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Connect Skills Securely Using Blockchain

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Abstract— *Skill-Connect is a forward-thinking platform created to unite hobby enthusiasts who are passionate about creativity, skill-building, and lifelong learning. It acts as a vibrant hub where users can purchase, sell, niche tools and materials required for various hobbies—ranging from pottery and baking to music and other creative pursuits. This marketplace is designed to lower entry barriers by giving people access to equipment without the hefty upfront investment, making it easier to explore new hobbies. A standout feature of the platform is its commitment to sustainability. By encouraging the sharing and renting of tools, it supports eco-conscious practices and helps minimize waste. Rather than owning equipment that sees occasional use, users can access resources on demand—promoting a more resource-efficient and environmentally responsible system.Looking ahead, potential areas of development include the use of blockchain technology to boost transparency and security in transactions, fostering a trustworthy environment for users. Additionally, leveraging modern web technologies could enhance interactivity, user experience, and platform accessibility. Blending technological innovation with a strong community focus, Skill-Connect has the potential to transform how hobbyists connect, collaborate, and share in a sustainable and seamless way.*

Keywords—*Blockchain technology, Decentralized marketplace, Secure transactions, Smart contracts, Supply chain transparency, Sustainable practices*

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I. INTRODUCTION

Engaging in hobbies plays a vital role in personal growth, offering a creative escape and contributing to emotional wellness. Yet, many people are discouraged from taking up new interests due to high equipment costs, limited knowledge, or access issues. Skill-Connect seeks to overcome these obstacles by building a platform centered around community and collaboration. It enables users to obtain specialized tools and supplies through various flexible methods, such as purchasing, renting, or borrowing. An added benefit of the platform is its integration of skill-sharing opportunities, where individuals can learn directly from experts in fields like painting, woodworking, and culinary crafts. This approach not only broadens access to hobbies but also supports environmentally conscious behavior by encouraging the reuse and sharing of materials and tools. What sets Skill-Connect apart is its blend of online marketplace functionality with strong community interaction. It appeals to both newcomers and experienced hobbyists by offering peer-to-peer rental services and educational experiences. With its innovative structure, the platform becomes a comprehensive hub for anyone eager to discover, develop, and share their creative passions in a sustainable way.

II. EASE OF USE

Skill-Connect is designed with user convenience at its core, offering a smooth and intuitive experience through smart navigation, advanced search filters, and easy-to-use transaction processes. Whether users are looking for tools, materials, or skill-sharing sessions, they benefit from tailored recommendations and clear, guided steps. The platform accommodates various payment options, supports instant booking for sessions, and provides a hassle-free rental system with transparent pickup and return guidelines. With compatibility across both desktop and mobile devices, users can stay connected from anywhere. Additionally, features like round-the-clock customer support and peer-generated reviews help build trust and foster a sense of community. By streamlining the entire process, Skill-Connect lowers the barrier to entry for newcomers while enhancing efficiency for seasoned hobbyists, making the journey from interest to engagement both simple and enjoyable.

III. LITRATURE SURVEY

[1] The study "Blockchain and the Art Market: Resistance or Adoption?" explores the complexities of blockchain integration within the art industry. It highlights key challenges such as trust issues, resistance to change, and fragmented adoption. While blockchain presents significant advantages in authenticity verification, ownership traceability, and transactional transparency, barriers like high costs, lack of standardization, and skepticism from traditional stakeholders hinder widespread implementation. The study underscores the tension between innovation and tradition, emphasizing that blockchain adoption requires a cultural shift alongside technological advancements. In contrast, Skill Connect focuses on accessibility, practicality, and community-driven engagement in the skill-sharing and hobby marketplace. By leveraging blockchain for trust and transparency, it ensures secure transactions, resource rentals, and collaborative learning without the complexities that hinder adoption in the art market. The platform promotes sustainability and inclusivity, enabling users to monetize skills, access tools affordably, and engage in a supportive ecosystem. Unlike the art market, which struggles with systemic resistance, Skill Connect seamlessly integrates blockchain to enhance usability and adoption in a more flexible and open environment.

