International Research Journal on Advanced Engineering Hub (IRJAEH)
e ISSN: 2584-2137
Vol. 04 Issue: 06 June 2026
Page No: 4449 - 4455
https://irjaeh.com
https://doi.org/10.47392/IRJAEH.2026.0582

Skillgrid - Skill Exchange Platform

Kulkarni Akanksha[1], Hore Ainakshi[2], Kotalwar Sanika[3], Birajdar Aishwarya[4], Jadhav Shreya[5]
[1]Associate professor, Dept. of CSE, Dr. D. Y. Patil Institute of Engineering, Management and Research
[2,3,4,5]UG Scholar, Dept. of CSE, Dr. D. Y. Patil Institute of Engineering, Management and Research, Akurdi
Emails: *akanksha.kulkarni@dypiemr.ac.in[1], horeainakshi@gmail.com[2], sanikabkotalwar@gmail.com[3]*
aishbirajdar2306@gmail.com[4], sonushreya114@gmail.com[5]

Abstract
SkillGrid is an AI-driven skill exchange platform that enables users to barter knowledge and expertise without monetary transactions. It integrates AI-based recommendations, blockchain for credibility, and peer-to-peer learning to ensure fairness and transparency. The system promotes collaborative and community-based education while addressing personalization gaps in traditional e-learning. Ultimately, SkillGrid aims to create a scalable, equitable, and intelligent marketplace for global knowledge sharing.
Keywords: *Large Language Models (LLMs), natural language processing (NLP)*

1. Introduction
In the rapidly evolving digital economy, skill exchange platforms have emerged as innovative ecosystems for collaborative learning and mutual growth. Rather than relying solely on monetary transactions, these systems enable individuals to barter knowledge and expertise directly with peers. The proposed platform, SkillGrid, seeks to create an AI-driven environment for skill trading, where users can learn, teach, and collaborate in a decentralized and transparent way [2]. The increasing demand for diversified learning models has made traditional e-learning insufficient in fostering human interaction and community development. Platforms such as SkillsMe, LinguaChain, and Student Exchange Emporium highlight the transition toward community-based and sustainable education frameworks [5],[6]. However, current systems often lack personalization, reward fairness, and intelligent skill-matching capabilities SkillGrid addresses these limitations by integrating AI-assisted recommendation systems,block chain based credibility tracking, and peer-topeer learning models to ensure equitable exchange [5]. The goal is to establish a fair, scalable, and intelligent marketplace for knowledge exchange, promoting both accessibility and empowerment in digital learning ecosystems.

2. Literature Review
The study of P2P-Fed – Decentralized Federated Learning on Peer Networks (2025) focuses on developing a peer-to-peer model for privacypreserving collaborative learning. The approach uses federated learning along with decentralized data exchange, ensuring that sensitive data remains localized. The findings highlight improved scalability and strong privacy preservation [1]. This work is relevant to SkillGrid as it provides a foundation for designing a secure architecture where user skill data is protected without relying on a centralized system. The research on LinguaChain – Peer-to-Peer Dynamic Decentralized LLM with Coin-based Incentives (2025) aims to establish trust in peer-topeer systems using blockchain and AI technologies. It utilizes smart contracts and decentralized storage to ensure secure interactions. The study demonstrates how immutable ledger systems can guarantee transparency and commitment fulfillment [2]. This directly supports SkillGrid by guiding secure transaction logging and ensuring trust in skill exchange processes. Another study, AI-Driven Mobile Platform for Career Planning Integrating Real-Time Market (2025), focuses on connecting users with career opportunities based on real-time skill demand. It employs AI-based recommendation systems and skill analysis techniques. The results show improved accuracy in matching user skills with career paths [3]. This contributes to SkillGrid by enhancing its AIbased recommendation engine, enabling smarter and futureoriented skill matching. The SkillsMe –

International Research Journal on Advanced Engineering Hub (IRJAEH)
e ISSN: 2584-2137
Vol. 04 Issue: 06 June 2026
Page No: 4449 - 4455
https://irjaeh.com
https://doi.org/10.47392/IRJAEH.2026.0582

Knowledge Exchange Platform (2024) research emphasizes peer-to-peer knowledge sharing using a token-based reward system. It applies content-based matching algorithms to connect users and encourage engagement. The findings reveal that non-monetary incentives can effectively drive participation and collaboration [4]. This study influences SkillGrid's barter-based model, validating the concept of skill exchange without direct financial transactions. Finally, Student Exchange Emporium (2024) focuses on building a collaborative and sustainable learning ecosystem among students. It uses federated learning for distributed data sharing and promotes continuous knowledge reuse. The results indicate increased user engagement and long-term participation [5]. This research aligns with SkillGrid's goal of creating a continuous learning platform that encourages repeated interactions and sustained skill development[1 – 10].

