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Blockchain-Based Tax Calculator and Government Fund Allocation and Tracking Prototype

Aaditya Krishna *Computer Science* *Dayananda Sagar College of Engineering* aadityakrishna10@gmail.com	Bhoomika N *Computer Science* *Dayananda Sagar College of Engineering* *natarajabhoomika@gmail.com*	Himanshu Patil *Computer Science* *Dayananda Sagar College of Engineering* *himanshu.k.patil@gmail.com*	Sania Ahmed *Computer Science* *Dayananda Sagar College of Engineering* *saniaahmed2433@gmail.com*	Dr, Vimala Devi J *Associate Professor* *Dept.Of CSE, Dayananda Sagar College of Engineering* *jvimaladevi-cs@dayanandasagar.edu*

***Abstract*- Using blockchain technology, the tax-based calculator project aims to improve the efficiency and transparency of tax distribution and computation procedures. In addition to giving individuals a thorough understanding of how tax contributions are allocated among government agencies, this approach enables them to precisely calculate their taxes while taking into account a variety of deductions and exemptions. By ensuring that each transaction is safe, unchangeable, and traceable, blockchain integration promotes accountability and confidence. The platform has a strong backend that makes use of Flask and Solidity, along with an easy-to-use UI constructed with HTML, CSS, and JavaScript. In addition to calculating taxes, users may check deductions under sections 80C, 80D, and 80G and learn more about their tax status. The payment procedure is streamlined by the connection with MetaMask, enabling safe and decentralised transactions. In order to make tax distribution clear to users, the system further offers a breakdown of tax allocation to other ministries. User input is safely stored in a database, allowing for easy data administration and retrieval. This project shows how blockchain technology and web technologies may be combined to solve issues with tax systems' transparency and credibility. This solution closes the gap between taxpayers and government operations by providing a polished, user-friendly design that is optimised for seamless operation, thus promoting a more informed and engaged tax procedure.**

I. INTRODUCTION

Taxation is fundamental to national development, funding essential sectors like infrastructure, healthcare, and education. However, traditional tax systems suffer from inefficiencies, lack of transparency, and public distrust, making it difficult for taxpayers to understand how their contributions are utilized. Additionally, manual tax computations often lead to errors, delays, and inconsistencies. To address these issues, the Tax-Based Calculator Project integrates blockchain technology to provide a transparent, secure, and user-friendly tax computation and fund-tracking system.

This project simplifies tax calculations while ensuring compliance with tax laws by incorporating deductions and exemptions from sections 80C, 80D, and 80G. By automating these computations, the system reduces errors and enhances accuracy, making tax filing more efficient and accessible. Additionally, it provides users with a clear breakdown of how their tax contributions are allocated to different government departments, fostering trust and accountability in public finance.

A key innovation of this project is the use of blockchain technology to ensure that all transactions are immutable, traceable, and fraud-proof. Unlike centralized tax systems that rely on intermediaries, this approach removes middlemen, reduces transaction costs, and offers real-time verification of payments. The integration of MetaMask further strengthens security by enabling decentralized, direct, and cost-effective transactions, ensuring safe and seamless tax payments.

Built with a modern technology stack, the project ensures scalability and efficiency. The frontend, developed with HTML, CSS, and JavaScript, offers a responsive user interface, while the backend, powered by Flask and Solidity, handles tax calculations and blockchain integration. A secure database stores tax-related information, ensuring quick retrieval and compliance with regulations.

Beyond its technical strengths, the platform also promotes user awareness and engagement by providing real-time visualizations of tax distribution. By educating taxpayers on their responsibilities and the impact of their contributions, the system bridges the knowledge gap and encourages higher compliance with tax regulations. This transparency-driven approach fosters greater public participation and confidence in tax governance.

In conclusion, the Tax-Based Calculator Project sets a new standard for tax administration by addressing inefficiencies in traditional systems. By leveraging blockchain, decentralized payments, and automated tax computation, it enhances trust, efficiency, and financial awareness. This innovative platform ensures a secure, transparent, and streamlined taxation process that benefits both taxpayers and government institutions.