[2] The title "Pottery Industry and its Development by Effective Marketing through Information and Communication Technologies (ICT)" highlights the transformative potential of ICT in revitalizing the pottery and handicraft sector. This initiative seeks to address the critical challenges faced by rural artisans, including limited technological awareness, restricted access to broader markets, reliance on traditional production methods, and the inability to compete in an increasingly digital economy. In contrast, your Skill Connect platform focuses on building a vibrant, community-driven ecosystem that connects individuals with shared interests in hobbies, skills, and collaborative projects. It offers a platform for users to exchange knowledge, rent or share tools, and access resources efficiently.

[3] The title "Self-Employment and Economic Empowerment: A Case of Pot Makers" examines the transformative impact of self-employment in achieving economic independence and social equity, with a specific focus on traditional pot makers. The initiative delves into the historical and cultural significance of pottery, highlighting its role as a time-honored craft deeply embedded in community traditions. It also addresses critical challenges, such as competition from modern, mass-produced alternatives like plastic and metal, which threaten the viability and sustainability of this traditional art form. In comparison, Skill Connect emphasizes the creation of a collaborative and technologically driven platform designed to empower individuals across diverse interests and professions. It provides hobbyists and professionals with opportunities to explore their passions, acquire new skills, and monetize their expertise through resource sharing, tool rentals, or teaching.

[4] The title "Do the Hustle! Empowerment from Side- Hustles and its Effects on Full-Time Work Performance" explores the complex relationship between side-hustles and full-time job performance. The study examines how engaging in side hustles can provide psychological empowerment, enhancing full-time work by fostering a sense of accomplishment and motivation. In contrast, Skill Connect is focused on building a collaborative and inclusive platform that empowers individuals by providing them with access to resources, learning opportunities, and avenues to monetize their hobbies. Unlike the side hustle concept, which often involves managing dual work demands, Skill Connect emphasizes personal growth, leisure, and creativity. It encourages individuals to engage in activities that are not driven by traditional employment pressures but rather by passion and community collaboration.

[5] Both projects utilize blockchain technology to bring transparency, trust, and efficiency to their respective domains. "A Theoretical Implementation: Agriculture-Food Supply Chain Management using Blockchain Technology" focuses on the agriculture-food supply chain, emphasizing traceability, reducing fraud, and ensuring quality control from farm to consumer. In contrast, the Skill-Connect platformcenters on creating a secure, decentralized platform for hobbyists to share and monetize their skills and trade supplies. In the agriculture-food supply chain project, the blockchain ensures the provenance of food items, tracks each stage of production, and maintains immutable records of transactions and quality checks.

Similarly, the Hobby Skill-Sharing Marketplace utilizes blockchain for trust and transparency but adapts it to the context of hobbyists and creators. Smart contracts automate transactions, verify skill-sharing agreements, and facilitate secure payments, fostering a collaborative ecosystem.

[6] To compare your blockchain-based smart agriculture project with the paper "An IoT Blockchain Architecture Using Oracles and Smart Contracts: The Use-Case of a Food Supply Chain", we can analyze both in terms of their objectives, architectures, and applications. The paper focuses on enhancing transparency, traceability, and trust in the food supply chain by integrating IoT devices with blockchain technology, utilizing oracles to bridge the gap between the blockchain and real-world data, and implementing smart contracts to automate processes like data validation and payments. Similarly, skill connect using blockchain aims to introduce transparency and trust into agricultural transactions, leveraging Ethereum and Chainlink for blockchain and oracle functionality. While the paper explores an IoT-centric approach for continuous real-time data integration, your project focuses on smart agriculture with potential use cases such as automating supply-chain

payments, pricing, and resource monitoring.

[7] Blockchain-based smart agriculture project shares similarities and contrasts with the paper "Research on Cross- border E-commerce Logistics Supply under Blockchain" in its focus, application domains, and implementation strategies. Both projects leverage blockchain's core principles of decentralization, transparency, and immutability, but they cater to distinct domains—your project centers on agricultural transactions, while the paper focuses on cross-border e- commerce logistics supply chains. Both projects highlight blockchain's role in automating processes through smart contracts. However, your project's emphasis on payment systems and trust-building within agricultural ecosystems aligns more closely with decentralized capital flow, as described in the paper. In contrast, the paper delves deeper into supply chain complexities, addressing challenges like multilateral collaboration and cross-border transaction efficiency.

