

Journal DAO: A New Framework for DeSci in Web 3.0

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Abstract—The advent of Web3.0 signifies a notable evolution in the Internet landscape, emphasizing decentralization, openness, and user control over data. This paper begins by delineating the key characteristics of Web3.0, including a decentralized network architecture, the application of smart contracts, and the protection of data privacy. Against the backdrop of blockchain technology, leveraging the immutability and transparency of blockchain, the paper discusses how it can facilitate the authenticity, security, and traceability of paper data, providing a new perspective on ownership and governance. Lastly, the paper proposes the structure of a decentralized autonomous organization (DAO) and discusses its potential applications in resolving ownership and governance issues. Through the DAO framework, a more just, transparent, and open organizational structure can be realized, bringing new governance models to the academic research domain. This structure underscores more equitable stakeholder participation, fostering the collaborative development of the academic community. By comprehensively examining Web3.0, blockchain applications, ownership issues, and the structure of DAO, this paper aims to provide insights for future research directions and innovative applications in the academic and technological communities.

Index Terms—DAO, smart contract, decentralized autonomous organizations, decentralized funding, decentralized science, DeSci, parallel DeSci, Web3

I. INTRODUCTION

ACADEMIC publication methods have undergone significant historical transformations, reflecting the evolution of technology, society, and culture. Traditional scholarly journals, rooted in print formats and centralized editorial processes, have long been the primary medium for disseminating research findings [1]. However, the digital age has brought about profound changes, challenging the conventional models and paving the way for innovative solutions [2]. This paper delves into the historical trajectory of academic journals, highlighting key milestones and contextualizing the current paradigm shift towards blockchain technology.

The early days of academic publishing were marked by the establishment of prestigious print journals, serving as repositories of scholarly knowledge. These publications played a crucial role in shaping academic discourse, but their centralized nature often led to challenges such as delayed dissemination and limited accessibility. With the advent of the internet, electronic journals emerged, offering faster dissemination and broader reach, yet grappling with issues of copyright, authenticity, and peer review integrity. In recent years, the emergence of blockchain technology has presented a transformative opportunity for the academic publishing landscape. Blockchain,

with its decentralized and immutable ledger, addresses several longstanding challenges [3]. The transition to blockchain-based academic journals holds the promise of enhancing transparency, traceability, and security in scholarly communication.

This paper sheds light on the dynamic evolution of research publication methods, continually adapting to new technologies and societal trends. The future of academic publishing is expected to witness further transformations, including expanded open access, increased peer review transparency, enhanced international collaboration, and interdisciplinary research integration. These trends are poised to shape the future of research dissemination.

In the realm of academic journals, the integration of blockchain technology, smart contracts, and Decentralized Autonomous Organizations (DAO) represents a transformative frontier. Blockchain ensures the immutability and transparency of data, addressing issues of data integrity and reliability. Smart contracts, operating on the blockchain, automate and enforce the rules governing various processes, such as article submissions, peer reviews, and fund distribution. DAOs, as a governance structure, provide a decentralized decision-making framework, fostering inclusivity and community engagement. The synergistic application of blockchain, smart contracts, and DAOs can enhance the efficiency and integrity of academic journals. It introduces a trustless and transparent environment, reducing the need for intermediaries and ensuring that the entire process, from article submission to fund distribution, is executed with a high level of security and accountability. This paradigm shift has the potential to redefine the landscape of academic publishing, fostering a more collaborative, secure, and accessible platform for scholarly communication.

Application of DAO in Article and Journal as figure 1 shows:

- **Transparent Peer Review and Publishing Process:** Blockchain can be used to create a transparent academic publishing platform, ensuring transparency throughout the peer-review and publishing processes. [4] Smart contracts can manage review, publication, and payment procedures, ensuring traceability and fairness.
- **Protection of Intellectual Property:** Blockchain and smart contracts can safeguard authors' intellectual property, ensuring their works are not copied or distributed without permission.
- **Identity Verification and Reputation Building:** Blockchain can be employed to establish scholars' identities and reputations [5]. Smart contracts can automate