II. LITERATURE REVIEW

Government Funds Allocation and Tracking System Using Blockchain Technology

The study [1] proposes a blockchain-based architecture to improve government fund allocation efficiency, security, and transparency. It utilizes cryptographic hashing to ensure data integrity and automates fund distribution using smart contracts. A case study on education fund distribution highlights blockchain's role in preventing corruption and enhancing transparency.

Tax Expenditures in India

This paper [2] analyzes inefficiencies in India's tax expenditure system and suggests using blockchain to enhance compliance and transparency. The system leverages immutable ledgers and smart contracts to automate reporting and fund allocation. Case studies on tax exemptions illustrate reduced tax evasion and improved resource allocation.

Government Fund Allocation Using Blockchain

The article [3] explores a decentralized system for monitoring and allocating government funds with blockchain. Smart contracts automate fund delivery, reducing delays and removing intermediaries. A case study on disaster relief financing demonstrates blockchain's potential to prevent corruption and ensure funds reach the intended recipients.

Smart Government Fund and Scheme Allocation System

The study [4] introduces a blockchain-based system to improve government plan distribution. Smart contracts automate resource allocation while ensuring that eligibility criteria are met. A case study on rural development programs highlights how blockchain prevents fund diversion and ensures fair resource distribution.

Government Fund Allocation and Tracking System Over Blockchain

This project [5] aims to develop a blockchain-based system to track fund distribution and address inefficiencies. Smart contracts automate fund allocation while cryptographic hashing safeguards transaction records. A healthcare funding pilot project demonstrates blockchain's capability to enhance accountability and reduce administrative costs.

Government Fund Distribution and Tracking System Using Blockchain Technology

The paper [6] suggests a blockchain-based system for secure fund allocation to combat corruption. Smart contracts ensure only eligible recipients receive funds, with a case study on rural development funding showing how blockchain enhances efficiency and trust in governance.

Blockchain for Government Fund Tracking Using Hyperledger

This study [7] explores the use of Hyperledger Fabric for public fund tracking. Smart contracts automate fund disbursement, ensuring adherence to predetermined criteria. A case study on infrastructure development highlights Hyperledger's ability to ensure security, scalability, and real-time fund tracking.

Tracking Funds Usage Using Blockchain Technology

The study [8] proposes a blockchain-based system to monitor public fund utilization in real time. Smart contracts ensure funds are allocated as planned, preventing corruption. A case study on disaster relief funding demonstrates the system's real-time auditing capabilities.

Blockchain for Transparent Public Fund Management

This paper [9] discusses using blockchain to ensure transparency in public fund administration. Smart contracts automate fund transfers while maintaining data integrity. A pilot project on rural development showcases how blockchain prevents misuse and increases trust in financial systems.

Blockchain for Decentralized Fund Tracking in Public Finance

The article [10] investigates the decentralized tracking of public funds using blockchain. It explores using distributed ledgers for real-time transaction visibility and tamper-resistant records. Case studies comparing Ethereum and Hyperledger highlight blockchain's efficiency in reducing fraud.

Enhancing Public Sector Financial Transparency Using Blockchain

The study [11] proposes a blockchain-based system to manage public finances efficiently. Smart contracts automate fund allocation and ensure adherence to established guidelines. A case study on local government grants illustrates blockchain's ability to enhance financial transparency and reduce corruption.

Distributed Ledger Technology for Efficient Public Fund Allocation

This paper [12] explores using distributed ledger technology (DLT) for efficient fund allocation. A permissioned blockchain maintains data privacy while ensuring transparency. A welfare program funding case study highlights how smart contracts reduce administrative workload and ensure fund integrity.

METHODOLOGY

Introduction

The **Blockchain-Based Tax Calculator and Government Fund Allocation Prototype** addresses inefficiencies, lack of transparency, and security concerns in traditional tax systems. By leveraging blockchain technology, Flask, and MetaMask, the system automates tax computation, secures payments, and ensures real-time fund tracking.

Problem Analysis

The analysis phase identifies core challenges and solutions:

- **Inefficiencies in Tax Systems:** Manual processes lead to delays and errors.

- *Solution:* Automation using blockchain and advanced algorithms.

- **Lack of Transparency in Tax Allocation:** Public trust erodes due to opaque fund distribution.
  - *Solution:* Blockchain ensures traceable, immutable records.