[8] The concept of Blockchain in Agriculture using Decentralized Peer-to-Peer Networks and your Skill Connect project, while both leveraging blockchain technology, represent distinct yet innovative approaches to solving challenges in their respective industries. At their core, both projects emphasize the power of decentralization, security, transparency, and trust—principles that are fundamental to blockchain's success. Both projects employ blockchain's decentralized nature to remove intermediaries, which not only streamlines processes but also significantly reduces costs and barriers to access. In the agricultural blockchain initiative, this decentralization enhances trust among consumers, as they can independently verify the authenticity of agricultural products, thus mitigating concerns over food safety, quality, and unethical practices.

[9] The study "Malware Detection Using Blockchain Technology" presents a hybrid approach that combines signature-based and behavioral-based techniques in a decentralized blockchain network. This system allows for secure sharing and storage of malware signatures and behavioral patterns among user nodes in a peer-to-peer (P2P) environment. In contrast, Skill-Connect uses blockchain technology to enable secure, transparent transactions and resource-sharing in a decentralized marketplace for hobbyists. While the malware detection system focuses on cybersecurity and threat mitigation, Skill-Connect leverages blockchain for digital trust, transaction immutability, and rental ownership verification in a social and economic context. Both systems showcase the versatility of blockchain technology—from cybersecurity in distributed networks to community-driven peer-to-peer marketplaces. However, Skill-Connect emphasizes practical usability, accessibility, and sustainability, while the malware detection system highlights technical robustness and threat prevention.

[10] The paper "Enhancing Data Security and Traceability in Supply Chain Management using Blockchain Technology" proposes a blockchain-powered tool to address persistent issues in modern supply chains, such as fraud, counterfeiting, and lack of transparency. The system leverages smart contracts and the immutable nature of blockchain to securely record supply chain transactions from data collection to posting. In contrast, Skill-Connect uses blockchain to enable secure, peer-to-peer equipment rentals and transparent transactions within a skill-sharing and hobbyist community. While both systems aim to enhance trust and eliminate fraud.

[11] The paper "An Effective Counterfeit Medicine Authentication System Using Blockchain and IoT" addresses the growing issue of fake pharmaceuticals, which pose serious global health risks. The proposed system combines Blockchain and IoT to create a secure, transparent, and tamper-proof pharmaceutical supply chain. By decentralizing data control and providing real-time updates, the system aims to protect both consumers and manufacturers by ensuring drug authenticity and integrity. In contrast, Skill-Connect utilizes blockchain technology in a peer-to-peer environment to foster a trusted, secure marketplace for hobbyists and learners. While both systems prioritize trust and transparency, their goals differ: The medicine authentication system protects public health and product integrity in a regulated industry. Skill-Connect focuses on community empowerment, secure equipment sharing, and resource optimization, especially by using smart contracts to manage equipment rentals and ownership transparency.

[12] The paper on blockchain-based smart farming technology presents a secure and decentralized framework for agricultural data management. It ensures data persistence, auditability, and transparency by leveraging smart contracts and IoT-based authentication mechanisms. The proposed device-to-device (D2D) and device-to-gateway (D2G) authentication phases enhance mutual authentication and secure key agreements between IoT-enabled devices and network gateways. Additionally, the smart contract-based consensus mechanism verifies and adds data blocks in a Peer- to-Peer (P2P) cloud network. The study also includes formal security analysis and simulation to assess computational performance. In contrast to the smart farming paper, Skill- Connect focuses on peer-to-peer transactions in a decentralized marketplace. Instead of IoT authentication mechanisms, Skill-Connect ensures trust using digital identity verification and blockchain-based transaction security.