3. System Overview

SkillGrid is architected as a two-layer system, mediating between high-speed user experience and decentralized truth. The design combines peer-topeer architecture with intelligent recommendation mechanisms to ensure scalability, security, and efficient interaction [2], [5].

3.1.Role-Based Interaction

- Requester: Users seeking to acquire a specific skill. They utilize AI search tools to find compatible mentors and propose "Karmabased" trades [3],[5].
- Provider: Users offering their expertise. They receive requests, manage their teaching availability, and earn Karma Tokens upon successful completion [9],[6].
- Admin: Oversees platform analytics, manages user disputes, and monitors system performance.

3.2.Core Features

- Smart Search: A semantic search engine that uses NLP to understand the context of a user's skill gap rather than just keywords [8].
- Karma Token Economy: A non-monetary credit system that facilitates fair skill exchange and encourages community participation through incentive-based mechanisms [2],[9].
- Skill Depth Score (SDS): A proficiency metric based on validated performance history, ensuring transparency and reliability in user skill evaluation [1].As shown in Figure 1 User Flow Diagram for the SkillGrid

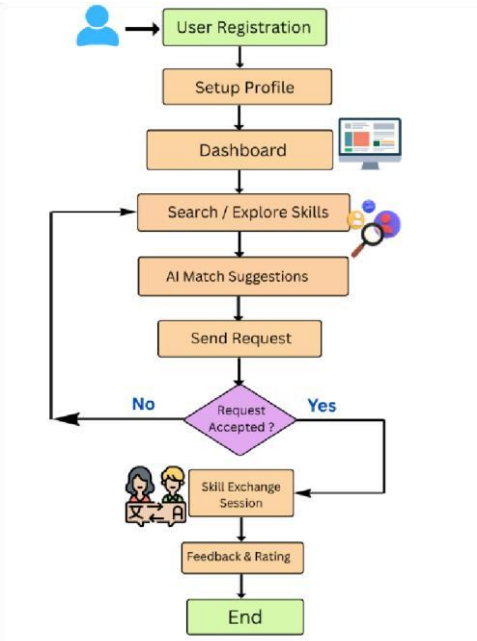

Figure 1 User Flow Diagram for the SkillGrid

4. System Architecture and Components

SkillGrid employs a hybrid architecture to balance high-speed user experience with secure, decentralized validation [2],[1].

4.1.System Components

- **User Interface (UI):** A responsive dashboard developed using React.js that allows users to browse skill recommendations, manage profiles, and view transaction history
- **Application Server:** Built with Spring Boot (Java), it manages complex business logic, user authentication via JWT, and the SDS calculation engine
- **Central Database:** Utilizes MySQL or MongoDB to store non-critical data such as user profiles and skill listings for rapid retrieval. As shown in Figure 2 System Architecture of the SkillGrid .

International Research Journal on Advanced Engineering Hub (IRJAEH)
e ISSN: 2584-2137
Vol. 04 Issue: 06 June 2026
Page No: 4449 - 4455
https://irjaeh.com
https://doi.org/10.47392/IRJAEH.2026.0582

