

Blockchain Based Transparent Public Complaint Management And Tracking System Using Ethereum

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Abstract— Handling public complaints in a reliable and transparent way has always been a challenge in many existing systems. In most cases, complaints are either delayed, poorly tracked, or handled through centralized systems where users have very little visibility. Because of this, people often lose trust in how their issues are managed.

In this project, we developed a blockchain-based complaint management and tracking system using Ethereum to address these problems. The idea was to create a system where once a complaint is submitted, it remains secure and cannot be altered. By using blockchain, we ensure that all records are transparent and trustworthy.

Users can easily submit complaints and follow their progress step by step, while administrators and departments handle them in a structured way. Smart contracts are used to automate important actions such as storing complaint data and updating status, which reduces manual work and errors.

During the development, our focus was not only on security but also on simplicity, so that anyone can use the system without difficulty. Overall, this system provides a more reliable, transparent, and efficient way to manage public complaints and helps in building trust between citizens and authorities.

Keywords— Blockchain, Complaint Management, Ethereum, Smart Contracts, Transparency, E-Governance, Decentralization

1. Introduction

Public complaint systems are an important part of any society, as they provide a way for people to report issues related to public services such as roads, water supply, electricity, sanitation, and safety. Ideally, these systems should help authorities understand problems quickly and take action in a timely manner. However, in reality, many existing complaint management systems do not work as expected. Complaints are often delayed, ignored, or not properly tracked, and users are usually not aware of what is happening after they submit a complaint. This lack of transparency reduces trust and creates frustration among citizens.

Most traditional complaint systems are built using centralized databases, where all the information is controlled by a single authority. While this approach is simple to manage, it has

several drawbacks. Data can be modified or deleted, either intentionally or accidentally, and there is no clear way for users to verify whether their complaint is being handled correctly. In many cases, users have to rely completely on the system without any proof or tracking mechanism. This makes the entire process less reliable and less accountable.

With the advancement of technology, web-based complaint systems were introduced to improve accessibility. These systems allowed users to submit complaints online and check their status without visiting offices physically. Although this was an improvement, the core issues still remained the same because these systems continued to rely on centralized architecture. As a result, problems such as data manipulation, lack of transparency, and limited trust still exist.

To overcome these challenges, blockchain technology provides a promising solution. Blockchain is a decentralized and secure technology where data, once recorded, cannot be altered or deleted. This makes it highly suitable for applications where trust and transparency are important. By storing complaint-related information on blockchain, it becomes possible to ensure that records are permanent, secure, and verifiable.

In this project, we propose a blockchain-based public complaint management and tracking system using Ethereum. The system uses smart contracts to store complaint data securely and automate key processes such as status updates and verification. Users can submit complaints through a web interface and track their progress in real time. Administrators and departments can manage complaints efficiently, while all important actions are recorded securely.

The main objective of this project is to create a system that is transparent, secure, and easy to use. Along with improving efficiency, the system also aims to build trust between citizens and authorities by providing clear visibility of the complaint handling process. By combining web technologies with blockchain, this project demonstrates how modern solutions can improve traditional public service systems.

2. Problem Statement

In many existing public complaint management systems, users face several challenges that reduce the effectiveness of the system. One of the major problems is the lack of

transparency. After submitting a complaint, users are often unaware of what is happening with their request. There is no proper visibility of the complaint status, which creates confusion and reduces trust in the system.

Another important issue is that most systems are centralized, meaning all data is stored and controlled by a single authority. This makes the system vulnerable to data manipulation, deletion, or unauthorized access. Users have no way to verify whether their complaint is being handled properly or if the data has been altered. This reduces reliability and accountability.

In addition, delays in complaint resolution are very common due to manual processes and poor coordination between departments. Complaints may remain pending for a long time without proper updates. These limitations highlight the need for a system that is secure, transparent, and efficient.

Therefore, there is a need for a blockchain-based complaint management system that ensures data integrity, provides real-time tracking, and improves trust between users and authorities.

3. Objectives of The Project

The main objective of this project is to develop a secure, transparent, and efficient public complaint management system using blockchain technology. The system aims to solve the problems present in traditional complaint systems and provide a better user experience.

One of the key objectives is to ensure that once complaint data is recorded, it cannot be modified or deleted. This is achieved by using blockchain technology, which provides immutability and security. Another important objective is to provide real-time tracking of complaints, allowing users to monitor the progress of their complaints at any time.