[13] The concept of Blockchain in Agriculture using Decentralized Peer-to-Peer Networks and your Skill Connect project, while both leveraging blockchain technology, represent distinct yet innovative approaches to solving challenges in their respective industries. At their core, both projects emphasize the power of decentralization, security, transparency, and trust—principles that are fundamental to blockchain's success. Both projects employ blockchain's decentralized nature to remove intermediaries, which not only streamlines processes

but also significantly reduces costs and barriers to access. In the agricultural blockchain initiative, this decentralization enhances trust among consumers, as they can independently verify the authenticity of agricultural products, thus mitigating concerns over food safety, quality, and unethical practices.

[14] The study "Smart Contract-Based Agricultural Food Supply Chain Traceability" explores the role of blockchain in enhancing transparency and security within food supply chains. The study highlights critical challenges such as long supply chain cycles, data distrust, and centralized control, which make it difficult to track product safety and quality. By utilizing smart contracts and blockchain, the proposed framework improves traceability, eliminates intermediaries, and ensures data integrity. Additionally, IPFS integration enhances data security while reducing blockchain storage limitations. Despite its advantages, the system faces challenges such as adoption barriers and technological constraints in large-scale implementation. In contrast, Skill- Connect focuses on peer-to-peer transactions in the skill- sharing and hobby marketplace, leveraging blockchain to facilitate secure equipment rentals, trust-building, and community engagement. While agricultural supply chains use blockchain for food safety and traceability, Skill-Connect ensures seamless transactions and digital identity verification to create a reliable, decentralized marketplace. By prioritizing accessibility and sustainability, Skill-Connect fosters a more inclusive and practical blockchain adoption model compared to the structured and compliance-heavy agricultural supply chain system.

[15] The study "Data Management System Based on Blockchain Technology for Agricultural Supply Chain" explores how blockchain can enhance data security, traceability, and efficiency in agricultural supply chains. Traditional agricultural data management relies on centralized databases that are vulnerable to theft, tampering, and inconsistencies. The proposed system utilizes smart contracts and decentralized storage (IPFS) to ensure secure, verifiable, and transparent data management In contrast, Skill-Connect focuses on peer-to-peer interactions in the skill-sharing and hobbyist marketplace, leveraging blockchain to facilitate secure transactions, digital identity verification, and equipment rentals. While agricultural data management systems use blockchain for secure record-keeping and traceability, Skill-Connect employs blockchain for transaction security, trust-building, and community-driven resource sharing. Unlike the structured agricultural system, Skill-Connect's decentralized approach promotes inclusivity, accessibility, and sustainability in a flexible marketplace.

IV. ARCHITECTURE

Software Requirements

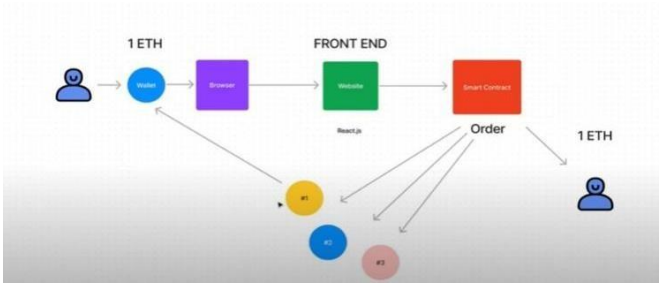

Fig1. Architecture of proposed Blockchain solution

The architecture of this e-commerce project is structured around blockchain-based smart contracts and a React.js- powered frontend. The development environment leverages Hardhat, a framework for Ethereum development, enabling efficient deployment and testing of smart contracts. To enhance contract functionality, tools like Hardhat-Gas- Reporter for gas usage analysis, Hardhat-Deploy for deployment management, Ethers.js for blockchain interaction, and the Etherscan Plugin for contract verification are used. The smart contract layer, developed in Solidity, ensures secure and decentralized transactions.

On the frontend, React.js is the core framework, supported by React-DOM for rendering, React Router DOM for navigation, and Vite for fast development builds. Code quality is maintained using ESLint with plugins for React, Hooks, and React Refresh. Additional UI enhancements come from Axios for HTTP requests and React-Toastify for user-friendly notifications. The backend, built on Express.js, manages API interactions and database operations with Mongoose for MongoDB. Security and data integrity are maintained through Body-Parser for request parsing, Cors for cross-origin support, Bcrypt for password hashing, and JWT for authentication. File uploads are handled via Multer, while input validation is ensured using Validator. Development efficiency is improved with Nodemon for automatic server restarts.