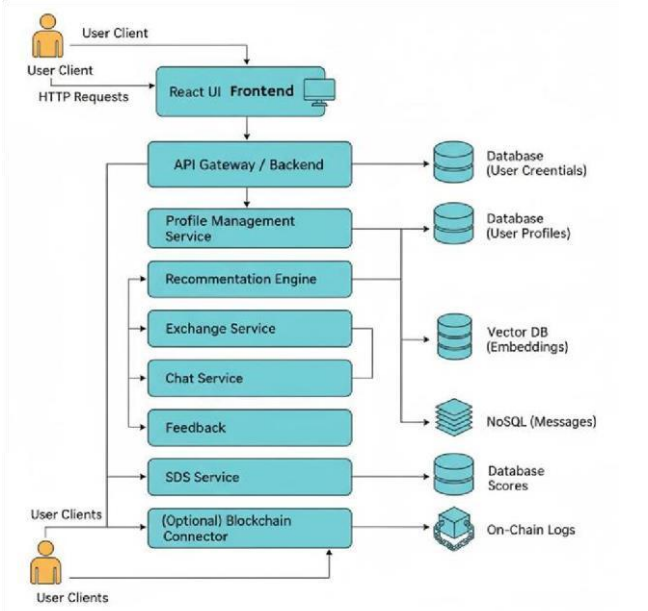

Figure 2 System Architecture of the SkillGrid

5. Proposed Methodology

The system follows a structured methodology that integrates AI-based decision systems with decentralized and transparent mechanisms to ensure efficient and fair skill exchange [3], [2].

5.1.Skill Matching Algorithm (AI-Based)

- Compares user offered skills and requested skills
- Uses keyword matching and similarity scoring
- Identifies compatible users for exchange
- Computes similarity using basic matching score:
- Number of Common Skills

$$\text{Matching Score} = \frac{\text{Number of Common Skill}}{\text{Total Skills}}$$

- Total Skills
- Higher score indicates better match
- Users are ranked based on matching score
- Improves accuracy of recommendations
- [3],[5]

5.2.Nlp-Based Skill Analysis

- Processes user-entered skill descriptions
- Extracts keywords using text parsing
- Identifies related or similar terms
- Converts text into tokens

- **Text → Tokens = {$w_1, w_2, w_3, \ldots$}**
- Removes stop words and irrelevant data
- Maps similar terms (e.g., "AI" ≈ "Machine Learning")
- Enhances matching beyond exact keyword comparison [8] Process Diagram as shown in Figure 3 Flow of Text Processing in NLP

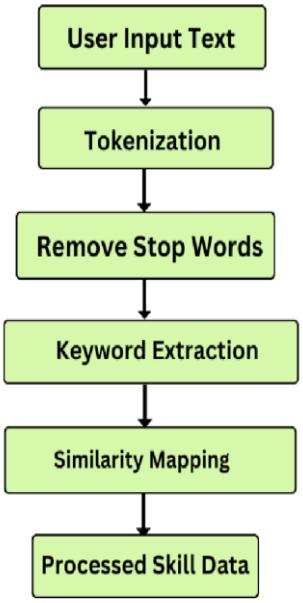

Figure 3 Flow of Text Processing in NLP

5.3.Bi-Directional Matching Algorithm

- Checks mutual skill exchange condition
- Ensures both users benefit
- Validates two-way compatibility
- Matching condition:

$$User_A(Offers) \cap User_B(Wants) \neq \emptyset$$
$$User_B(Offers) \cap User_A(Wants) \neq \emptyset$$

- Only valid if both conditions are satisfied
- Filters out one-sided matches
- Ensures fair barter exchange [9]

User A Offers → Check → User B Wants
User B Offers → Check → User A Wants

International Research Journal on Advanced Engineering Hub (IRJAEH)
e ISSN: 2584-2137
Vol. 04 Issue: 06 June 2026
Page No: 4449 - 4455
https://irjaeh.com
https://doi.org/10.47392/IRJAEH.2026.0582

5.4.Search & Filtering Algorithm (Regex-Based)

- Uses pattern matching in MongoDB
- Filters users based on skills and preferences
- Supports partial and flexible search
- Query pattern
- db.users.find({skills: { $regex: "query", $options: "i" }})
- Case-insensitive matching
- Uses indexing for optimization
- Reduces search time complexity

5.5.Feedback & Reputation Algorithm

- Collects ratings after task completion
- Calculates average rating
- Ranks users based on performance
- Rating formula:

$$R_{avg} = \frac{\sum_{i=1}^{n} R_i}{n}$$

- Where R_i= individual ratings
- Higher rating improves user visibility
- Helps in trust and reliability [4]

