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Secure Online Seller Registration System

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Abstract: ***The rapid growth of e-commerce has led to an increase in counterfeit products and fraudulent sellers, causing financial losses to buyers and reducing trust in online marketplaces. Traditional verification systems are inadequate in detecting fraud, necessitating the implementation of advanced AI-driven solutions. This paper proposes an AI-powered marketplace that integrates Aadhaar-based seller verification, sentiment analysis for fraud detection, and multi-factor authentication (MFA) to ensure a secure and trustworthy e-commerce platform. Our system employs AI, natural language processing (NLP). The proposed solution reduces fraud risks, improves transparency, and builds consumer confidence in online purchases***
Keywords: E-commerce, Fraud Detection, AI, NLP, Aadhaar Verification, Multi-Factor Authentication (MFA)

I. INTRODUCTION

E-commerce has revolutionized shopping, providing global accessibility and convenience. However, it faces major challenges, including fraudulent sellers, counterfeit products, and security risks**,** which undermine trust and result in financial losses for buyers. Traditional verification methods like manual document reviews are prone to human error, inefficiency, and exploitation by fraudsters who manipulate credentials and deceive consumers. To address these challenges, a more advanced, technology-driven approach is required. This paper proposes an AI-driven secure online seller registration system integrating Aadhaar-based authentication, AI-powered sentiment analysis, and blockchain-based digital signatures**.** These technologies enhance seller verification, detect fraud, and ensure transparency in e-commerce transactions. By automating identity verification, product authentication, and dispute resolution**,** the system aims to create a trustworthy and secure online marketplace while improving operational efficiency.

II. RELATED WORKS

Several research papers have addressed security challenges in e-commerce through the use of AI and sentiment analysis. This section highlights significant studies related to fraud detection, authentication, and AI-driven verification.

Patel et al. [1] explored Facial Expression & Emotion Recognition to assess user emotions during digital transactions. Their study demonstrated how AI-driven sentiment analysis could detect fraudulent behaviors based on facial cues and expressions.

Chowdhury et al. [2] implemented AI-Based Sentiment Analysis using NLP models to analyze customer reviews. Their research focused on identifying fraudulent sellers by detecting misleading or manipulated product feedback.

Ghosh et al. [3] investigated Digital Signature Authentication through blockchain-based security mechanisms. Their study emphasized the role of cryptographic signatures in ensuring secure, tamper-proof transactions in e-commerce.

Shah et al. [4] examined Multi-Factor Authentication (MFA) as an additional security layer for online transactions. Their findings highlighted how integrating biometric verification and OTP authentication enhances fraud prevention.

Overall, these studies emphasize the potential of AI, blockchain, and authentication models in enhancing e-commerce security. The proposed system builds upon these concepts to develop an advanced seller verification framework that mitigates fraud risks and ensures transparency in digital marketplaces.

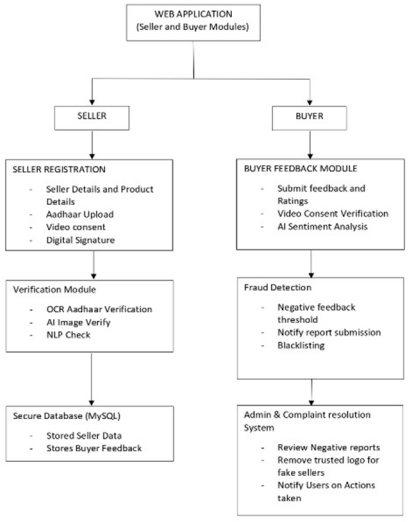
III. PROPOSED SYSTEM

The Secure Online Seller Registration System aims to create a secure and fraud-free e-commerce platform by verifying sellers and tracking their actions. The growth of counterfeit items and deceptive sellers in online marketplaces has resulted in greater financial losses and a loss of trust among consumers. Traditional verification methods often fail to detect fraudulent sellers, making it essential to integrate AI-driven authentication, product verification, and customer feedback analysis. This system ensures that only legitimate sellers can register, list their products, and operate within the marketplace. It achieves this through Aadhaar-based authentication, video consent verification, digital signature authentication, and AI-powered product verification.

To prevent fraudulent activities, the system incorporates AI-based sentiment analysis, which analyzes customer feedback to detect false claims and misleading sellers. The automated product verification module scans product descriptions and images using NLP (Natural Language Processing) and AI-based image processing to flag suspicious or counterfeit products.

