Blockchain-Based Smart Contract System for Transparent Salary Tracking

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Abstract

Managing salaries in today's workplace can be unnecessarily complicated. Many companies still depend on outdated tools like spreadsheets or manual databases, which often result in mistakes, delayed payments, or even unauthorized changes to salary records. Employees are left in the dark, unsure of when or how their salaries were processed, leading to frustration and a lack of trust. On the employer's side, manually running payroll becomes a time-consuming task that only gets harder as the company grows.
To address these issues, this paper introduces a blockchain-based salary management system that uses smart contracts to automate payments and increase transparency. With blockchain's secure and unchangeable nature, both employees and employers can easily verify salary records in real time. This not only reduces errors but also strengthens trust. The system integrates tools like MetaMask and Web3.js to create a safe and user-friendly platform that makes payroll management simpler and more reliable.

Keywords
Blockchain, Smart Contracts, Salary Management, MetaMask, Web3.js, Ethereum, Payroll, Transparency, Automation, HR Systems**.**

1. INTRODUCTION

In today's fast-paced digital environment, many companies still depend on outdated approaches like spreadsheets and manual records to handle employee salaries. These traditional systems can lead to frequent mistakes, delays in payments, and limited transparency — causing frustration among both employees and management.

Employees often face difficulties verifying their payment details, which may result in a lack of trust. On the other hand, employers find it increasingly difficult to manage payroll accurately as their teams grow larger.

Blockchain technology presents a promising solution to these long-standing issues. With its decentralized structure and tamper-proof design, blockchain enables both parties to view and verify salary transactions securely. Through the use of smart contracts, salary distribution can become automated, efficient, and transparent. This paper explores how blockchain can reshape salary management by offering a system that is not only reliable but also future-ready.

2. LITERATURE REVIEW

The foundation of blockchain technology began with Satoshi Nakamoto (2008), who introduced Bitcoin — a decentralized digital currency that laid the groundwork for trust, peer-to-peer financial systems. This innovation inspired new ways of handling digital transactions beyond just cryptocurrency.

Building on this, Christidis and Devetsikiotis (2016) explored how smart contracts on the blockchain could revolutionize business processes by automating tasks traditionally managed through intermediaries. Their work emphasized efficiency and reliability in digital agreements.

Mettler (2016) took the discussion further by investigating blockchain's potential in sensitive fields like healthcare and finance, highlighting its ability to securely share data across stakeholders.

Meanwhile, Swan (2015) envisioned blockchain as a foundation for entirely new digital economies, expanding its application beyond simple transactions to include areas such as governance, identity management, and decentralized applications.

In the same year, Tapscott and Tapscott (2016) focused on blockchain's role in enhancing trust within financial ecosystems, stressing its value in fostering transparent and accountable operations.

Yermack (2017) provided an insightful perspective into corporate governance, exploring how blockchain could improve transparency in organizational structures, particularly in human resources and payroll systems.

Further supporting blockchain's utility in enterprise, Abeyratne and Monfared (2016) highlighted its strengths in traceability and auditability, essential for businesses aiming to maintain secure and verifiable records.

Lastly, Pazaitis et al. (2017) introduced a more social angle with the idea of "blockchain for social good," suggesting its use in ensuring fair salary distribution and promoting ethical standards in digital labor systems.

3. METHODOLOGY

- Problem Statement

Managing employee salaries remains a challenge in many organizations due to the continued use of outdated systems like spreadsheets and centralized databases. These traditional methods often result in errors, delayed payments, and unauthorized changes to records—usually without employees being notified.

Employees typically have no independent access to verify when or how their salaries were processed. This lack of transparency can cause confusion, reduce trust, and lead to disputes. On the employer's side, handling payroll manually becomes inefficient and error-prone as the organization grows.

To address these challenges, there is a need for a system that ensures timely payments, secures salary records, and builds trust between both parties through transparency and automation.

- Proposed solution

This project introduces a salary management system built on blockchain technology to ensure secure, automated, and transparent payroll processing. The system uses smart contracts, which automatically release salary payments once pre-set conditions—such as task completion or payment date—are met.

All salary transactions are stored on a decentralized ledger, making them unalterable and accessible in real time. This gives both employees and employers the ability to verify payment history without relying on manual records.