- **Complex Tax Computation:** Errors arise due to complex rules.
  - *Solution:* Simplify deductions and exemptions through automation.

- **Security Concerns in Payments:** Middlemen increase vulnerability.
  - *Solution:* MetaMask ensures secure, decentralized payments.

- **Fragmented User Experience:** Lack of a unified platform leads to inefficiency.
  - *Solution:* Integrate all functionalities into a single system.

System Design and Architecture

The system follows a layered architecture:

- **Frontend Layer:** Built using HTML, CSS, JavaScript, and Tailwind CSS for responsive UI.
- **Backend Layer:** Flask processes tax logic and manages API interactions.
- **Blockchain Layer:** Solidity-based smart contracts ensure secure, immutable payments.
- **Database Layer:** PostgreSQL/MySQL stores user data and transaction logs.

Software Requirements

Key technologies include:

- **Flask:** Backend logic and API management.
- **Solidity:** Smart contract development for tax and fund management.
- **MetaMask:** Secure payment processing on the Ethereum blockchain.
- **HTML, CSS, JavaScript:** Interactive UI and dynamic data handling.
- **Tailwind CSS:** Styling for responsive design.
- **Node.js:** Backend request management and transaction handling.

System Architecture

The architecture ensures seamless interaction between:

- **User Interface:** Accepts tax inputs and displays results.
- **Backend API:** Processes computations and interacts with blockchain.
- **Blockchain Network:** Manages secure payment processing and transaction records.

Use Case Diagram

Actors:

- **Taxpayer:** Calculates taxes, initiates payments, and tracks allocations.
- **Administrator:** Manages system rules and monitors fund distribution.
- **Blockchain:** Ensures immutable transaction records..

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A. SYSTEM ARCHITECTURE

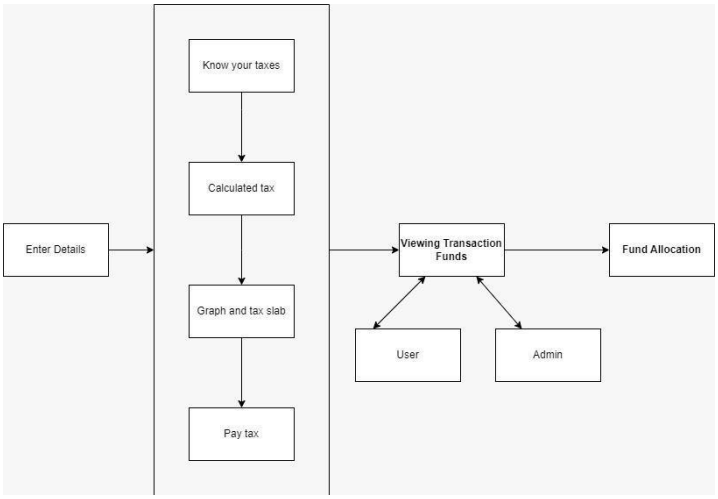

Figure 3.1: System Architecture

Figure 4.1, the system architecture consists of multiple modules that interact to ensure seamless tax computation, payment processing, and fund allocation through blockchain technology. The process begins with user data entry, followed by tax calculation, blockchain transaction authorization, and fund visualization for both users and administrators.

Overview

The diagram illustrates the operational workflow of the **Blockchain-Based Tax Calculator and Government Fund Allocation System**. It highlights the steps from user input to tax computation, blockchain transaction, and fund allocation, ensuring secure and transparent financial management.

Workflow Description

User Input and Tax Calculation

- **Enter Details:** Users input financial information (income, deductions).
- **Know Your Taxes:** Displays applicable tax information.
- **Calculated Tax:** Backend computes tax liabilities.
- **Graph and Tax Slab:** Visualizes tax slab and deductions.
- **Pay Tax:** User confirms and authorizes payment via MetaMask.

Transaction and Fund Visualization

- **Viewing Transaction Funds:** Displays payment history and fund allocations.
- **User and Admin Views:**
  - **User Interface:** Shows tax details and fund allocation breakdown.
  - **Admin Interface:** Allows transaction validation and fund management.

Fund Allocation and Tracking

- **Fund Allocation:** Blockchain allocates funds to relevant ministries.
- **Data Logging:** Transaction details and fund distributions are securely stored.