5.6.Task & Exchange Management Algorithm

- Handles request creation and acceptance
- Tracks task progress (pending → ongoing → completed)
- Updates system status dynamically
- State transition
- Request → Accepted → In Progress → Completed
- Ensures proper workflow management
- Maintains records of all exchanges
- Ensures smooth workflow and monitoring [2]. As shown in Figure 4 Flow of Skill Exchange Mechanism

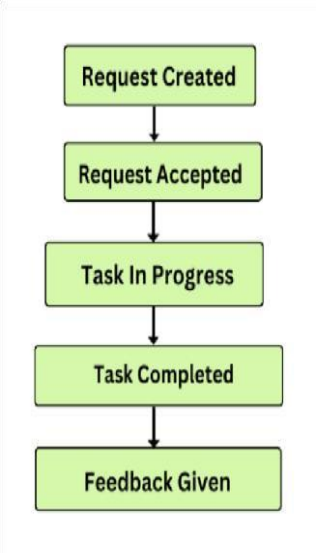

Figure 4 Flow of Skill Exchange Mechanism

6. System design And Implementation

6.1.Technologies Used

- Frontend: React.js for a responsive, dashboard-driven UI.
- Backend: Java with Spring Boot for RESTful API management and business logic.
- Database: MongoDB for efficient storage and retrieval of user and skill data.
- AI Integration: Google Gemini AI [3],[7],[10].
- Blockchain: Ethereum Test Network
- (Ganache) for smart contract execution[20 – 28].

6.2.Algorithms Used

- NLP Proficiency Mapping: Uses Natural Language Processing and generative AI to analyze and interpret user skills [8], [7].
- Matching Algorithm: Bi-Directional Skill
- Intersection Logic [9].
- Reputation Algorithm: Karma-based Reward System
- Search Optimization: Regex-based pattern matching in MongoDB for efficient and flexible querying [8].
- Stateless Authentication: JWT-based

International Research Journal on Advanced Engineering Hub (IRJAEH)
e ISSN: 2584-2137
Vol. 04 Issue: 06 June 2026
Page No: 4449 - 4455
https://irjaeh.com
https://doi.org/10.47392/IRJAEH.2026.0582

authorization for secure session management .

- Credential Security: BCrypt Password Hashing
- CORS Configuration: Cross-Origin Resource Sharing Protection
- Access Control: Role-Based Access Control (RBAC)

7. Results And Discussion

The SkillGrid platform demonstrates effective skill matching and user interaction through AI-based recommendation and NLP techniques, improving personalization and accuracy.As shown in Figure 5 View of Home page ,Figure 6 User Dashboard