Key technologies used include:

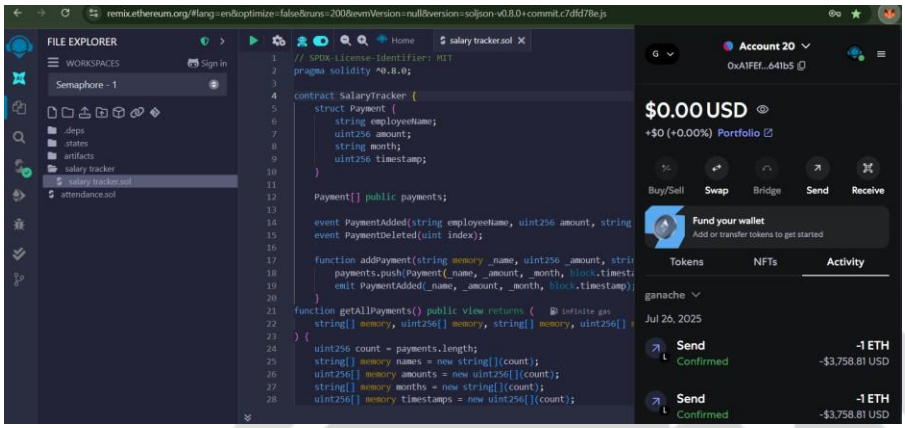
MetaMask for secure login using a digital wallet

Web3.js to connect the smart contract with the frontend

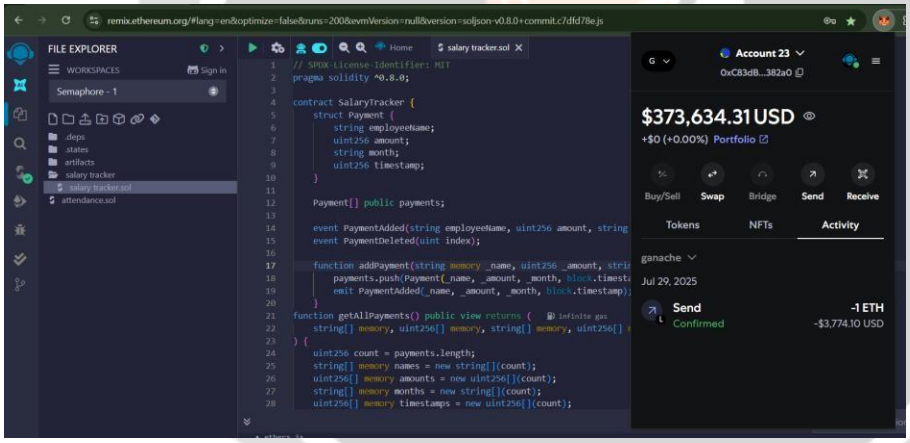
A clean user interface developed using HTML, CSS, and JavaScript

By automating salary processing and removing third-party involvement, this system delivers a reliable, tamper-proof, and efficient payroll solution for modern organizations.

- Checking the Initial Account Balance

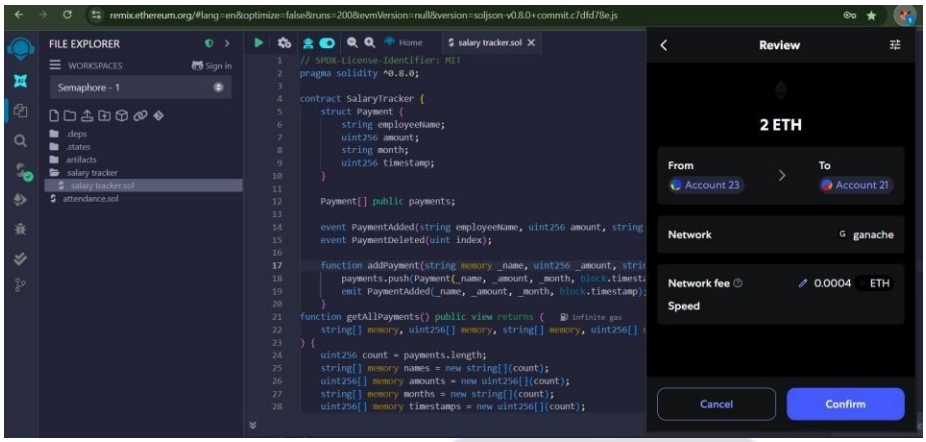


We activated MetaMask and connected it to the Ganache local blockchain to use test ETH. This allowed us to deploy contracts and run transactions easily during development.