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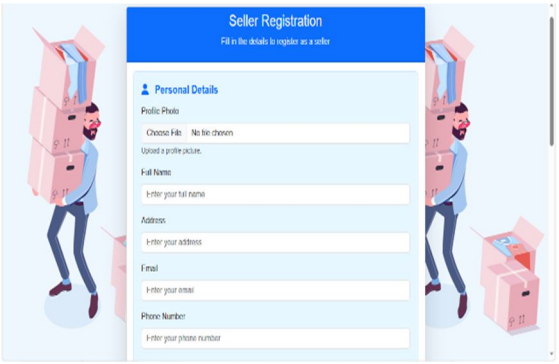
Additionally, a trust badge and blacklisting system ensures that sellers with positive reviews receive a "Trusted Seller" certification, whereas those involved in fraudulent activities are blacklisted. This approach not only safeguards buyers from scams but also ensures marketplace transparency and credibility. By leveraging AI, NLP, image recognition, and blockchain-based authentication, the system minimizes risks, fosters consumer trust, and improves the overall security of e-commerce platforms.



The architecture of this system consists of two primary user interfaces—one for seller registration and another for buyer feedback and fraud detection. These interfaces are backed by multiple modules, each responsible for different verification and security tasks. The frontend interface is built using HTML, CSS, JavaScript, and Django, providing a seamless experience for users. The backend logic, developed using Python (Flask framework), handles user authentication, product verification, feedback processing, and AI-based fraud detection.

At the core of the system lies the verification module, which includes Aadhaar-based authentication, AI-powered product screening, and NLP-driven content analysis. The Aadhaar verification process utilizes OCR (Optical Character Recognition) to extract details from government-issued Aadhaar cards and validate them against an official database. Video consent verification ensures that sellers are physically present during registration, using AI-powered liveness detection to prevent identity fraud. Once a seller is verified, the AI-based product verification system scans product images and descriptions to flag counterfeit or misleading listings. Meanwhile, the buyer feedback module collects reviews and analyzes sentiments using machine learning techniques to identify sellers with fraudulent practices. If a seller receives multiple negative feedback reports, the blacklisting module automatically removes their "Trusted Seller" status and notifies the system administrator.

The database layer, built using MySQL securely stores all seller and buyer data, product listings, and feedback reports. The complaint resolution system is integrated into the backend, allowing buyers to report suspicious sellers and automatically generating fraud reports. This modular system architecture ensures high security, scalability, and real-time fraud detection, making online marketplaces more reliable and trustworthy.



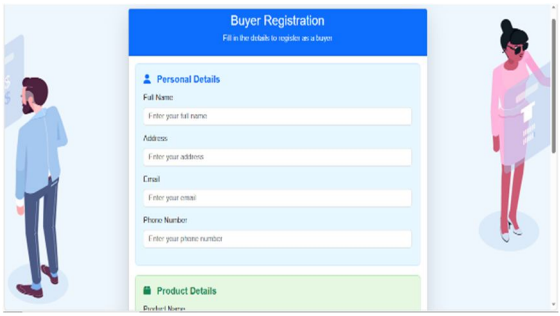


Fig.2 Seller (Personal details)

The seller registration process is designed to prevent unauthorized and fraudulent users from accessing the marketplace. The registration page collects crucial identity and product-related details, ensuring that only genuine businesses can list products. Sellers must provide basic personal details**,** including their name, email ID, phone number, and business address. To verify their identity, sellers must upload a government-issued Aadhaar card**,** which is processed using OCR technology to extract and validate the details against official records.

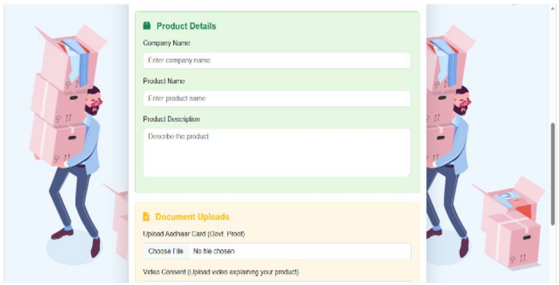


Fig.3 Seller (Product details)

A crucial part of the registration process is video consent verification, where sellers must submit a real-time video as proof of identity. This video is analyzed using AI-based liveness detection to confirm that the seller is not using pre-recorded or manipulated footage.