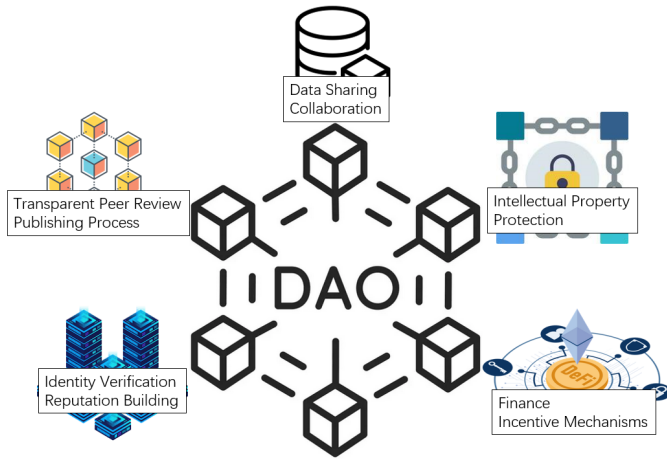


Fig. 1. Application of DAO in Article and Journal

the validation of scholars' achievements, storing them on the blockchain.

- **Data Sharing and Collaboration:**

Blockchain and smart contracts can facilitate data sharing and collaboration among scholars, ensuring data integrity and traceability [6].

- **Finance and Incentive Mechanisms:**

DAO and cryptocurrencies can be used to support research finance and incentive mechanisms. Funds can be allocated according to token weights.

These application examples highlight the potential value of blockchain, smart contracts, and DAO technology in academic publishing and journal management. They enhance transparency, protect intellectual property, verify identity, automate processes, and encourage collaboration. As these technologies continue to evolve, they hold promise for further innovation and efficiency in academia.

In the traditional landscape of Web 2.0, the ownership of articles remains with the creators, yet the entirety of the associated data is ensconced within the databases of publishers, shrouded in a lack of transparency. This opaqueness extends to financial allocations, where, even if publishers express willingness to distribute funds, the absence of intermediary oversight poses challenges to ensuring fairness and accountability in the process. This paper delves into the transformative potential of Web 3.0 and blockchain technology within the DAO framework to rectify these issues, ushering in a new era of decentralized, transparent, and equitable financial distribution for content creators.

This paper underscores the transformative impact of blockchain technology on authorial ownership within the DAO framework. By securing and amplifying authorship rights, the paper explores how this paradigm shift facilitates a fair and transparent allocation of finance. Through the inherent decentralization and smart contract capabilities of DAOs, the financial ecosystem becomes a dynamic and equitable space, fostering an environment where creators are duly recognized and rewarded for their contributions.

II. JOURNAL DATA OWNERSHIP IN THE SYSTEM OF WEB3.0

This chapter delves into the intricate matter of research data ownership. In the realm of academic research, the question of who possesses, controls, and manages research data is of paramount importance, involving researchers, academic institutions, publishers, and various stakeholders within society. We also investigate existing data-sharing models and open-access policies and their potential effects on the academic community and knowledge innovation. By delving into the issue of research data ownership, we gain a deeper understanding of the challenges and opportunities in today's academic environment, offering new perspectives for future research and collaboration.

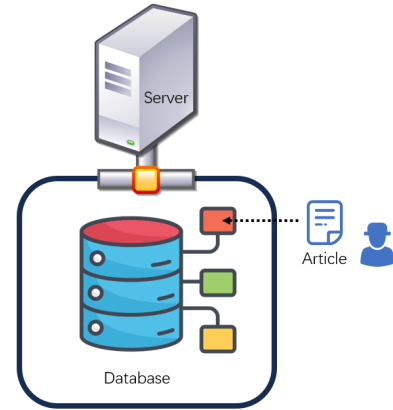


Fig. 2. Article in Database

From a physical perspective like Figure 2, the data of articles is stored in the database of the journal website. When regular users access the journal website, they can browse and download articles of interest. The interaction between users and the journal website typically involves the following steps.

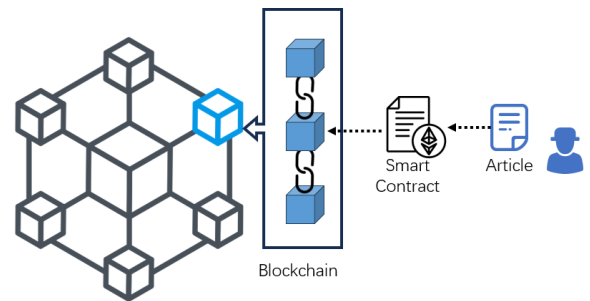


Fig. 3. Article in Blockchain

When an article is uploaded to a blockchain like Figure 3, its content, timestamp, and relevant metadata are all recorded on the blockchain. This means that anyone can verify the existence, content, and timestamp of the article. This provides a high level of assurance for the immutability and transparency of documents, particularly with potential significance in research, intellectual property protection, and copyright. Uploading articles to the blockchain also enables decentralized data storage, reducing reliance on centralized institutions. This

offers a more open and trustworthy means of data sharing for the academic community and other domains. Uploading an article to a blockchain, as compared to storing it in a traditional database, provides the author with a clear and objective ownership of the article. In a traditional database, the ownership of the data and the integrity of the database are controlled by the entity or organization managing the database. Authors and other stakeholders may not have direct control or visibility into the ownership and usage of the data.