The project also aims to reduce delays and manual work by automating processes using smart contracts. This helps in improving efficiency and minimizing errors. Additionally, the system focuses on improving communication between users, administrators, and departments to ensure smooth handling of complaints.

Overall, the objective is to build a reliable system that increases transparency, enhances data security, and builds trust between citizens and authorities.

4. Literature Review

Several researchers have worked on developing complaint management systems using digital platforms. In earlier systems, complaints were mostly handled manually or stored in centralized databases. Because of this, these systems often faced issues such as delays, lack of transparency, and poor communication between users and authorities.

With the growth of technology, web-based complaint systems were introduced. These systems allowed users to submit complaints online and track their status. Although this improved accessibility, these systems still depended on centralized control. As a result, problems like data manipulation, lack of trust, and security issues still remained.

Recently, blockchain technology has been explored to improve such systems. Blockchain provides a secure and decentralized way of storing data, where information cannot be changed once recorded. This makes it useful for applications that require transparency and trust. Some studies have shown that blockchain can improve accountability and reduce corruption in public service systems.

In addition, researchers have proposed systems that use smart contracts to automate complaint handling processes. These systems help in reducing manual work and provide better tracking of complaints. However, many existing solutions are complex and do not provide a simple user interface or proper workflow.

In our project, we tried to combine the advantages of blockchain with a user-friendly system. We focused on creating a simple interface along with a structured complaint handling process. This helps in improving transparency, security, and efficiency in managing public complaints.

5. Existing System

In the existing complaint management systems, most processes are handled using centralized platforms or even manual methods. In many cases, complaints are submitted through government offices, websites, or mobile applications, but the overall system is not very efficient. Once a complaint is submitted, users often have to wait for a long time without receiving proper updates.

One of the major problems with these systems is the lack of transparency. Users cannot clearly see what is happening with their complaint after submission. There is no proper tracking mechanism, and in some cases, complaints may be ignored or delayed without any clear reason. This reduces user trust in the system.

Another issue is that most existing systems depend on centralized databases. This means all the data is stored and controlled by a single authority. Because of this, there is a possibility of data being modified, deleted, or even lost. Users have no way to verify whether their complaint data is safe or being handled correctly.

In addition, the process is often manual and involves multiple steps, which increases the chances of errors and delays. Communication between departments is not always smooth, leading to slow response times and inefficient handling of complaints.

Overall, the existing systems lack security, transparency, and proper tracking features. These limitations highlight the need for a more reliable and efficient solution.

6. Challenges of Existing System

Existing complaint management systems face several challenges that affect their performance and reliability. One of the main issues is the lack of transparency. Users are often not able to see what is happening with their complaint after submission, which creates confusion and reduces trust in the system.

Another major challenge is delay in complaint resolution. Since many systems depend on manual processes or poorly connected departments, complaints take a long time to be addressed. This leads to dissatisfaction among users.

Data security is also a concern in centralized systems. Since all the data is stored in one place, there is a risk of data being modified, deleted, or accessed without proper authorization. Users have no way to verify whether their information is safe.

In addition, there is no proper tracking mechanism in many systems. Users may not receive regular updates, and sometimes complaints are lost or ignored. Poor communication between departments further increases inefficiency.

Overall, these challenges show that existing systems are not fully reliable and highlight the need for a more secure, transparent, and efficient solution.

7. Proposed System

To overcome the limitations of existing systems, we propose a blockchain-based public complaint management and tracking system using Ethereum. The main idea of this system is to provide a secure, transparent, and reliable platform where users can submit and track their complaints without any confusion.

In this system, users can register and log in through a web interface. After logging in, they can submit complaints by providing details such as category, description, location, and images. Each complaint is given a unique ID so that it can be easily tracked at any time.

Once a complaint is submitted, the admin reviews and verifies it. After verification, the complaint is forwarded to the appropriate department based on its type. The department then assigns a worker to resolve the issue. The worker completes the task and uploads proof, after which the admin verifies the resolution and marks the complaint as completed.

The main feature of this system is the use of blockchain technology. A hash of the complaint data is stored on the Ethereum blockchain, which ensures that the data cannot be

changed or tampered with. This increases transparency and builds trust among users.

Smart contracts are used to automate important processes such as storing complaint information and updating status. This reduces manual work and improves efficiency. At the same time, the database is used for quick data storage and retrieval, while the blockchain ensures security.

Overall, the proposed system provides a better solution compared to traditional systems by improving transparency, security, and efficiency in handling public complaints.

8. Advantages of Proposed System

The proposed system offers several advantages over traditional complaint management systems.

