainable, efficient, and trustworthy model for online trade in second-hand goods.

Proposed Approach

In order to solve the issue with existing second-hand product marketplaces, we develop a secure online marketplace which can be utilized by potential customers and sellers in order to buy and sell products. The marketplace is designed with the prime focus on security, convenience, and transparency; thus, customers are able to use the marketplace without any kind of restrictions. The marketplace materialized in the shape of a standalone marketplace app. Sellers and customers can communicate with each other utilizing Know Your Customer-based verification, secure listing of products and in-app real-time communication in the shape of chats. Users are also able to search for hyperlocal deals, making the usage of map-based location and building the confidence among the users and reducing the possibility of frauds [17]. In the background, coding was conducted utilizing technologies such as MongoDB and Node.js, ensuring scalable and secure storing the information for the profiles of the users, listing of the products, and chats among the users and administration and processing the information [18]. On the frontend, the app was designed utilizing TailwindCSS and React; frontend enables mobile-first and easy-to-navigate, fast app utilizing tailwindCSS. Users are able to utilize the listing without restrictions and search and manage. In addition, we also utilize Cloudinary utilizing easy and fast uploading and optimizing images and Clerk - which enables secure sign-on process among the users and login session. Utilization of WebSockets (Socket.IO) enables fast-time communication message in the shape of a chat among a buyer and a seller and utilizing Mapbox for location-based searching deals.

Methodology

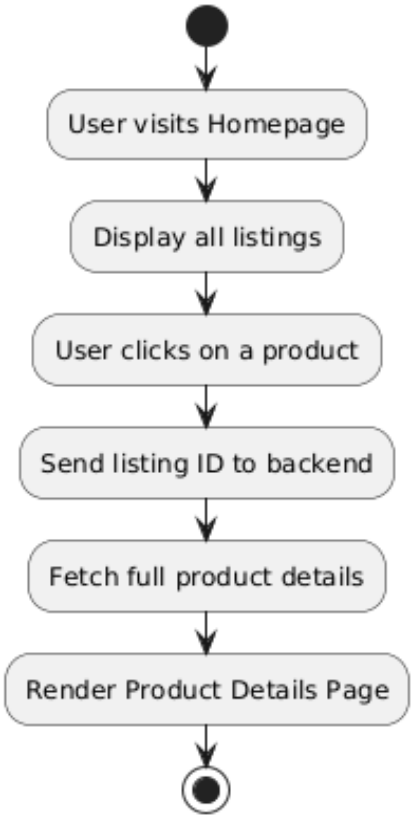


Fig. 1.1 Flow of Proposed Methodology

The configuration and working workflow are illustrated in the marketplace platform proposed that enables the trading in second-hand goods. The configuration accommodates frontend and backend aspects, which together offer a safe and interactive environment scaling well for the seller and the buyer sides. Users initiate the interaction at the point of entry through the User Access Interface from where they are required to signup or login. The process is conducted through KYC-based authentication conducted by Clerk. On successful access, the users can search the listing and also can put products up for sale. Furthermore, they can conduct real-time conversations with the balance of the platform members. Accessing the base modules including the Product Listings, User Dashboard, Map-Based Search, and the Real-Time Chat are conducted through the Content Navigation Layer. Listings carry metadata which consist of the title, the description, the price, the images, and the seller information. Everything resides in the MongoDB safely with the interactions being conducted through the Node.js REST APIs.