Security and Transparency

The system leverages Ethereum smart contracts and MetaMask authentication to ensure secure, immutable, and tamper-proof transactions. Fund allocations are transparent and verifiable, enhancing system trust and accountability.

B. IMPLEMENTATION

System Overview

The Blockchain-Based Tax Calculator and Government Fund Allocation and Tracking System integrates frontend, backend, and blockchain components to provide a secure and seamless experience for users. The system's core functionalities include tax computation, secure payments via the Ethereum blockchain, and real-time allocation of funds to various government ministries. Users interact with the system through a web interface built with HTML, CSS, JavaScript, and Tailwind CSS. The backend, powered by Flask, processes API requests, computes taxes, and interacts with Ethereum blockchain smart contracts using web3.js or web3.py. MetaMask facilitates transaction authorization, ensuring secure payment processing and transparent fund tracking.

Module Description

The system is modularized into four main components:

- **Frontend Software:** Provides a user-friendly interface with multi-step forms for collecting financial information and computing taxes.

- **Application Backend:** Handles user requests, tax computations, and communication with the blockchain via Flask APIs.
- **Blockchain Integration:** Employs Solidity-based smart contracts to manage secure and transparent tax payments and fund allocations.
- **User Interaction Features:** Offers real-time feedback, ensuring responsiveness and accessibility across devices. This modular approach ensures high performance, secure transactions, and reliable fund distribution.

C. ALGORITHMS

Algorithms for Tax Computation and Blockchain Transactions

The system follows a well-defined sequence to compute taxes and allocate funds. Initially, the frontend interface is loaded, and user data is collected. Relevant tax slabs and deduction details are retrieved from the database or APIs, and tax computations are performed based on income, deductions, and applicable laws. Once the tax amount is determined, a smart contract is generated, and the user is redirected to MetaMask for transaction authorization. Upon successful approval, the transaction is logged on the Ethereum blockchain, and the allocated funds are transferred to respective government ministries. All transaction logs and fund allocation details are securely stored in the system's database.

Blockchain Transaction and Smart Contract Algorithm

The blockchain interaction involves initializing the smart contract, recording tax details, creating a transaction, and awaiting approval from MetaMask and the Ethereum network. After authorization, funds are transferred to designated government ministries, and all relevant transaction data is logged for auditing purposes. The system ensures that all transactions are validated and allocated as per predefined guidelines, promoting security and transparency.

System Interfaces

The system features three critical interfaces:

- **Form Page:** Allows users to input financial details for tax computation and transaction authorization.
- **Admin Page:** Enables administrators to manage and monitor tax payments and dynamically allocate funds across various government sectors.
- **Home Page:** Serves as the entry point for users, offering intuitive navigation to tax services, transaction history, and fund allocation insights.
- These interfaces ensure data integrity through input validation, real-time feedback, and modular design while enhancing operational efficiency.

Security and Transparency Considerations

Security is a cornerstone of the system, ensured through blockchain immutability, smart contract integrity, and MetaMask-based transaction authentication. Smart contracts eliminate manual errors by enforcing predefined protocols, while admin privileges are controlled via secure authentication. Blockchain integration guarantees immutable records, providing real-time visibility into fund allocations. Role-based access ensures that only authorized personnel can manage critical system parameters, enhancing the system's reliability and transparency.

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III. RESULTS

The blockchain-enabled tax calculator and fund allocation platform successfully streamlined tax computation, payment processes, and transparency while building user trust. By integrating advanced technologies like blockchain, decentralized wallets, and dynamic visualizations, the platform addressed inefficiencies in traditional tax systems. It ensured accurate tax calculations by dynamically applying deductions under Indian tax laws (Sections 80C, 80D, 80E) and effectively managing edge cases like zero taxable income and high-income surcharges. Real-time feedback provided users with instant insights into their tax liabilities, enhancing accuracy and usability.

Blockchain integration played a key role in enhancing transparency and accountability in tax payments and fund distribution. Transactions were immutably stored on the Ethereum blockchain, preventing data manipulation and allowing users and government agencies to audit financial records. Decentralization eliminated risks of mismanagement and corruption, ensuring that taxpayers could track their contributions across various government ministries. The system also generated unique blockchain addresses for each transaction, further strengthening credibility and auditability.