To manage configurations across different environments, dotenv is used for handling environment variables in both frontend and backend. The image illustrates how the user interacts with the e-commerce system, starting from their wallet to access the website via a browser. The frontend interacts with a smart

contract to process orders and payments using Ethereum (ETH). The decentralized nature of blockchain ensures that transactions are transparent and secure, allowing seamless order processing while maintaining a trustless payment system.

V. METHODOLGY

The development of this blockchain-based e-commerce system follows an organized methodology to ensure efficiency, security, and seamless user interaction. The process starts with system design and planning, where the architecture is outlined, detailing how users interact with the frontend (React.js), backend (Express.js + MongoDB), and smart contracts (Solidity on Ethereum). Essential tools such as Hardhat for smart contract development and Node.js for backend processing are selected.

For smart contract development, Solidity is used to create contracts that handle payments and orders. These contracts are tested with Hardhat, optimized with Hardhat-Gas-Reporter, and verified using Etherscan Plugin. The frontend is built using React.js, with Vite for fast builds, React Router DOM for navigation, and Axios for API calls. The backend uses Express.js, with Mongoose managing database interactions, JWT for authentication, and Bcrypt for password hashing.

The system undergoes testing and debugging, including unit tests on smart contracts, API validation using Postman, and frontend testing for user experience. Finally, the deployment phase involves launching smart contracts on the Ethereum network, hosting the frontend on Vercel/Netlify, and deploying the backend on AWS/Heroku, ensuring a fully functional, decentralized e-commerce platform.

VI. IMPLEMENTATION AND RESULTS

Working of Proposed System

The proposed blockchain-integrated platform revolutionizes skill-sharing and hobby resource rentals by ensuring security, transparency, and efficiency. User onboarding begins with registration, where hobbyists provide their details, including skillsets or tools available for rent. Identity verification enhances authenticity, while JWT-based authentication ensures secure access.

Users can list skill-based services with pricing details or offer tools and materials for rent with availability and usage terms. The platform's core functionality is powered by Ethereum smart contracts, developed using Hardhat, which automate service bookings, rental agreements, and payments, reducing intermediary dependency and ensuring trustless transactions. Ethers.js facilitates seamless interaction between users and the blockchain.

A booking system allows users to search and reserve services or resources with blockchain-backed transparency. Payments are executed securely via blockchain wallets, ensuring reliable and immutable transactions. The system also provides real-time tracking of bookings and service engagements, keeping all stakeholders informed.

Data security is paramount, with MongoDB managing user profiles, service details, and transaction history while ensuring integrity. Additionally, the platform offers analytics to help hobbyists optimize their offerings. Employing encryption, secure authentication, and regular audits, the system ensures compliance and security, fostering a trustworthy, decentralized marketplace for skill-sharing and hobby rentals.By blending blockchain technology with a comprehensive and intuitive platform, this system aims to redefine skill-sharing and hobby resource rentals. It offers a transparent, efficient, and secure ecosystem for hobbyists to connect, collaborate, and grow.

Results

The results demonstrate the secure and transparent transaction process facilitated by blockchain technology. The first stage involves sending the amount, where users initiate a transaction through the platform using their blockchain- integrated wallet. This transaction request is recorded and processed via Ethereum smart contracts, ensuring that funds are securely handled without intermediaries.

In the second stage, the amount is stored within the smart contract, which acts as an escrow, holding the payment until predefined conditions are met—such as successful service completion or rental confirmation. This ensures trustless transactions, where neither party can manipulate or alter the agreement once deployed. A confirmation message is generated upon successful fund storage, providing users with transparency and security.

The final stage is the withdrawal process, where the recipient, such as a service provider or resource lender, retrieves their earnings from the smart contract. The smart contract releases the funds only when conditions are satisfied, eliminating the risk of fraud or disputes.