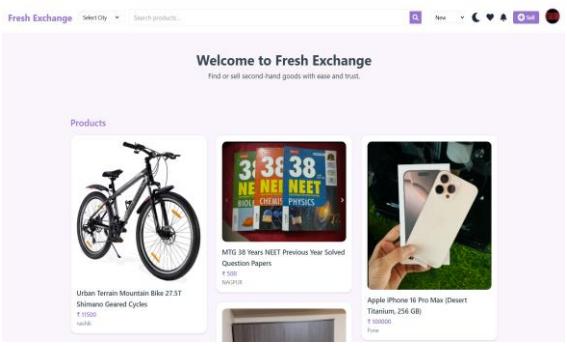
An Admin Panel runs the entire show. Moderators deal with user behaviour there. They scan listings and resolve conflicts. That suppresses fake or deceptive products. The marketplace remains transparent for the most

part. To chat, the site employs WebSockets with Socket.IO. That allows for real-time conversation among buyers and sellers. Product photos get uploaded and processed through Cloudinary. It makes storage optimized and renders quickly. Mapbox aids in location-based tagging. That increases discoverability for hyperlocal searches. Security includes session management with HTTPS and encrypted storage. And KYC verification. Users manage their profiles via the dashboard. They update information, view chat history, or view active listings. All activity on the platform gets recorded. User registrations, product listings, chat material, location searches. All to the Centralized Data Store. That enables analytics and monitoring. It provides inputs for improvements in the future. The methodology tracks iterative development under Agile SDLC [19]. Parallel testing of modules. Unit testing verifies main features such as authentication, chat, and product listing. Integration testing ensures complete workflows are robust. Deployment strikes cloud services. Vercel for frontend, Render for backend, MongoDB Atlas for storage. That configuration scales and remains up. Gluing secure authentication with modular structure, real-time comms, and cloud aspects together. This creates a trustworthy system's that's extensible and user-centric.

Result And Discussion

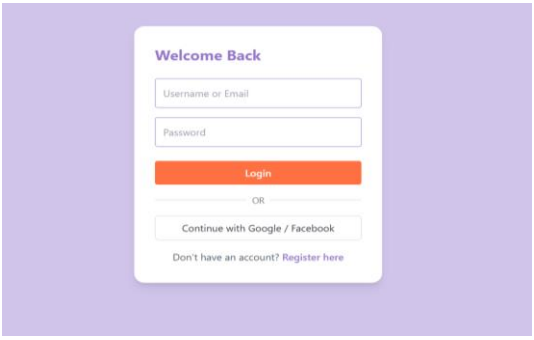
1) Home Page Interface

The Fresh Exchange system's homepage also serves the main gateway point for the users with featured product listing and an interactive navigation bar that accommodates city selection features and product search functionalities as well as the login for the users. The modern-looking interface with the addition of soft purple accentuation allows for seamless browsing. Users are also enabled to quickly explore second-hand goods, narrow down search queries with respect to category or location, and examine product information with only a single click. Consistent layout design enhances the experience for the users and supports efficient exploration across the site.



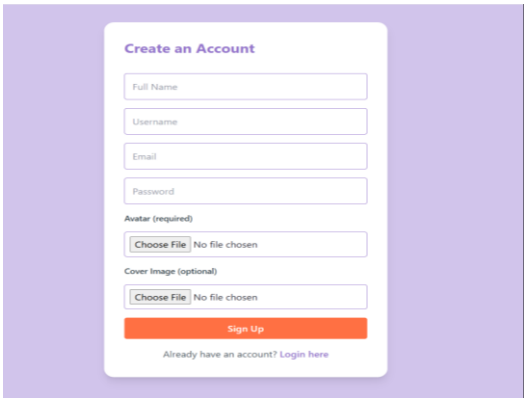
2) Login Page Interface

The login page allows secure access for existing users to their accounts utilizing registered password and email address credentials. Designed with a simple aesthetics defined with dark highlights, it also includes validation processes for invalid inputs and redirects automatically to the user's dashboard after successful authorization. Clerk-based authentication implementation ensures security and reliability, while the modern toaster system provides real-time feedback in the form of the status of the login attempt's success or failure.