Secure tax payment processing was enabled through MetaMask, allowing users to make blockchain-based payments without intermediaries. Its user-friendly interface ensured accessibility for non-technical users while reducing fraud risks and transaction costs. MetaMask's secure, decentralized structure guaranteed that private keys remained protected, ensuring safe transactions without revealing sensitive information. By removing central authorities, users retained complete control over their payments, increasing confidence in the system.

The platform also provided interactive visualizations to display tax distribution, making financial data more accessible to users. Real-time updates showed the proportional allocation of tax contributions to different ministries, helping taxpayers understand the impact of their payments. By simplifying complex data through pie and bar charts, the system encouraged greater taxpayer participation and compliance. Overall, the project effectively demonstrated the potential of blockchain in modernizing tax collection and fund allocation systems.

Figure 4.1: Home Page

Displays the home page of the tax calculator system, offering navigation to tax calculation or tracking features.

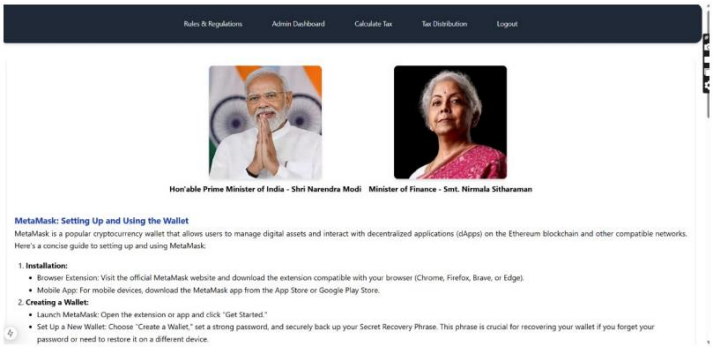

Figure 4.2: Rules & Regulations

This page provides a MetaMask wallet setup guide, helping users connect their digital wallet to the blockchain-based tax system for secure tax payments and transactions.

Figure 4.3: Payee Details

Allows users to enter and submit their personal details, including name and PAN card number, which are essential for identification in the blockchain-based tax calculation system.

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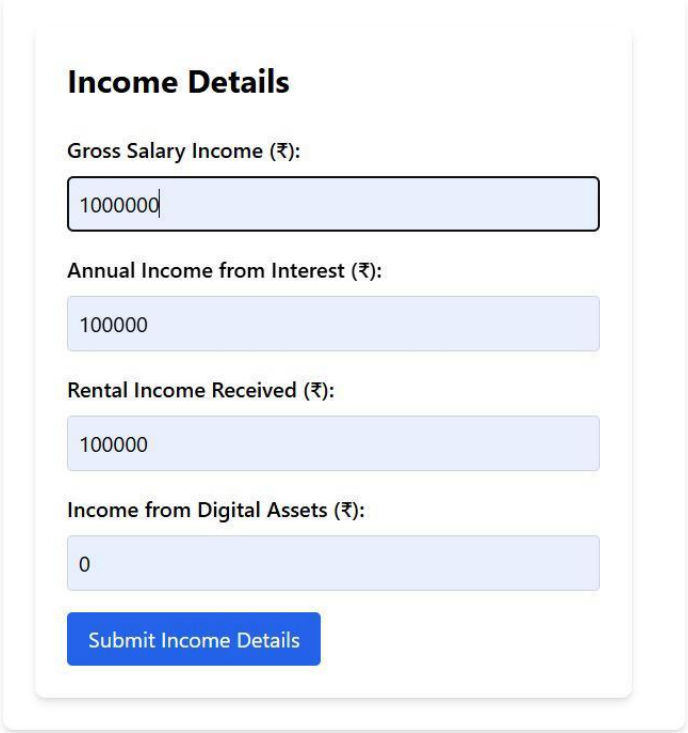

Figure 4.4: Income Details

Provides a form for users to enter income and deduction details to calculate their tax based on predefined rules.