Ste p	Action	Triggere d By	Stored In	Verified On
1	Service/Tool Booking	User	MongoD B	Platform Interface
2	Payment Initiated	User Wallet	Smart Contract	Ethereum Blockchain
3	Payment Confirmation	Smart Contract	Blockchain Ledger	Etherscan

4	Service Delivered	Provider	MongoD B	UI Notification / Email
5	Funds Withdrawn	Provider	Wallet	Smart Contract Transaction

Table 1. Transaction Flow Summary

This table outlines each step involved in a user transaction on the Skill-Connect platform — from initiating a booking to the withdrawal of funds. It shows how actions are securely recorded, processed, and validated using a combination of MongoDB and blockchain, ensuring transparency and traceability.

Function Name	Descripti on	Access Role	Outco me
Deposit Funds()	Sends payment to smart contract	User	Funds securely stored
Confirm Delivery()	Confirms service/tool was delivered	User/Provider	Unlocks payment
Withdraw Funds()	Withdraw s funds from contract	Provider	Transfer s to wallet
Get Booking Details()	Retrieves booking data	Any	Returns booking info

Table 2. Smart Contract Functions Overview

Details the core functions in the smart contract and their corresponding roles and outcomes in the system. This helps understand how automation is implemented through code logic and how user roles (buyer, seller) interact with the blockchain.

Feature	Traditional Platform	Skill-Connect (Blockchain-based)
Payment Handling	Centralized	Decentralized via Smart Contracts
Transaction Transparency	Limited	Fully Transparent
Trust Requirement	High	Trustless
Service Verification	Manual	Automated
Security of Funds	Vulnerable	Cryptographically Secure

Table 3. Feature Comparison – Traditional vs Blockchain

Compares key functional aspects between a traditional hobby-sharing platform and Skill-Connect's blockchain-based system. It emphasizes blockchain's advantages such as transparency, trustlessness, and security over conventional centralized platforms.

Security Aspect	Traditional Platforms	Skill-Connect (Blockchain- based)
Data Storage	Centralized servers	Decentralized + MongoDB
Payment Fraud Risk	High	Minimal
Data Tampering Possibility	Possible	Immutable
Authentication	Basic password	JWT + Hashed passwords
Audit Trail	Limited	Full On-chain History

Table 4. Data Security Comparison

Explains how data is stored, protected, and verified in both traditional systems versus the proposed blockchain system. Illustrates enhanced security through decentralized storage, immutability, and cryptographic protection.

Blockchain ensures high security through decentralization, immutability, and cryptographic encryption. Transactions are tamper-proof, traceable, and irreversible, significantly reducing fraud risks. By eliminating intermediaries and leveraging secure wallet authentication, the system enhances both financial transparency and user trust in the platform.

VII. FUTURE SCOPE

The Hobby Skill-Sharing and Supplies Marketplace has immense potential for growth and innovation. Future research could explore advanced technologies, such as blockchain, for secure transactions and token-based rewards. Sustainability practices may include promoting eco-friendly materials and circular economy models through upcycling and refurbishment. Enhancing community engagement through gamification, rewards, and social interactions can strengthen learning outcomes. Scalability and localization efforts should address cultural preferences, language barriers, and regional hubs for offline collaboration. The platform's economic and educational impact could be studied in terms of gig economy contributions and informal learning opportunities. Additionally, integration with broader ecosystems—including partnerships with schools, NGOs, and local businesses—can enhance accessibility and community support. By exploring these areas, the marketplace can evolve into a more innovative, inclusive, and sustainable platform for hobbyists worldwide.

VIII. CONCLUSION

The Skill-Connect Platform represents a transformative approach to enabling and supporting a thriving community of hobbyists. By providing a platform where users can rent, buy, and sell specialized equipment and materials, the marketplace reduces the financial and logistical barriers to exploring new interests. The integration of skill-sharing sessions further enhances the experience by facilitating learning, collaboration, and connection among people with shared passions. While the platform offers numerous benefits, such as enhanced security, reduced fraud, and improved transaction efficiency, it also faces challenges related to internet dependency, transaction costs, and regulatory compliance. Addressing these limitations through ongoing development and user education will be crucial for the platform's success and widespread adoption.

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