- **Improved Transparency:** Since complaint data is stored on the blockchain, users can trust that their information cannot be changed or hidden. This helps in building confidence among users.
- **High Data Security:** Blockchain technology ensures that once data is stored, it cannot be modified or deleted. This protects complaint data from unauthorized access and manipulation.
- **Real Time Tracking:** The system also provides real-time tracking of complaints. Users can easily check the status of their complaints at any time, which improves communication and reduces confusion. This feature makes the system more user-friendly.
- **Reduced Manual Work:** By using smart contracts, many processes such as storing complaint data and updating status are handled automatically. This reduces manual work, minimizes errors, and speeds up the overall process.
- **Increased Accountability:** The system improves efficiency and accountability. Each step in the complaint handling process is recorded, making it easier to track responsibilities and ensure timely resolution.
- **Tamper-Proof Records:** All complaint data is stored in a way that cannot be modified. This ensures that records remain accurate and trustworthy. It prevents misuse or manipulation of data.
- **Reduced Delays:** Automation helps in faster processing of complaints. Tasks that were manual are now handled quickly. This reduces waiting time for users.
- **Efficient Complaint Handling:** The system follows a clear step-by-step process. This improves coordination between users, admins, and departments. It helps in resolving complaints smoothly.
- **Better User Experience:** The system is designed to be simple and easy to use. Users can submit and track

complaints without difficulty. This makes the platform more user-friendly.

Overall, the proposed system provides a secure, transparent, and efficient solution, making it more reliable compared to existing complaint management systems.

9. Methodology

In this project, we followed a step-by-step approach to design and implement the complaint management system. The main aim was to make the process simple, secure, and transparent by combining web technologies with blockchain.

First, the user registers and logs into the system using valid credentials. After logging in, the user can submit a complaint by entering details such as category, description, location, and uploading images if required. Once the complaint is submitted, the system generates a unique complaint ID, which helps in tracking the complaint later.

The complaint details are then stored in the database for easy access. At the same time, a hash of the complaint data is created using a hashing algorithm. This hash is stored on the Ethereum blockchain to ensure that the data cannot be changed or tampered with.

After submission, the admin reviews the complaint and verifies whether it is valid. Once verified, the complaint is forwarded to the appropriate department based on its type. The department assigns the complaint to a worker who is responsible for resolving the issue.

The worker completes the task and uploads proof as evidence. The system updates the complaint status, and this update is also recorded on the blockchain. This helps in maintaining transparency and ensures that all actions are properly tracked.

Finally, the admin verifies the resolution, and the complaint is marked as completed. The user is notified about the status update. In this process, Web3.py is used to connect the backend with the Ethereum blockchain, and smart contracts handle secure data storage and updates.

Overall, the methodology ensures that the system works in a structured and efficient way, while maintaining security, transparency, and reliability.

9.1 Technologies Used

In this project, we used a combination of web and blockchain technologies to build a secure and efficient complaint management system.

- **HTML, CSS, JavaScript:** These technologies are used to design the frontend of the system. They help in creating a simple and user-friendly interface where users can register, submit complaints, and track their status.

- **Flask (Python):** Flask is used as the backend framework. It handles user requests, manages login and authentication, processes complaints, and controls the overall system logic.
- **SQLite Database:** SQLite is used to store data such as user details, complaint information, complaint status, and department assignments. It helps in fast and efficient data storage.
- **Ethereum Blockchain:** Ethereum is used to store complaint hashes securely. It ensures that the data cannot be modified once it is stored, making the system more transparent and trustworthy.
- **Solidity:** Solidity is used to write smart contracts. These smart contracts help in storing complaint data and updating status automatically on the blockchain.
- **Web3.py:** Web3.py is used to connect the Flask backend with the Ethereum blockchain. It allows the system to interact with smart contracts and perform blockchain operations.

Overall, these technologies work together to provide a secure, transparent, and efficient complaint management system.

10. System Architecture

The system is designed in a layered structure so that each part has a specific role. This makes the system easy to understand and manage.

- The first layer is the user layer, where users interact with the system. Citizens can submit complaints and track their status, while admin and workers can manage and resolve complaints.
- The next layer is the application layer, which is developed using Flask. It handles all the main operations like login, complaint processing, and updating status.
- The data layer stores all the information such as user details and complaint data in the SQLite database.
- The last layer is the blockchain layer, where complaint data hashes are stored using Ethereum. This ensures that the data is secure and cannot be changed.

All these layers work together to make the system secure, simple, and efficient.