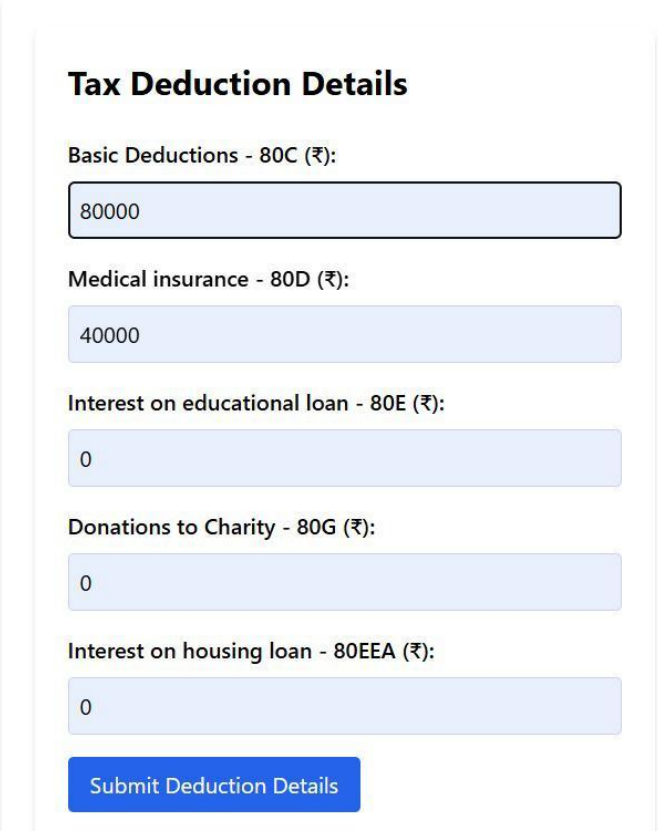

Figure 4.5: Tax Reductions

Enables users to input various tax deduction details under different sections of the Income Tax Act, helping calculate the net taxable income.

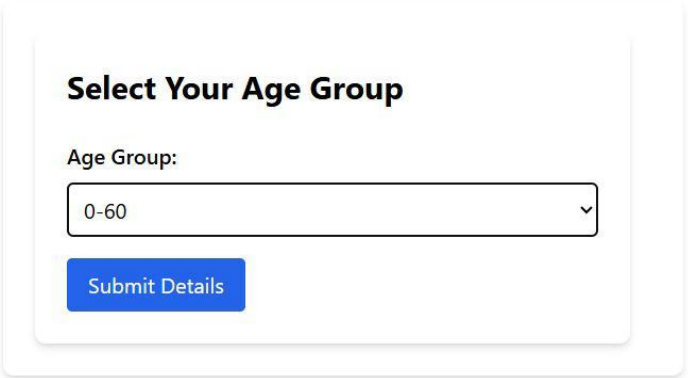

Figure 4.6: Age group

Users can select their age group, which is crucial for applying the correct income tax slab rates during tax calculation.

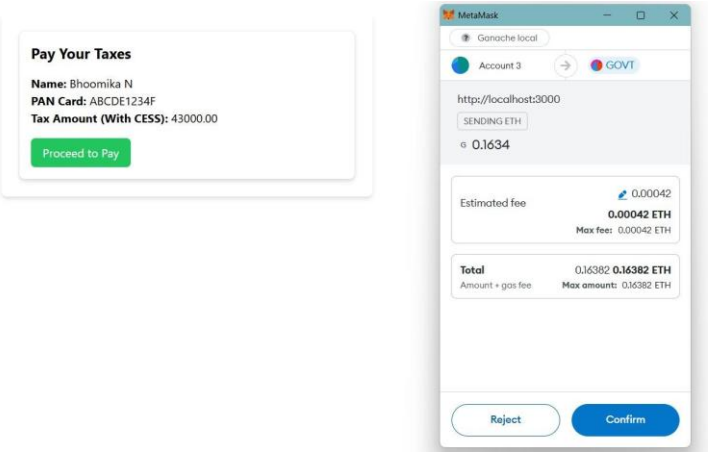

Figure 4.7: Tax Payment

This page allows users to review their tax amount and initiate payment through the MetaMask wallet, enabling secure blockchain-based tax transactions.

Figure 4.8: Tax Allocation

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For visualizing tax revenue allocation, allowing users to explore distribution through bar and pie charts.