3) Signup Page Interface

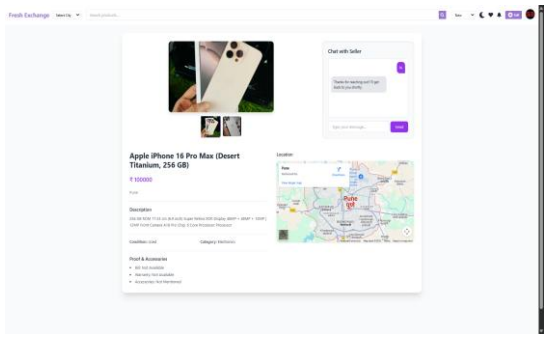
The registration interface aids in the integration of new users by offering a straightforward and user-friendly enrolment form. Key information requirements, including full name, email address, and password, are systematically arranged to promote swift account establishment. The design adheres to the overarching aesthetic, fostering both clarity and user convenience. Following a successful enrolment process, users obtain confirmation feedback and are subsequently directed to their customized home environment.



4) Product Description Page Interface

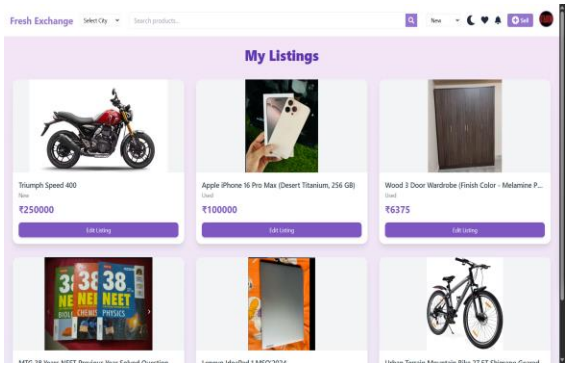
The product description page displays comprehensive details of each listed item, including images, specifications, price, seller information, and location map. Users can chat directly with the seller through the integrated chat box, promoting seamless buyer-seller

communication. Additional sections highlight product condition, category, proof and accessories availability, and detailed descriptions. The embedded map offers geographical context for buyers, increasing trust and transparency in transactions.



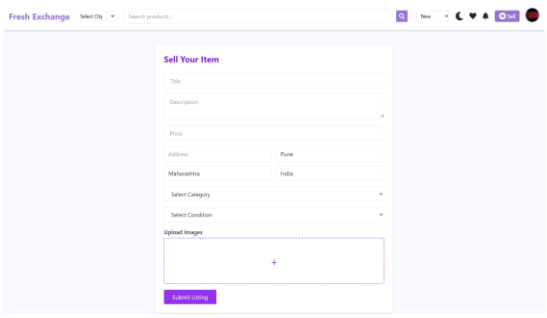
5) My Listings Interface

The "My Listings" interface offers sellers a systematic summary of all products they have submitted to the marketplace. Each product card features the item's visual representation, title, price, and status (which may be active, sold, or under review). Sellers have the ability to conveniently modify or remove their listings, thereby maintaining complete authority over their posted items. The organized format facilitates inventory management and improves the overall experience for sellers.



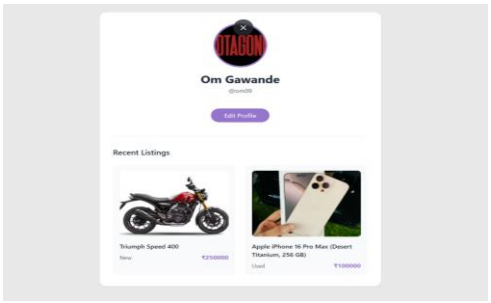
6) Product Listing Form Interface

Form for listing products The listing form enables the creation of new listings from sellers, with multiple photos, full product information, and geographic location information. It covers fields for title, category, description, condition, and accessories with the automatic pulling of map-based coordinates. It accommodates Cloudinary integration for uploading multiple photos with real-time preview prior to committing them. The responsive form layout allows ease of use from the desktop and mobile phones and thus maximizes the listing process.