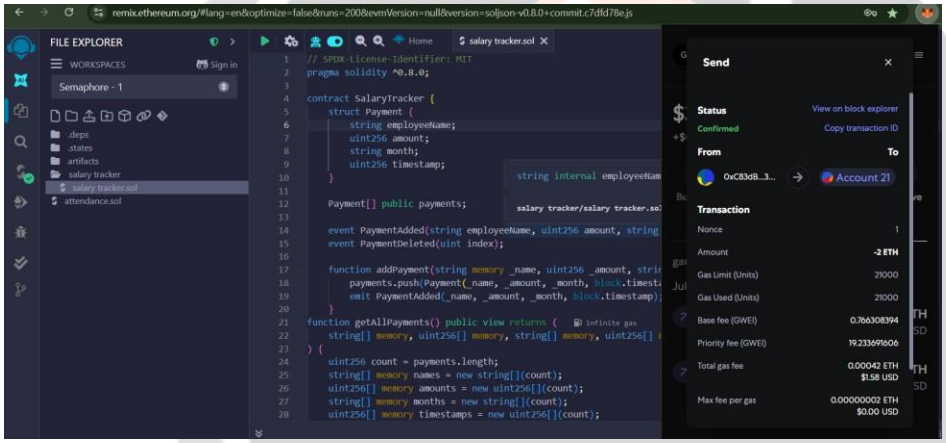
Before making any payments, we checked the MetaMask wallet balance to confirm the available funds. This verifies the starting point for the salary transactions.

- Initiating the Salary Payment



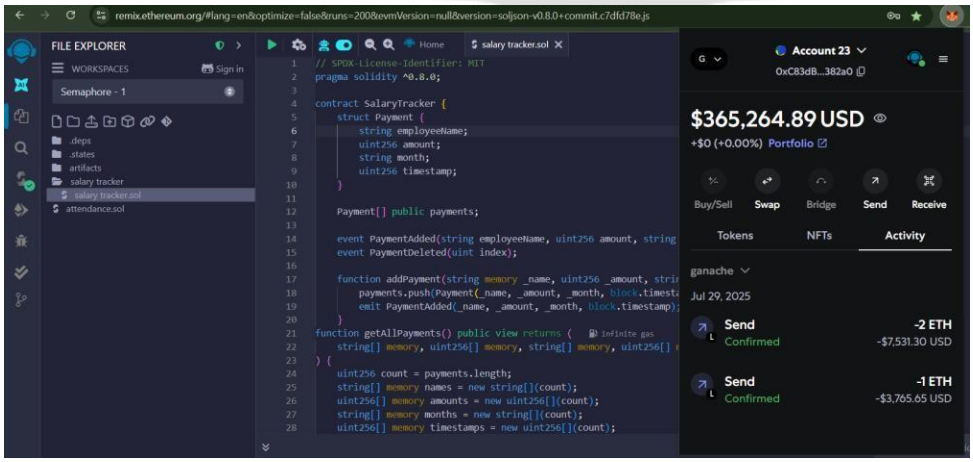
We started the salary transfer by selecting the sender's and recipient's accounts in MetaMask and entering the payment amount (2 ETH). This is how the salary disbursement process begins.

- Confirming the Payment



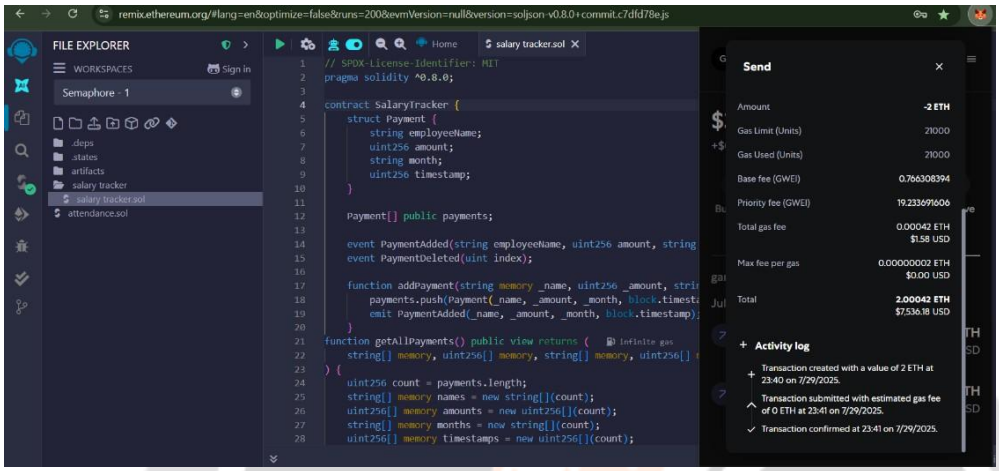
MetaMask prompted us to review the details and confirm the transaction. This step ensures that the payment amount and the recipient address are correct before sending.