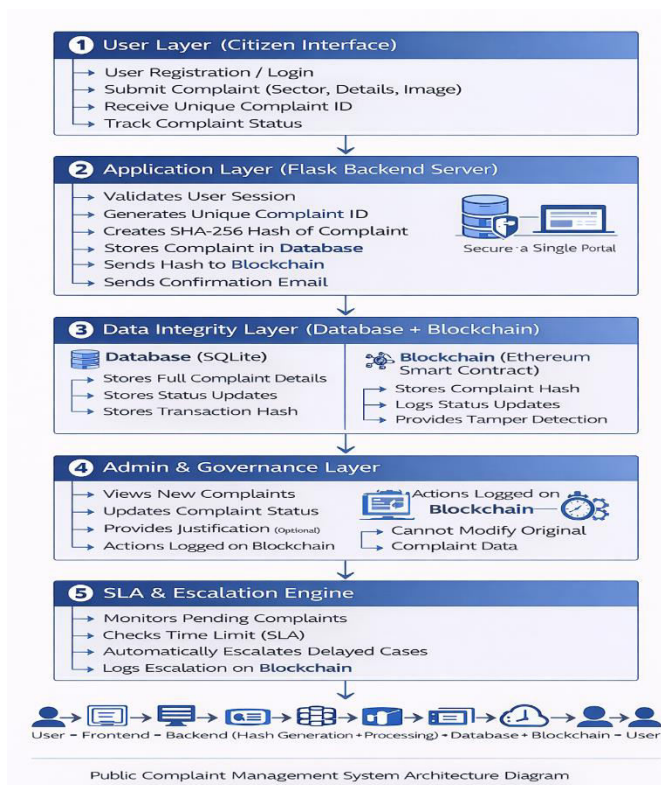


Figure 1: System Architecture

11. System Flow

The system follows a structured step-by-step process to manage complaints efficiently. First, the user registers and logs into the system using valid credentials. After successful login, the user can submit a complaint by entering details such as category, description, location, and uploading images if required.

Once the complaint is submitted, the system generates a unique complaint ID. This ID is used to track the complaint throughout the process. The complaint data is stored in the database, and a hash of the data is created and stored on the Ethereum blockchain to ensure security and prevent any modifications.

After submission, the admin reviews the complaint and verifies its validity. If the complaint is valid, it is forwarded to the appropriate department based on its category. The department then assigns the complaint to a worker who is responsible for resolving the issue.

The worker completes the task and uploads proof of completion. The system updates the complaint status, and this update is also recorded on the blockchain. Finally, the admin verifies the resolution and marks the complaint as completed. The user is notified about each update and can track the complaint status at any time using the complaint ID.

System Flow of Blockchain-Based Public Complaint Management System

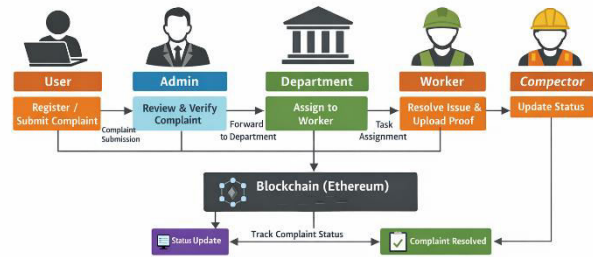


Figure 2: System Work Flow

12. Implementation

The system works in a simple step-by-step process to handle complaints efficiently. First, the user registers and logs into the system. After logging in, the user submits a complaint by entering details such as category, description, location, and images.

Once the complaint is submitted, the system generates a unique complaint ID. This ID helps the user to track the complaint later. The complaint details are stored in the database, and at the same time, a hash of the data is created and stored on the Ethereum blockchain to ensure security.

Next, the admin reviews the complaint and verifies whether it is valid. After verification, the complaint is forwarded to the appropriate department. The department assigns the complaint to a worker who is responsible for resolving the issue.

The worker resolves the problem and uploads proof of completion. The system updates the complaint status, and this update is also recorded on the blockchain.

Finally, the admin verifies the resolution, and the complaint is marked as completed. The user is notified about the update and can check the final status using the complaint ID.

This process ensures that the system is transparent, secure, and easy to use.

13. Results and Discussions

The developed system was tested to check its performance and functionality. The results show that the system works correctly and handles complaints in a structured and efficient way. Users are able to register, log in, submit complaints, and track their status without any difficulty.

Figure 1 shows the user registration and login page, where users can create an account and access the system. The interface is simple and easy to use.