On the other hand, when an article is uploaded to a blockchain, the author can have greater confidence in their ownership and control over the article. The blockchain's decentralized and immutable nature ensures that the ownership records are transparent, tamper-resistant, and not under the sole control of a centralized authority. This empowers authors to have a direct and verifiable claim to their work, which can be particularly important for intellectual property protection, copyright, and ensuring that the author's rights are respected.

Compared with traditional journals, articles on the chain belong entirely to the author.

a) Traditional Databases:

- Traditional databases are typically controlled by a central entity or organization, with database administrators responsible for management and access control. This centralization may result in less transparent ownership.
- Access to and modification of data in traditional databases often depend on access controls set by database administrators. This can lead to disputes or lack of transparency regarding data access.
- Data in traditional databases can be relatively easily modified or deleted. This may raise concerns about data security and integrity, especially in cases where intellectual property protection is crucial.
- Ownership and control of data are typically centralized with the database administrator. This centralization introduces a single point of control over data usage, increasing the risk of misuse or improper handling.

b) Blockchain:

- Every transaction on the blockchain has a clear timestamp, documenting the transfer of ownership. This provides authors with a transparent, immutable record of ownership. Authors can trace ownership back to each stage of the data's lifecycle.
- Blockchain utilizes smart contracts to define and enforce data access permissions. This allows dynamic adjustments of data access rights based on different conditions, such as paid access or specific usage licenses.
- Blockchain is decentralized, with data stored across multiple nodes in the network. This ensures that no single central entity can unilaterally control ownership, enhancing data security and tamper resistance.
- Once data is written to the blockchain, it is nearly impossible to modify or delete. This ensures the immutability of data, providing robust protection for the author's rights.

In summary, blockchain offers a more transparent, immutable, and decentralized ownership mechanism, providing stronger protection for authors' intellectual property and data rights.

This is particularly advantageous in scenarios where emphasis is placed on data security, traceability, and transparency. Using a blockchain for article storage offers authors a more objective and transparent means of claiming ownership of their work compared to traditional database systems.

III. AUTHOR FINANCE FROM JOURNAL

In the evolution of electronic journals, websites have become the primary medium for disseminating research papers. Although the content of users' papers remains the intellectual property of the authors, the wealth generated by journals through these papers often belongs predominantly to the journals rather than the authors. In our hypothetical scenario, we contemplate a shift in this paradigm, envisioning a system where a certain proportion of the generated wealth is allocated back to the authors. Taking paid downloads as a simple example, this mechanism aims to provide authors with a more direct economic incentive. Such a transformation not only has the potential to enhance authors' motivation and creativity but also holds the promise of establishing a more equitable wealth distribution system. This envisioned change could contribute to fostering a sustainable and mutually beneficial development model in the realm of electronic journals, addressing the balance of interests between authors and journals more effectively.

Web2, also known as the social web, refers to the current state of the internet that we use today, which is primarily focused on social media, e-commerce, and other web-based applications that allow users to interact with each other and with content in various ways. In Web2, payment systems are typically centralized, meaning that they are controlled by a single entity or organization.

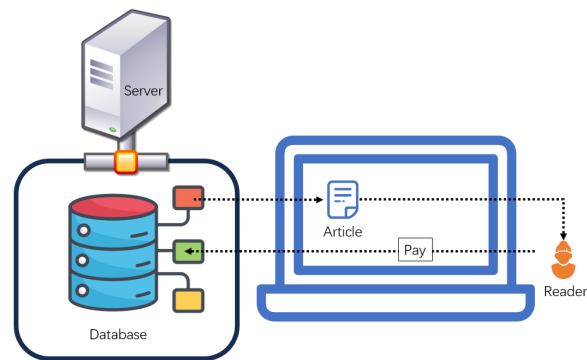


Fig. 4. Reader Pay for Download in Web2.0

As the figure 4 shows. In the context of Web 2.0, the establishment of a platform for downloading articles entails several steps. Firstly, the creation of a functional website serves as the primary interface for users. This website acts as a centralized hub, hosting a database that stores a diverse range of articles across various disciplines. When a user decides to download a specific article, a payment system is in place to facilitate the transaction. The user pays a designated fee for the download, and the platform, acting as an intermediary, manages the distribution of funds. The allocation of funds may involve a proportional distribution to the authors, and

this process is typically administered by the central entity running the website. This centralized model means that all user interactions, content storage, and payment transactions occur within the controlled environment of the website. Users depend on the centralized platform to oversee and coordinate all aspects of the transactional process, creating a reliance on a single authority for the entire operation.