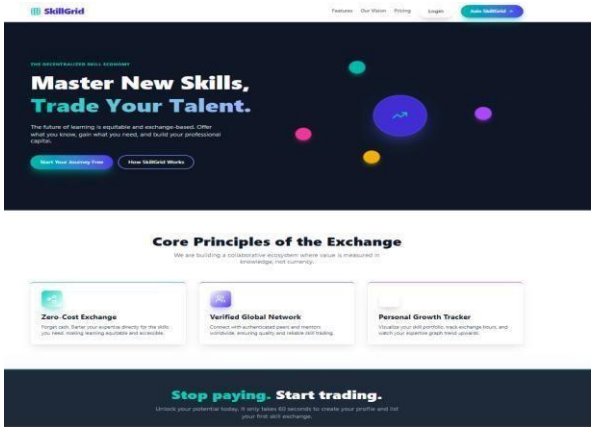

Figure 5 View of Home page

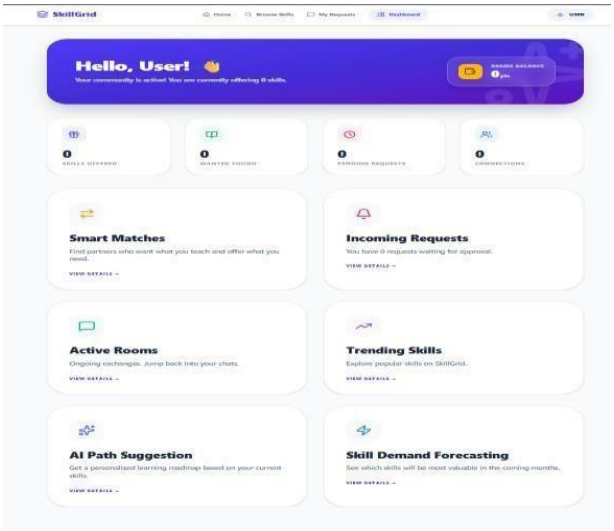

Figure 6 User Dashboard

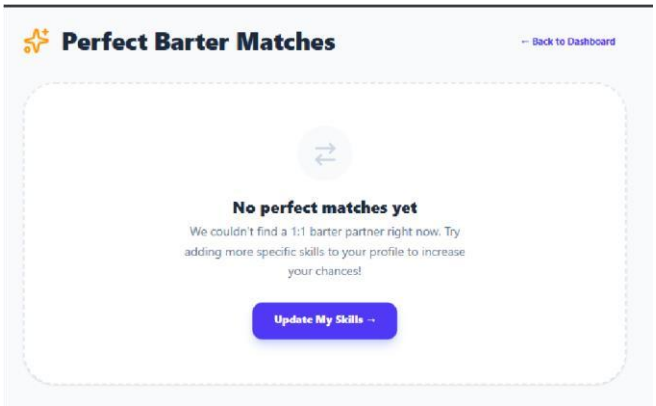

Figure 7 User Skill Matching

Conclusion

SkillGrid is an AI-based skill exchange platform that enables users to learn and share skills without monetary transactions. It utilizes intelligent matching techniques to connect users based on their interests and goals, enhancing personalized learning experiences. The platform promotes collaborative learning and improves user engagement through a barter-based model. Additionally, the Skill Depth Score contributes to trust and credibility assessment. Overall, SkillGrid provides a flexible and userfriendly approach to modern learning systems, aligning with advancements in AIdriven personalized platforms [3].

Future Work

To expand its global utility, future development of SkillGrid will focus on several key areas:

- Global Expansion: Incorporating multilingual AI translation to enable seamless knowledge exchange across different cultures.
- Immersive Learning: Integrating Augmented Reality (AR) and Virtual Reality (VR) to provide hands-on, immersive skill development experiences.
- Professional Certification: Introducing blockchain-verified micro-certifications and badges to link validated skills directly to career pathways and employment opportunities [1].
- AI Optimization: Enhancing recommendation algorithms through

International Research Journal on Advanced Engineering Hub (IRJAEH)
e ISSN: 2584-2137
Vol. 04 Issue: 06 June 2026
Page No: 4449 - 4455
https://irjaeh.com
https://doi.org/10.47392/IRJAEH.2026.0582

custom machine learning models to further improve matching accuracy [7],[5].

- AI Dispute Resolver: Implementing AIdriven conflict resolution mechanisms to handle disputes between users by analyzing interaction history, feedback, and transaction records. Such systems can improve fairness, transparency, and user trust in digital platforms [10].

References

[1]. A. Lim, S. Jang, and J. Lee,"P2P-Fed: A Decentralized Federated Learning Platform on Structured Peer-to-Peer Systems," 2025 IEEE 25th International Symposium on Cluster, Cloud and Internet Computing (CCGrid), 2025.

[2]. Citation: Decentralized federated learning platforms improve scalability and privacy-preserving collaborative systems.

[3]. P. Sharma, R. Gupta, and S. Verma,"Design of a Secure and Scalable Peer-to-Peer Knowledge Sharing Platform,2025 International Conference on Advances in Computing, Communication and Applied Informatics (ACCAI), IEEE, 2025.

[4]. Citation: Secure peer-to-peer knowledge sharing platforms improve scalable and collaborative learning systems.B. Kurian, S. K. Singh, R. K., A. S., C. R., and K. V. S.,

[5]. "AI-Driven Mobile Platform for Student Career Planning Integrating Real-Time Market Data,"Proceedings of the 6th International Conference on Intelligent Communication Technologies and Virtual Mobile Networks (ICICV), IEEE, 2025.

[6]. Citation: AI-driven recommendation systems improve career and skill matching accuracy. M. A. Islam, M. B. Islam, M. R. Ali, and M. A.Islam,"An Evaluation of AI-Enhanced Collaborative

[7]. Learning Platforms," 2024 International Conference on Communication, Computer Sciences and Engineering (IC3SE), IEEE, 2024.Citation: AI-enhanced collaborative learning platforms improve engagement and peer-to-peer interaction.