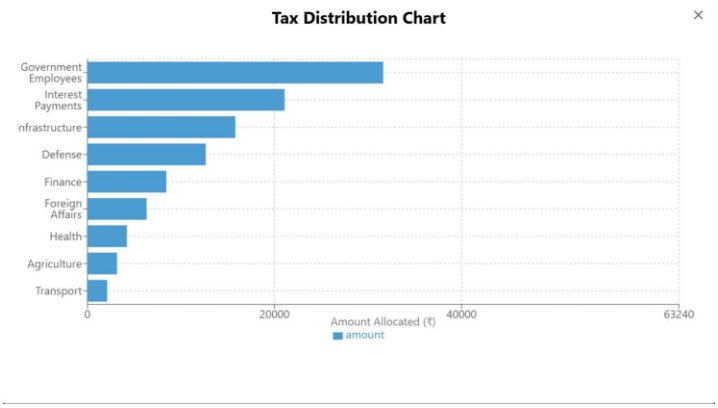

Figure 4.9: Tax Distribution Bar Chart

A dynamic bar chart visualization showcasing tax revenue allocation across various government sectors for improved transparency.

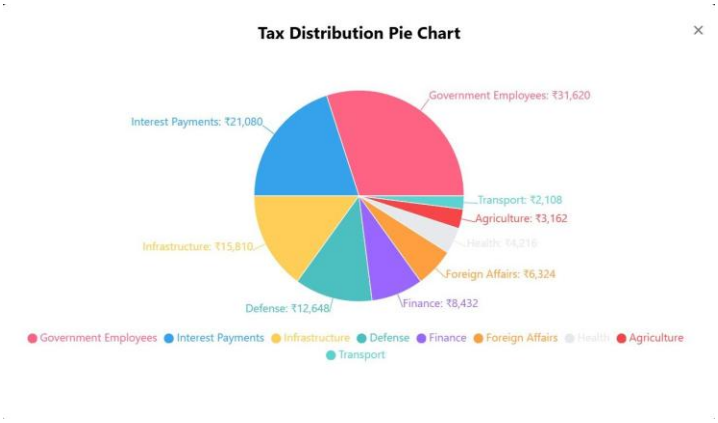

Figure 4.10: Tax Distribution Pie Chart

An intuitive pie chart representation of sector-wise tax distribution, offering users a quick comparative overview of allocations.

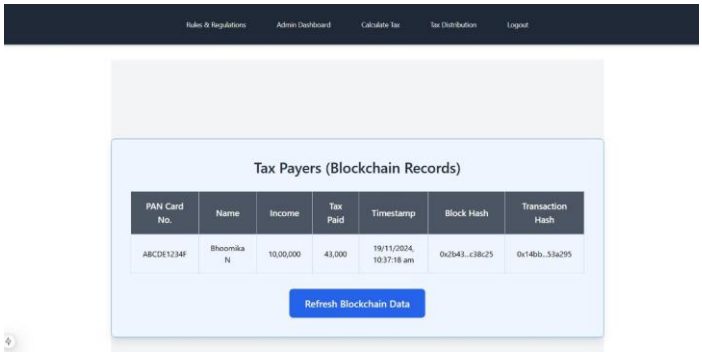

Figure 4.11: Blockchain-based Taxpayer Record

A blockchain-integrated interface that records and displays individual taxpayer transactions securely, ensuring traceability and data integrity.

V. Conclusion

The Blockchain-Based Tax Calculator and Government Fund Allocation Platform successfully addressed inefficiencies in traditional tax systems by integrating blockchain technology. It provided a secure, scalable, and user-friendly approach to tax computation and transparent fund distribution. By leveraging technologies like Flask, Solidity, Tailwind CSS, and MetaMask, the platform ensured efficient tax calculations while complying with Indian tax laws, dynamically applying deductions under sections 80C, 80D, and 80E, and handling edge cases such as zero income and maximum deductions.

A key innovation was the use of blockchain to maintain immutable and transparent records of tax payments and fund allocations. Ethereum's blockchain removed risks of corruption and manipulation, allowing users to track their contributions and verify transactions independently. The integration of MetaMask further enhanced security, enabling decentralized and cost-effective payments while ensuring user control over transactions. This eliminated the need for intermediaries, reducing fraud risks and improving the efficiency of the payment process.