Web3, also known as the decentralized web, represents a shift toward a more open, decentralized, and secure internet that is built on blockchain technology [7]. In Web3, payment systems are decentralized, meaning that they are not controlled by a single entity or organization [8]. Instead, payments are made using cryptocurrency, which is a digital asset that is secured by cryptographic techniques and operates independently of central banks and other financial institutions. Cryptocurrency payments are processed directly between users without the need for intermediaries, which can result in lower transaction fees and faster processing times.

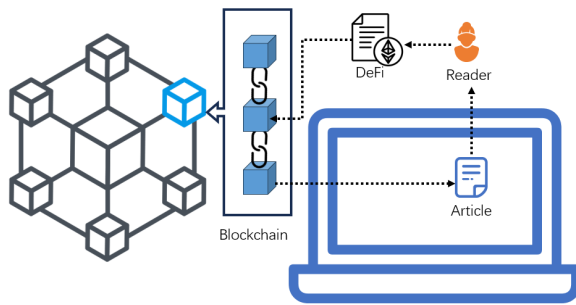


Fig. 5. Reader Pay for Download in Web3.0

As the figure 5 shows. In the realm of Web 3.0, we witness a fundamental transformation in the dissemination of academic articles. Unlike the traditional Web 2.0 model, it introduces a paradigm shift. In this innovative framework, the data entity of articles resides directly on the blockchain, with the website serving as a mere interface reflecting the blockchain data. When users make payments for downloads, the entire fund allocation process is automated through smart contracts, eliminating the need for manual intervention. This groundbreaking framework ensures complete transparency and traceability throughout the process. As users pay to download articles, funds are automatically distributed according to the rules set within the DAO framework, without any centralized oversight. In the Web 3.0 paradigm, this novel model signifies a departure from reliance on traditional intermediaries. Instead, it empowers users with the direct participation in DAO frameworks, utilizing smart contracts for automated and secure fund distribution. This shift not only achieves decentralization in the transaction process but also enhances the efficiency of academic article transactions. In the Web 3.0 environment, articles are directly uploaded to the blockchain. All operations, including payment processing and fund distribution, are seamlessly executed through smart contracts. This innovative framework ensures complete transparency and traceability throughout the entire process. When users pay to download articles, the funds are automatically allocated according to the

rules established within the DAO framework, eliminating the need for any centralized oversight.

Overall, the main difference in payment systems between Web2 and Web3 is the degree of centralization. Web2 payment systems are centralized, while Web3 payment systems are decentralized. While Web3 is still in its early stages, it has the potential to revolutionize the way we think about payments, transactions, and financial systems. In the current era of digitization, the act of anchoring a paper on the blockchain signifies the author's complete ownership of the work, opening up boundless possibilities. The introduction of blockchain technology empowers authors with more rights and limitless potential. Once a paper is inscribed on the immutable blockchain, authors not only possess intellectual property rights but also gain absolute control over their creations. This shift in ownership implies that authors can explore innovation more freely, facilitate transparent data sharing, and attain fairer returns from the wealth generated by their works. The immutability and transparency afforded by blockchain provide robust protection for the rights of paper owners, ushering in new possibilities for academic research and knowledge sharing. This profound ownership transformation elevates a paper beyond being merely a conduit for academic dissemination; it becomes a symbol of the unique wealth created by the author, sparking a profound revolution in the relationship between academia and authors.

IV. DAO TO DeSci

In the practical implementation of the Journal DAO, we leveraged the Aragon framework to establish a decentralized and transparent infrastructure for academic publishing. The execution of the DAO involved several key steps to ensure a seamless and fair distribution of tokens among participants.

a) Token Distribution Mechanism:

1) Author Rewards:

Authors receive tokens based on the evaluation provided by reviewers during the submission process. The more constructive and impactful the reviews, the higher the token allocation to the authors.

2) Reviewer Incentives:

Reviewers are rewarded with tokens for their valuable contribution to the peer-review process. This includes providing insightful feedback and assisting in maintaining the quality of published work.