Figure 2 shows the complaint submission page, where users can enter details such as category, description, and upload images.

Figure 3 shows the complaint tracking page, where users can check the current status of their complaints using the complaint ID. This helps users stay updated and reduces confusion.

Figure 4 shows the admin dashboard, where the admin can verify complaints and assign them to departments.

Figure 5 shows the worker interface, where the assigned worker can update the complaint status and upload proof after resolving the issue. All these steps are properly recorded in the system.

The integration of blockchain ensures that the complaint data is secure and cannot be modified. Each important update is stored as a hash on the Ethereum blockchain, which improves transparency and trust.

Overall, the system performs efficiently and provides a reliable solution for managing public complaints. It reduces delays, improves communication, and ensures secure handling of complaint data.

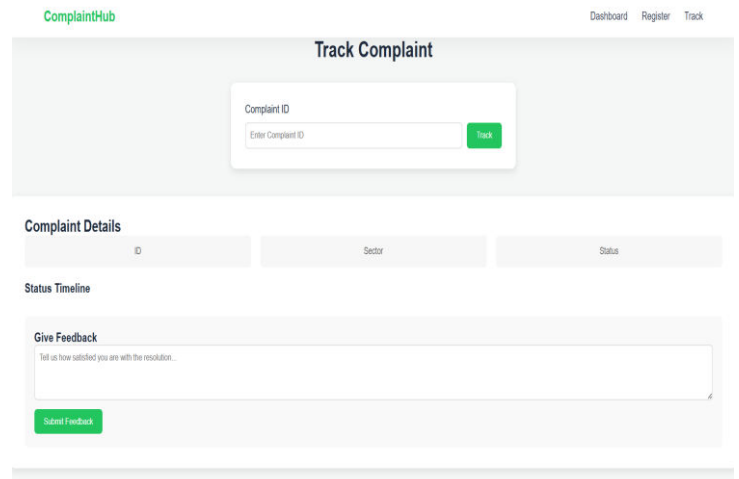


Figure 5

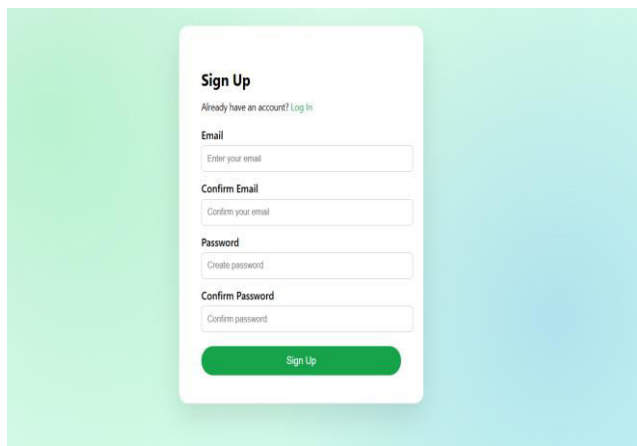


Figure 3

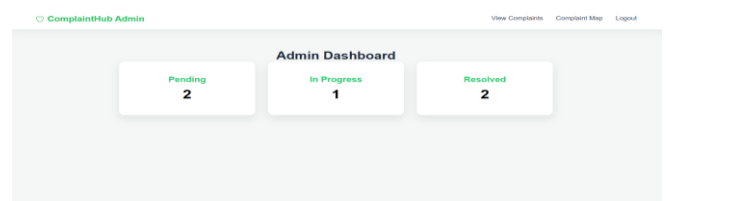


Figure 6

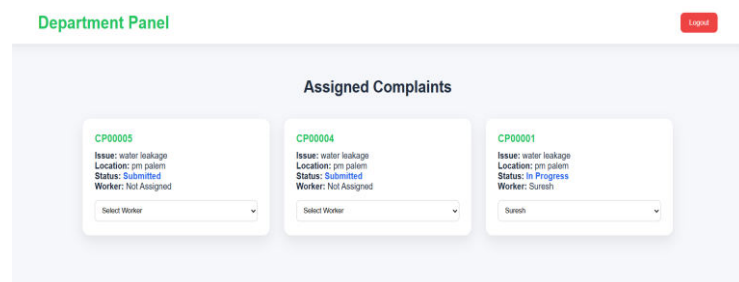


Figure 7

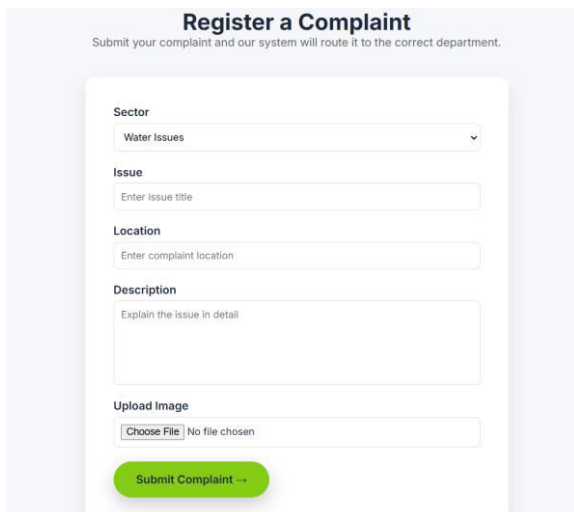


Figure 4

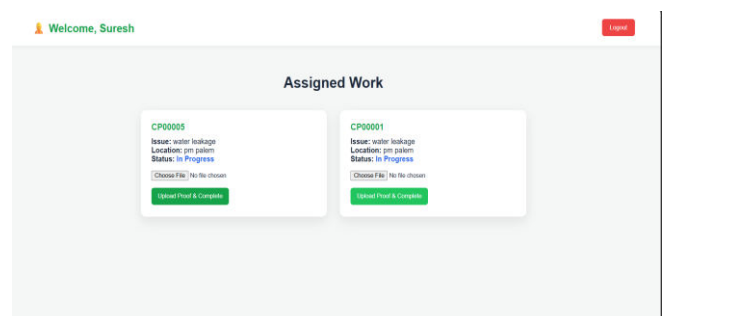


Figure 8

The results clearly indicate that the proposed system improves transparency, ensures data security, and reduces delays when compared to traditional complaint management systems. The integration of blockchain technology enhances trust and provides a reliable platform for users.

14. Conclusion

In this project, we developed a blockchain-based public complaint management and tracking system using Ethereum. The main goal was to solve the problems present in existing systems, such as lack of transparency, delays, and data security issues. By using blockchain technology, we made sure that the complaint data remains secure and cannot be changed once stored.

The system allows users to easily submit complaints and track their status in real time. Admins and departments can manage complaints in a structured way, which improves efficiency and reduces delays. The use of smart contracts helps in automating important processes and reduces manual work.