Dynamic visualizations played a crucial role in educating users about tax distribution. Interactive pie and bar charts provided real-time insights into how tax contributions were allocated across government ministries, fostering civic engagement and compliance. The modular and scalable design of the platform allows for future enhancements, such as new tax regulations, additional deduction categories, and real-time refund features, making it adaptable to evolving financial requirements.

In conclusion, the platform significantly improved transparency, efficiency, and trust in tax collection and fund allocation. By addressing the limitations of conventional tax systems, it established a model for modern, secure, and user-centric public finance management. The project demonstrated blockchain's transformative potential in governance, paving the way for more accountable and transparent financial systems in the future.

REFERENCES

[1] Olaf Owe, Elahe Fazeldehkordi, “A lightweight approach to smart contracts supporting safety, security, and privacy” Journal of Logical and Algebraic Methods in Programming 127 (2022) 100772, April 2020

[2] Jiajing Wu, Jieli Liu, Yijing Zhao, Zibin Zheng, “Analysis of cryptocurrency transactions from a network perspective” Journal of Network and Computer Applications 190 (2021) 103139, June 2021.

[3] Cosimo Laneve, Claudio Sacerdoti Coen, “ Analysis of smart contract balances”. Blockchain: Research and Applications 2 (2021) 100020, December 2020.

[4] Fabian Knirsch, Andreas Unterweger, And Dominik Engel, “Implementing a blockchain from scratch.”. EURASIP Journal on Information Security, 2019.

[5] NGUYEN, V.-C., PHAM, H.-L., TRAN, T. HUYNH & NAKASHIMA Y. “Digitising Invoice and Managing VAT Payment using Blockchain Smart Contract”, 2019 IEEE International Conference on Blockchain and Cryptocurrency (ICBC).

[6] Sujatha Kumari B A, Sadaf Farheen, “Blockchain based Data Security for Financial Transaction System”. IEEE Xplore Part Number:CFP20K74-ART; ISBN: 978-1-7281-4876-2.

[7] Pravin, N. P., Anil, K. P., Sunil, S. M., Kundlik, M.S., & Suhas, P.A., “ Block chain technology for protecting the banking transaction without using tokens”. IEEE Xplore Part Number: CFP20N67 -ART ; ISBN: 978-1-7281-5374-2.

[8] Akhilesh NS, Aniruddha MN, Sowmya K S, “Implementation of Blockchain for Secure Bank Transactions” Electronic ISBN:978-93-5406- 901-7 2020 International Conference on Mainstreaming BlockChain Implementation (ICOMBI).

[9] Saumen Chattopadhyay and Arindam Das-Gupta, “The Personal Income Tax in India: Compliance Costs and Compliance Behaviour of Taxpayers” National Institute of Public Finance and Policy, New Delhi.

[10] Kavita Rao, “Income Tax data and Facets of transparency” National Institute of Public Finance and Policy New Delhi

[11] Jitendra Kumar, “An Analysis of Tax Structure in India” Emerging Trends and Innovations in Modern Management.

[12] Nagendra Singh Yadav, Vishal Goar, Manoj Kuri, “ Crypto Wallet: A Perfect Combination with Blockchain and Security Solution for Banking” DOI: 10.37200/IJPR/V24I2/PR2021078.

[13] E. Chebanyuk and K. Markov, "An approach to class diagrams verification according to SOLID design principles," 2016 4th International Conference on Model-Driven Engineering and Software Development (MODELSWARD), Rome, Italy, 2016, pp. 435-441.

[14] Y. A. Ahmad, M. Fadhil Shaharuddin, T. S. Gunawan and F. Arifin, "Implementation of an E-voting Prototype using Ethereum Blockchain in Ganache Network," 2022 IEEE 18th International Colloquium on Signal Processing & Applications (CSPA), Selangor, Malaysia, 2022, pp. 111-115, doi: 10.1109/CSPA55076.2022.9782016.

[15] Z. Zheng, S. Xie, H. Dai, X. Chen and H. Wang, "An Overview of Blockchain Technology: Architecture, Consensus, and Future Trends," 2017 IEEE International Congress on Big Data (BigData Congress), Honolulu, HI, USA, 2017, pp. 557-564, doi: 10.1109/BigDataCongress.2017.85.