3) Publication and Download Rewards:

Upon successful publication, both authors and users who download the papers are granted tokens. This encourages not only the creation of quality content but also its dissemination and accessibility.

4) Citation Bonuses:

Authors receive additional tokens when their published work is cited by other researchers. This incentivizes the production of influential and impactful research that contributes to the academic community.

b) *NFT-Based Finance Distribution*: The finance generated within the Journal DAO is distributed based on the NFT model, where each token holder is entitled to a proportional

share. This innovative approach ensures that the financial rewards align with the level of contribution and engagement at various stages of the academic process.

c) *Decentralized Governance*: The DAO operates on a decentralized governance model, allowing token holders to participate in decision-making processes. This ensures that the community has a say in the evolution of the platform, creating a democratic and inclusive environment.

d) *Results and Implications*: The implementation of the Journal DAO has yielded positive results in terms of increased engagement, quality submissions, and a more inclusive academic ecosystem. The transparent and automated token distribution mechanisms have effectively addressed issues of ownership and reward distribution, fostering a collaborative and fair scholarly environment.

In conclusion, the detailed execution of the Journal DAO demonstrates the viability of blockchain and DAO principles in reshaping academic publishing. The emphasis on decentralized governance, token incentives, and transparent finance distribution has the potential to revolutionize the scholarly landscape, making it more accessible, collaborative, and equitable for all participants.

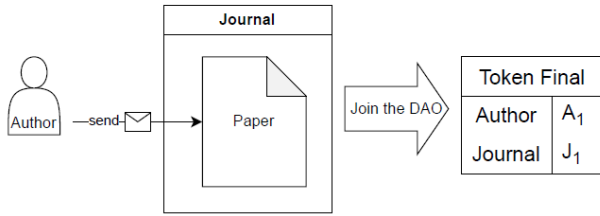


Fig. 6. Distribute Token by DAO

Figure 6 is the process:

- 1) **Author Submission**: The author submits their paper to the DAO-powered academic publishing platform.
- 2) **Token Allocation**: Tokens are allocated to the author and the publisher. Tokens can be utilized within the DAO ecosystem.
- 3) **Community Governance**: DAO members, including authors and publishers, may participate in governance decisions related to the platform.

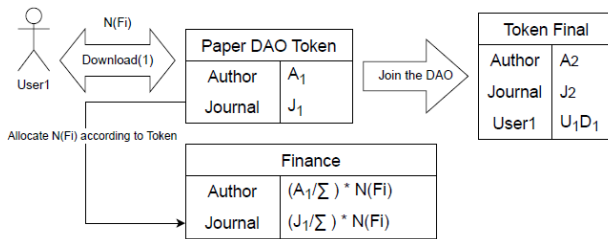


Fig. 7. Distribute Token while User Download

Figure 7 is the process: When a user creates a financial activity, such as paid downloads, rewards are distributed to all holders based on their previous token holdings. Additionally, the user who creating the financial activity receives a certain

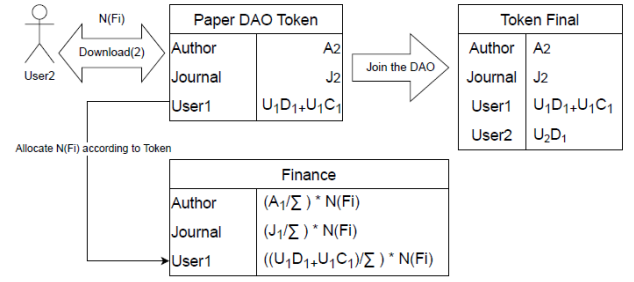


Fig. 8. Distribute Token while Another User Download

amount of tokens as a reward for their contribution, becoming a new holder.

Figure 8 is the process when another user makes a paid download, the finance generated will be distributed among the author, publisher, and user1 based on their token holdings. Subsequently, user2 will also become a new token holder as a result of their contribution.

$$\text{Distribution} = \begin{bmatrix} p_1 a_1 & p_2 a_1 & \dots \\ p_1 a_2 & p_2 a_2 & \dots \\ p_1 r_1 & p_2 r_1 & \dots \\ p_1 r_2 & p_2 r_2 & \dots \\ p_1 u_1 & p_2 u_1 & \dots \\ p_1 u_2 & p_2 u_2 & \dots \\ p_1 u_3 & p_2 u_3 & \dots \\ \dots & \dots & \dots \end{bmatrix} \times \begin{bmatrix} p_1 a_1 & p_1 a_2 & p_1 a_2 & p_1 r_1 \\ p_2 a_1 & p_2 a_2 & p_2 a_2 & p_2 r_1 \\ \dots & \dots & \dots & \dots \end{bmatrix} \text{DAO1}$$