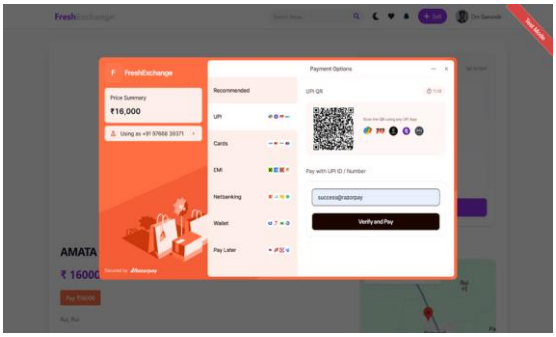
7) My Profile Interface

Profile UI enables viewing and administration of the personal information of users such as full names, contact information, and posted listings. The well-designed card-like layout displays key user information in a clear format with the possibility for profile information editing and transaction history viewing. Internal design language keeps the visual harmony with the rest of the system and therefore enhances recognition and convenience for the user.



8) Secure Payment Interface

The payment interface secures monetary transactions through an escrow-based processing mechanism. Structured with transactional encryption, it securely holds funds until the buyer verifies the product, hence mitigating hazards associated with online fraud. The user-friendly layout of the interface presents real-time payment status and transaction history, thus ensuring transparency and reinforcing trust between the buyer and seller.



Expected Result

The proposed Secure Second-Hand Marketplace is expected to drastically reshape the contours of peer-to-peer resale by removing a set of fundamental deficiencies regarding trust, transparency, and the security of transactions. A resultant central outcome of the realization of this marketplace is the creation of a high-confidence ecosystem through the strong enforcement of verification procedures based on KYC. By making identity proofing necessary, the system does away with the prevalence of fake profiles and duplicate listings so that all interactions are between genuine, verified entities.

Beyond identity verification, the platform boasts of sound data integrity due to advanced security measures. The integration of transactional encryption with secure session management shields sensitive user data and financial information from unauthorized access, hence mitigating potential online business hazards. In facilitating seamless commerce, the application utilizes WebSockets to support instantaneous in-app messaging, enabling users to negotiate prices and clarify product details in real time. This immediate communication channel substantially reduces misunderstandings and accelerates decision-making.

Furthermore, User Experience is brought to the next level via geolocation-based discovery, supporting hyperlocal commerce through efficient, location-aware product searches. This is complemented by the high-performance image optimization through Cloudinary, ensuring that product listings come with great detail while fast-loading. The system is scalable since it follows the MERN architecture and was deployed across Vercel and Render, showing high availability and future-proof performance. Ultimately, this holistic solution nurtures not only a safe trading environment but also environmental sustainability through supporting the circular economy and reducing e-waste.

Conclusion

The development of the Secure Second-Hand Marketplace demonstrates the ability of modern technology to address fundamental defects found in current platforms like OLX, Quikr, and Facebook Marketplace. By putting trust, transparency, and transaction safety in the foreground, the system creates a secure platform where buyers and sellers can trade goods with very minimal chance of fraud or misrepresentation. Seamless integration of Know Your Customer verification, anti-fraud checks, and transparent transaction logs provides a much-needed layer of accountability that fosters responsible trading practices while discouraging malicious agents.

The project was executed in an Agile Software Development Life Cycle that allowed for dynamic engineering. Iterative design and frequent testing ensured the platform remained scalable, responsive, and adaptive to evolving user requirements. In addition to technical robustness, the marketplace generates substantial socioeconomic value in furthering environmental sustainability. By facilitating effective reuse of items, the platform supports the circular economy and contributes to reducing electronic waste.

Looking ahead, the implementation will not only add value to consumers from their assets but also create a sound foundation for integrating future technologies around AI-driven fraud prevention, escrow-backed payment automation, and advanced logistics solutions [20]. Ultimately, the initiative sets a new standard for secure and user-centric digital marketplaces, effectively bridging the gap between e-commerce potential and consumer trust in the digital economy.

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