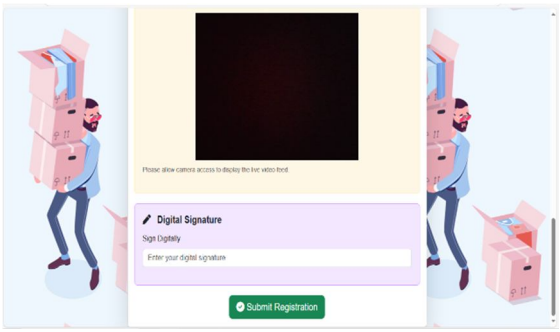


Fig.4 Seller (Video consent, Digital sign)

To add another layer of security, the system implements digital signature authentication, ensuring that each seller legally consents to the platform's policies. After successful verification, sellers proceed to submit product details**,** including the product name, description, images, and optional video proof. These submissions undergo AI-powered analysis to detect counterfeit products and misleading descriptions before being approved for listing. Once all verification steps are completed, the seller is either approved or rejected, depending on the results of the automated authentication process.

The buyer feedback module plays a crucial role in ensuring marketplace transparency and seller accountability. Buyers can search for registered sellers, filter them based on ratings, and provide detailed feedback on their purchases. The feedback submission page includes fields for product ratings, textual reviews, and media uploads (images or video proofs)**.** To prevent fake reviews, the system requires buyers to submit a video consent, which is analyzed by AI-driven liveness detection to determine if the feedback is genuine or manipulated.

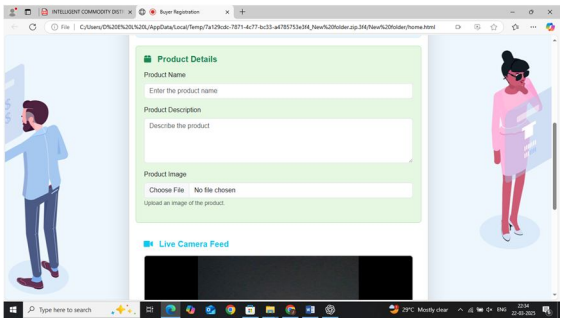


Fig.5 Buyer (Personal details)

In addition to analyzing video proofs, the system employs NLP-based text analysis to detect positive/negative, biased, or fraudulent reviews. Product images uploaded by buyers are cross-referenced against listed products using AI-powered image verification to ensure that reviews accurately reflect product quality. If a seller receives consistent negative reviews, the fraud detection module flags the seller for manual review and potential blacklisting.

By integrating AI-powered fraud detection techniques, the feedback system ensures that buyers can make informed purchasing decisions while eliminating fraudulent activities, manipulated reviews, and misleading product claims**.** This module ultimately enhances buyer confidence and platform integrity**.**

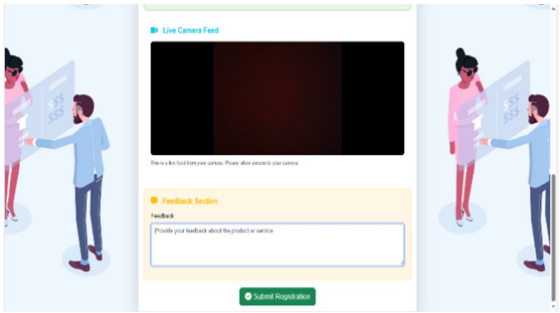


Fig.6 Buyer (Video consent/proof, feedback

The system dynamically assesses seller performance based on buyer feedback and AI-driven fraud detection. Sellers with a high percentage of positive reviews and verified transactions receive a "Trusted Seller" certification, displayed as a badge on their profile. This badge assures potential buyers that the seller has been verified and has a history of providing quality products.

Conversely, sellers who accumulate multiple negative reviews, fraud reports, or misleading product listings undergo automated fraud investigation. The blacklisting module removes their Trusted Seller status, restricting their ability to list new products. Additionally, a warning system automatically emails the seller and system administrators, notifying them about potential fraudulent activities. If a seller is found guilty of violating platform policies, the system blocks their account and prevents further transactions.

This certification and blacklisting approach ensures that honest sellers are rewarded while fraudulent sellers are systematically removed from the marketplace. The automated fraud detection mechanisms, powered by AI and machine learning, help maintain a secure, transparent, and trustworthy e-commerce ecosystem.

IV. CONCLUSION AND RESULT

The Secure Online Seller Registration System enhances e-commerce security by leveraging AI-driven verification, NLP-based analysis, and sentiment-driven fraud detection. It ensures only verified sellers can list products while enabling buyers to provide AI-analyzed feedback, reducing counterfeit sales and fraudulent transactions.

With Aadhaar authentication, video consent, and digital signatures, the system builds seller trust, while automated review analysis and complaint handling safeguard buyers. This project not only minimizes fraud but also empowers consumers with accurate information and secure transactions, setting a new standard for online seller verification and consumer protection.