[8]. L. Zhang, H. Zhao, and M. Chen,"Artificial Intelligence-Based Recommendation Systems for Personalized Learning Platforms,"2024 IEEE International Conference on Artificial Intelligence and Knowledge Engineering (AIKE), IEEE, 2024.

[9]. Citation: Personalized recommendation systems enhance intelligent skill matching and learning experiences.

[10]. S. Amancha, T. Sunitha, D. Srinidhi, and S. Sravya,"Development of an E-Learning Platform with Live Doubt Resolution and Game-Based Learning Instructions," 2025 6th International Conference on Recent Advances in Information Technology (RAIT), IEEE, 2025.

[11]. Citation: AI-supported e-learning platforms improve interactive and collaborative education systems.

[12]. C. L. Kok, N. T. C. Thanh, C. K. Ho, T. H. Teo, and Y. Y. Koh, "Collaborative Learning Environments Facilitated by AI Technologies," (Publication details to be updated).

[13]. C. B. Murthy, S. R. Gumma, B. Vanitha, and S. Kankanala,"Automated Skill Extraction and Resume Classification using DistilBERT-based NLP Framework," in Proc. 2nd Int. Conf. on Networks and Soft Computing (ICNSoC), 2025, pp. 478–482.

[14]. Citation: DistilBERT-based NLP frameworks improve automated skill extraction and classification accuracy. M. Shiva Kumar, C. J. Vishnu Prakash, M. Muneer, and G. Nihsal,

[15]. Citation:AI-facilitated collaborative environments Citation: Prompt-based and contrastive NLP methods improve knowledge sharing and personalized learning. improve semantic skill matching performance.

[16]. J.Chen, Y. Liu, and X.Wang, [13] S. Huang, H. Yang, Y. Yao, X. Lin, and Y. Tu,"AI Based Talent Management System," in Proc. Int. Conf. on Computer Science and Communication Engineering (ICCSCE), Atlantis Press, 2025.

International Research Journal on Advanced Engineering Hub (IRJAEH)
e ISSN: 2584-2137
Vol. 04 Issue: 06 June 2026
Page No: 4449 - 4455
https://irjaeh.com
https://doi.org/10.47392/IRJAEH.2026.0582

[17]. "Skill Extraction and Job Matching Using Natural Language Processing and Machine Learning," 2024 IEEE International Conference on Big Data and Smart Computing (BigComp), IEEE, 2024. Citation: NLP and machine learning techniques improve intelligent skill extraction and job matching accuracy.
[18]. A. Singh and U.J.,
[19]. "Student Exchange Emporium: Promoting Sustainability and Community Collaboration,"2024 8th International Conference on Computational System and Information Technology for Sustainable Solutions (CSITSS), IEEE, 2024.
[20]. Citation: Community-based collaborative platforms improve sustainable peer-to-peer learning environments.
[21]. R. AlMakinah, A. Norcini-Pala, L. Disney, and M. A. Canbaz, "Enhancing Mental Health Support through Human-AI Collaboration: Toward Secure and Empathetic AI- Enabled Chatbots," arXiv preprint arXiv:2410.02783, 2024.
[22]. Citation: Human-AI collaborative systems improve intelligent interaction and personalized user support.
[23]. "Deep Adaptive Interest Network: Personalized Recommendation with Context-Aware Learning," arXiv preprint arXiv:2409.02425, 2024.
[24]. Citation: Context-aware recommendation systems improve personalized matching and user engagement. B. Sribharathi, S. V. Balamurugan, S. Megavarmaraj, S. Deepak, and S.Kajendhiran, "Scopira: An AI-Driven Career Guidance System Using Resume Parsing, Skill Gap Analysis, and Intelligent Job Matching," in Proc. IEEE 10th Int. Conf. on Smart Structures and Systems (ICSSS), 2025.
[25]. Citation: AI-driven career guidance systems improve intelligent job matching and skill gap analysis.
[26]. I. X. Vazquez, S. Gonzalez, and J. Sedano,
[27]. "Beyond Titles: Semantic Matching of Jobs and Skills Using LLMs and S-BERT,"
[28]. CEUR Workshop Proceedings, vol. 4038, 2025. Citation: Semantic matching using LLMs and S-BERT improves intelligent skill recommendation accuracy.