Overall, the system provides a simple, secure, and transparent solution for handling public complaints. It helps in building trust between users and authorities and shows how modern technologies like blockchain can improve public service systems.

15. Future Work

In the future, the system can be improved by adding more features and expanding its usage. One important enhancement is to extend the system into a multi-department platform by integrating services like disaster management, fire services, and health departments. This will help in handling emergency situations more effectively.

Another improvement is the development of a mobile application, which will make the system more accessible and easier to use for users on the go. This will allow users to submit complaints and track updates directly from their phones.

The system can also be enhanced by adding AI-based features to automatically categorize complaints and identify priority levels. This can help in faster processing and better decision-making.

Additionally, notification services like SMS or email alerts can be added to keep users informed about their complaint status without needing to log in repeatedly.

Overall, these improvements can make the system more efficient, user-friendly, and suitable for real-world applications.

16. References

[1] Satoshi Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System," 2008.

[2] Vitalik Buterin, "Ethereum White Paper," 2014.

[3] Z. Zheng, S. Xie, H. Dai, X. Chen, and H. Wang, "Blockchain Technology Overview," IEEE, 2017.

[4] M. Swan, "Blockchain: Blueprint for a New Economy," O'Reilly Media, 2015.

[5] D. Tapscott and A. Tapscott, "Blockchain Revolution," Penguin, 2016.

[6] R. Kumar and S. Verma, "E-Complaint Management System for Public Administration," 2016.

[7] P. Sharma and A. Mehta, "Smart Grievance Redressal System Using Web Technologies," 2018.

[8] K. Reddy and N. Priya, "Automated Complaint Management System Using Cloud," 2019.

[9] S. Singh and R. Gupta, "Blockchain-Based E-Governance System," 2021.

[10] A. Ahmed et al., "Decentralized Complaint Management Using Blockchain," 2022.

[11] Ethereum Foundation, "Ethereum Documentation," 2023.

[12] Solidity Documentation, "Solidity Programming Language," 2023.

[13] Flask Documentation, "Flask Web Framework," 2023.

[14] Web3.py Documentation, "Web3.py Library for Ethereum," 2023.

[15] OWASP Foundation, "Web Application Security Guidelines," 2021.