V. FUTURE ENHANCEMENT

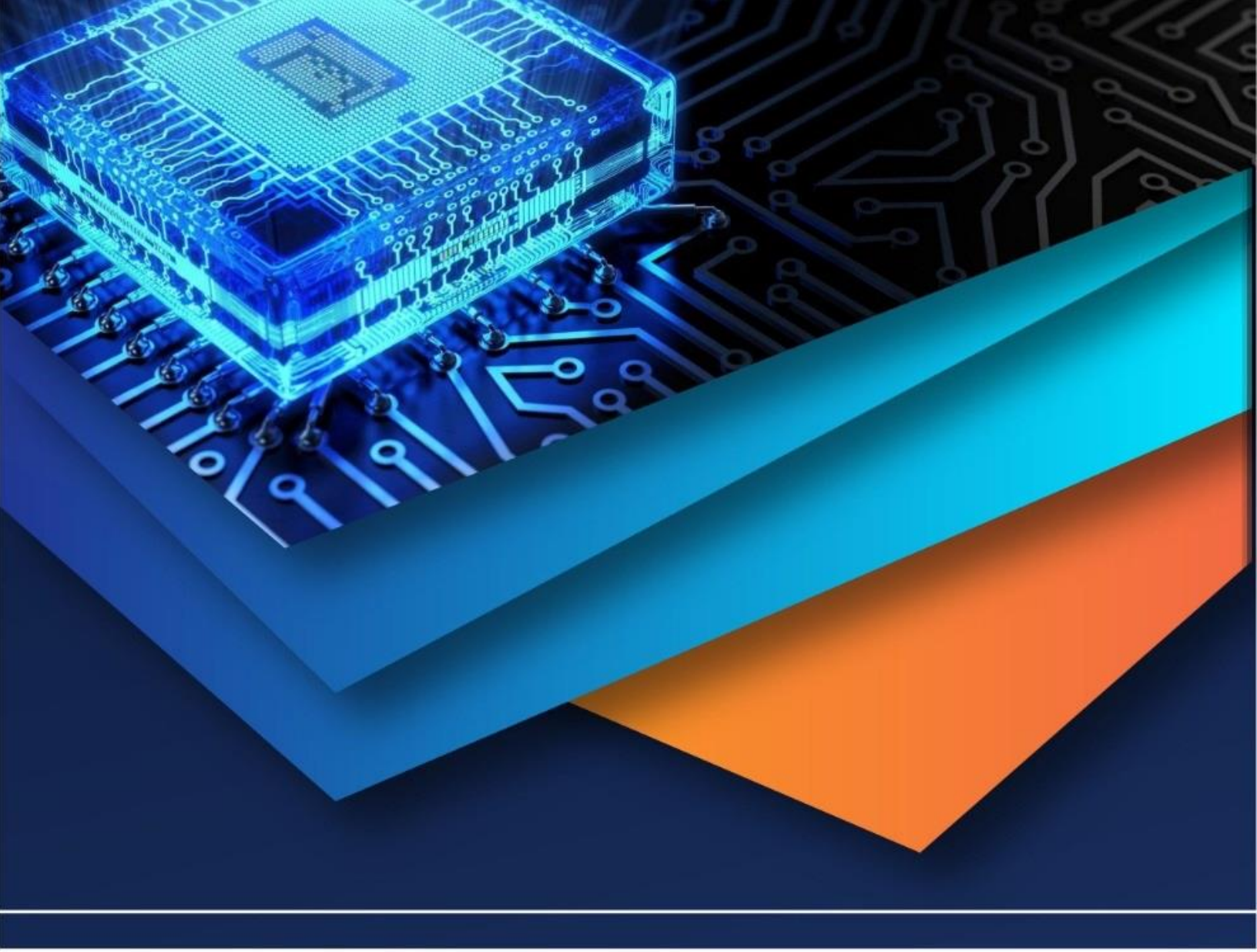
Future enhancements to the system aim to further strengthen security, improve accessibility, and enhance user trust. One major improvement is the integration of biometric authentication for seller registration, utilizing fingerprint or facial recognition linked to Aadhaar. This will provide a more robust and fraud-proof verification process, ensuring that only genuine sellers can register and operate on the platform. Additionally, an automated seller trust score can be introduced, which will evaluate sellers based on multiple factors such as registration authenticity, customer feedback, transaction history, and complaint records. This trust score will offer buyers greater transparency, enabling them to make more informed purchasing decisions and reducing the risk of fraudulent interactions. To further enhance accessibility, the system can incorporate multi-language support and voice-based registration. This feature will allow users from diverse linguistic backgrounds to navigate the platform seamlessly in their preferred language. Moreover, voice-based registration will simplify the onboarding process, particularly for users who may have difficulty typing or are unfamiliar with digital platforms.

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