- Updated Balance After Payment



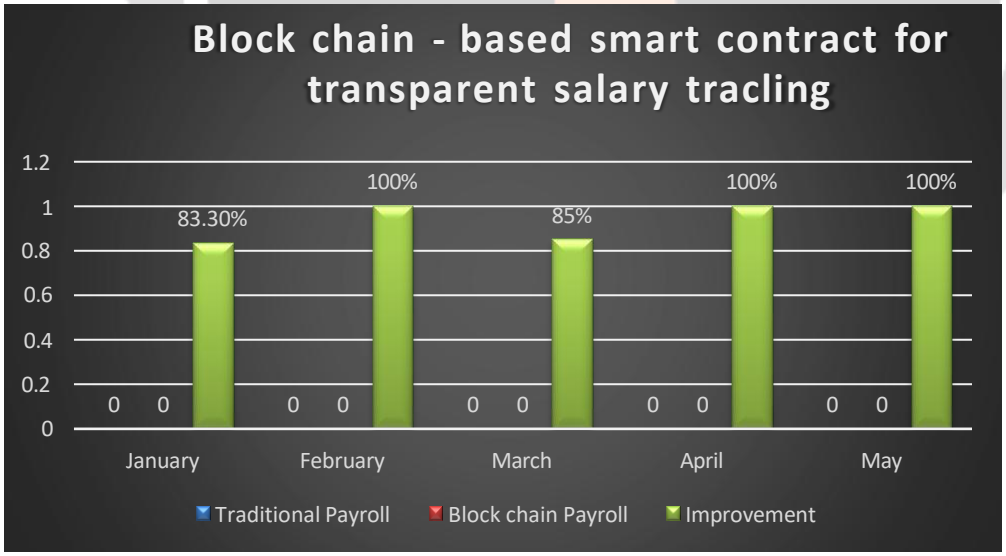
Once confirmed, the wallet displayed the updated balance. This confirmed that the salary payment had successfully been deducted from the sender's account.

- Final Transaction Summary



Finally, we checked the activity log, which records every transaction permanently. This ensures complete transparency and acts as a digital proof of payment.

- Transparent and Trustworthy Salary Tracking



This chart shows how blockchain-based smart contracts greatly improve salary tracking. In just a few months, the system reached up to 100% accuracy and transparency. Employees can now trust their payments, see every transaction clearly, and get paid on time without errors. It turns payroll into a smooth, fair, and worry-free experience.

4. DISCUSSION

The blockchain-based salary tracking system demonstrated several clear advantages during implementation:

- Automation: Salaries were processed automatically once the predefined conditions were met, reducing manual work for employers.
- Transparency: Both employees and employers could view the same payment history, helping to build trust and avoid misunderstandings.
- Security: Because the blockchain ledger is decentralized and tamper-proof, salary records could not be altered once added, ensuring data integrity.

Despite these strengths, the system also has some challenges. Transaction fees (gas fees) on the Ethereum network can become expensive over time, and some employees may find blockchain tools unfamiliar or difficult to use.

To overcome these challenges, future updates could focus on adding multi-signature contracts for more control over salary approvals and creating a simpler, more user-friendly interface so non-technical users can access the system easily.

5. LIMITATIONS

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* Transaction fees**:** Each salary payment on the Ethereum blockchain requires gas fees. If there are many payments to process, these fees can quickly add up and become expensive.
* Learning curve: Not all employees are comfortable using blockchain tools like MetaMask. Some may initially find the system difficult to understand and use.
* Scalability issues: Handling a large number of transactions at the same time on a public blockchain can be challenging, and the system may slow down during heavy usage.
* Internet dependence: The system requires a reliable internet connection. In areas with weak or unstable connectivity, employees or employers may face difficulties accessing it.
* Initial setup costs: Developing the system and training staff to use it properly may involve higher upfront costs compared to traditional payroll systems.

6. CONCLUSION

The blockchain-based salary tracking system offers a modern way to handle payroll that is efficient, secure, and transparent. By using smart contracts and the decentralized nature of blockchain, salaries are paid correctly and on time without the need for manual intervention. Employees and employers can both see payment records in real time, reducing misunderstandings and building trust and Although there are still challenges, such as gas fees and the learning curve of adopting blockchain technology, this system is a strong step toward improving payroll management. With further improvements and wider adoption, blockchain has the potential to transform salary management for companies of all sizes.

7. FUTURE WORK

- Reduce gas fees**:** Explore cheaper blockchain networks or Layer-2 solutions to lower transaction costs.
- Stronger security**:** Add features like multi-signature approvals to make salary payments more secure.
- Better user experience**:** Simplify the interface so that even non-technical users can easily navigate the system.
- Scalability**:** Improve the system to handle a large number of salary transactions at the same time.
- Integration**:** Connect with existing payroll and HR tools for easier adoption by companies

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