After voluntarily making a payment, users' ability to participate contributes to a robust incentive mechanism, fostering a sense of autonomy within the entire framework. Through this design, users become direct contributors to financial activities, injecting new value into the framework and creating potential opportunities for self-reward. This decentralized autonomous model empowers users to engage directly in decision-making and contributions, shaping a more open, fair, and virtuous ecosystem. Overall, this autonomous framework cultivates a more positive and sustainable participation experience for users and the entire community.

As the Table I show. Through our detailed simulations and analyses, the incentive mechanisms within the DAO framework emerge as crucial drivers in shaping the dynamics of authorship and user participation. As downloads and citations increase, the token-driven rewards become a powerful motivator for authors, leading to an accumulation of influence and financial gains. This incentive structure not only acknowledges and rewards the contributions of authors but also establishes a direct correlation between their efforts and the benefits they accrue.

Furthermore, users who engage with the system by downloading papers witness a direct impact on their influence and, subsequently, on their earnings. This creates a dual incentive structure, where authors and users are mutually motivated to contribute to and participate in the DAO environment. The concept of decentralized autonomy becomes evident as the system operates independently, fostering a self-sustaining loop of contributions, rewards, and governance. In this context, the

TABLE I
FINANCE FOR TOKEN.

Download Count	Author	Reviewer	First User of Download
1	0.4995004995004995	0.4995004995004995	0.000999000999000999
2	0.5039525691699605	0.49407114624505927	0.001976284584980237
3	0.5083088954056696	0.488758553274682327	0.002932551319648094
...
10	0.5363636363636364	0.45454545454545453	0.00909090909090909
...
100	0.7129186602870813	0.23923444976076555	0.04784688995215311
...

DAO framework provides a powerful tool for aligning interests and promoting a fair distribution of rewards based on tangible contributions. The transparency and automation inherent in DAO contribute to a governance model that minimizes external intervention, allowing the ecosystem to evolve organically through the collective actions of its participants. This synergy of incentives and autonomy within DAO not only enhances the overall efficiency of the academic publishing model but also creates a robust and self-regulating environment for authors and users alike.

Once the paper is on the blockchain, it unequivocally belongs to the author, author is the real owner, that creating endless possibilities, especially in terms of financial activities. This means that the author not only owns their work but can also leverage blockchain technology to create various financial opportunities. Authors can receive rewards through financial activities, which may include paid downloads, knowledge exchanges, collaborative projects, and more. This decentralized framework provides authors with greater creative freedom and potential economic returns, enabling them to be more independent and influential in the academic domain. Overall, putting a paper on the blockchain opens up a new and forward-thinking path for authors.

V. CONCLUSION

This paper extensively explores the framework of DAO and provides a thorough analysis of its potential applications in the academic publishing domain. By placing papers on the blockchain, we have achieved transparency in ownership, allowing authors to have complete control over their works while also creating diverse financial opportunities. The autonomous nature of DAO enables users to directly participate in decision-making and contributions, constructing an ecosystem that is open, fair, and characterized by positive feedback loops.

Under this framework, users can not only pay for paper downloads but also receive rewards through participation in financial activities. This novel academic publishing model grants authors greater creative freedom while motivating users to actively engage, contribute, and share knowledge. The decentralized autonomous design brings a more open and fair publishing mechanism to academia, breaking away from the limitations of traditional academic publishing.

In summary, Decentralized Autonomous Organizations inject new vitality into academic publishing, creating a more equitable environment for both authors and readers. This innovative model holds promise for paving new paths in the

development of academia, fostering the free dissemination and sharing of knowledge.

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VI. BIOGRAPHY SECTION

If you have an EPS/PDF photo (graphicx package needed), extra braces are needed around the contents of the optional argument to biography to prevent the LaTeX parser from getting confused when it sees the complicated `\includegraphics` command within an optional argument. (You can create your own custom macro containing the `\includegraphics` command to make things simpler here.)

If you include a photo:



Michael Shell Use `\begin{IEEEbiography}` and then for the 1st argument use `\includegraphics` to declare and link the author photo. Use the author name as the 3rd argument followed by the biography text.

If you will not include a photo:

John Doe Use `\begin{IEEEbiographynophoto}` and the author name as the argument followed by the biography text.