



iJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 14 Issue: VII Month of publication: July 2026

DOI: <https://doi.org/10.22214/ijraset.2026.84214>

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Designing a Full-Stack Crowdfunding Web Application for Community-Driven Innovation

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Abstract: Crowdfunding has become a popular way to raise money for start-ups, social projects and charities. Most crowdfunding platforms existing nowadays work in a centralized way, where a third party manages the campaigns and the financial transactions.

The project is to develop a decentralized platform on the Ethereum blockchain to overcome the shortcomings of the traditional crowdfunding systems. The platform uses smart contracts to automate key processes such as campaign creation, donation management and secure fund transfer. This approach improves transparency, reduces reliance on third parties and enhances the overall efficiency and reliability of the crowdfunding process.

This system is built on Solidity, React.js, Node.js, Ethers.js and MetaMask. It also includes additional features such as an AI-powered chatbot and real-time updates on blockchain news to enhance user experience and engagement.

Keywords: Blockchain, Ethereum, Smart Contracts, Crowdfunding, Solidity, MetaMask, Decentralized Applications (Dapps)

I. INTRODUCTION

Crowdfunding has become a popular way to raise money from the masses via the Internet. Various crowdfunding methods have been developed and are being used by entrepreneurs, students, social groups, and NGOs to actualize their ideas and benefit from the outcomes of these ideas. However, the existing crowdfunding system is centralized, meaning all the raised money passes through special agents that operate the crowdfunding system. This introduces multiple issues, including the danger of losing hard-earned money due to lack of control, slow processing times due to the involvement of third parties, and the absence of a transparent and secure interface to operate crowdfunding transactions. Fortunately, the blockchain technology offers the tools to resolve the mentioned issues above due to its ability to provide transparency and security while eliminating the need for a trusted third party. The technology can be leveraged to make crowdfunding campaigns quicker, more convenient and secure. Smart contracts, which are self-executing contracts with the terms of the agreement directly written into code, can be utilized to make crowdfunding campaigns immutable and trustworthy. This project proposal aims to introduce a concept of a decentralized crowdfunding platform that eliminates the need for intermediaries, enables users to control their transactions and utilize smart contracts to raise money on the Ethereum blockchain.

A. Problem Statement

The current crowdfunding platforms have several limitations, including:

- Centralization
- Lack of transparency in the transaction process
- High risks of fraud and misappropriation of funds
- Absence of a reliable third party
- Fees charged by the platform
- Slow withdrawal of funds

These issues have prompted the need to develop a new crowdfunding platform that is transparent, dependable, secure, and efficient in managing and distributing funds.

B. Objectives

The following objectives have been established to guide the development of this project:

- To develop a decentralized crowdfunding platform using Ethereum blockchain.
- To automate fundraising operations through smart contracts.

- To provide transparent donation tracking.
- To integrate MetaMask for secure wallet authentication.
- To improve user engagement through AI-assisted support features.

C. Project Scope

The proposed system focuses on blockchain-based fundraising campaigns where users can create campaigns, donate cryptocurrency, monitor transactions, and securely manage funds.

II. EVALUATION OF LITERATURE

Recent studies have been concentrated on implementing the use of blockchain in crowdfunding and donation projects. The given research shows that Smart Contracts improve the transparency and reliability of the payment process and ensure that trust is not placed in any third parties.

Patel and Deshmukh have created a Smart Contract platform on the Ethereum blockchain, which increased the donors' trust because of the transparent nature of the transactions.

Roy and Menon have compared the characteristics of traditional crowdfunding platforms and blockchain-based ones, proving the second's advantages, including trust. By conducting the research, I would like to create a crowdfunding platform that would be decentralized and apply Artificial Intelligence and Real-Time Information Sharing.

Research Gap

- Research Gaps from Literature:
- Limited focus on user experience.
- Lack of integrated intelligent support systems.
- Absence of real-time industry information.
- Limited adoption of modern web technologies in some implementations.

III. PROPOSED SYSTEM

The proposed solution is a decentralized crowdfunding platform implemented on the Ethereum blockchain that allows for transparent and efficient fundraising while eliminating the need for an intermediary entity. The platform allows donors to make direct contributions to crowdfunding campaigns and receive benefits in the form of tokens issued through smart contracts. The platform consists of the following components:

- React.js Frontend
- Node.js Backend
- Ethereum Smart Contracts
- MetaMask Wallet Integration
- Gemini AI Chatbot
- NewsAPI Integration

By removing intermediaries from the fundraising process, the system improves trust and reduces operational complexity.

IV. SYSTEM ARCHITECTURE

This system architecture uses layered implementation to achieve comprehensive secure, transparent and transparent, efficient use for fundraising platforms

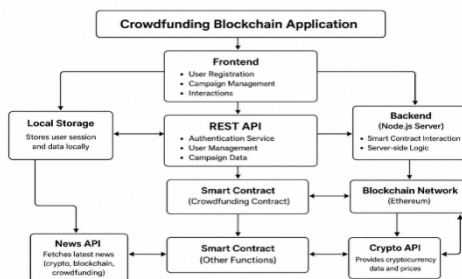


Figure: System Architecture

A. Frontend Layer

The frontend is developed using React.js and Tailwind CSS. It provides interfaces for campaign creation, donation management, and transaction monitoring.

B. Backend Layer

Node.js is used to handle API requests, data management, and communication between different services.

C. Smart Contract Layer

This developed in Solidity manage campaign creation, donation processing, and fund withdrawal activities.

D. Blockchain Layer

The Ethereum blockchain stores all transaction records permanently, ensuring transparency and immutability.

E. External Services

MetaMask enables secure wallet connectivity, while Gemini AI and NewsAPI enhance platform functionality through intelligent assistance and real-time updates.

V. METHODOLOGY

The project follows a structured development methodology.

Step 1: User connects MetaMask wallet.

Step 2: User creates a fundraising campaign.

Step 3: Campaign information is stored on the Ethereum blockchain.

Step 4: Donors contribute Ether to campaigns.

Step 5: Smart contracts validate and record transactions.

Step 6: Campaign creators withdraw funds according to predefined rules.

Step 7: AI chatbot provides assistance and guidance.

Step 8: NewsAPI delivers current blockchain-related information.

VI. IMPLEMENTATION

The core smart contract functionality was developed using Solidity, and the contracts were compiled, tested, and This would be provided through the assistance of Hardhat framework. React.js was used to build the user interface, while Ethers.js enabled communication between the frontend and blockchain network.

A. System Design

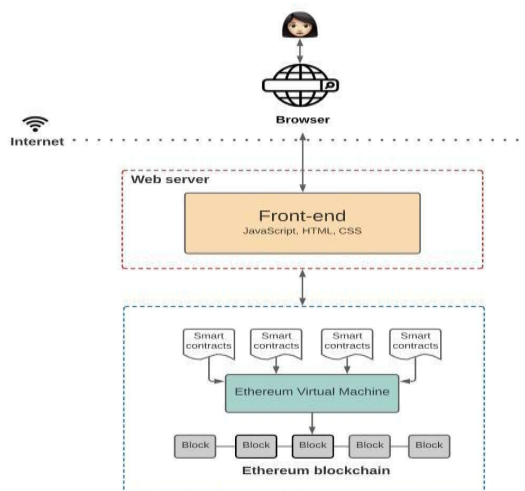


Figure: System Design

MetaMask integration allows users to authenticate securely and approve blockchain transactions.

VII. TESTING AND RESULTS

The system was tested in multiple real-world scenarios, including connecting cryptocurrency wallets, creating fundraising campaigns, processing donations, and withdrawing funds, to ensure smooth and reliable operation.

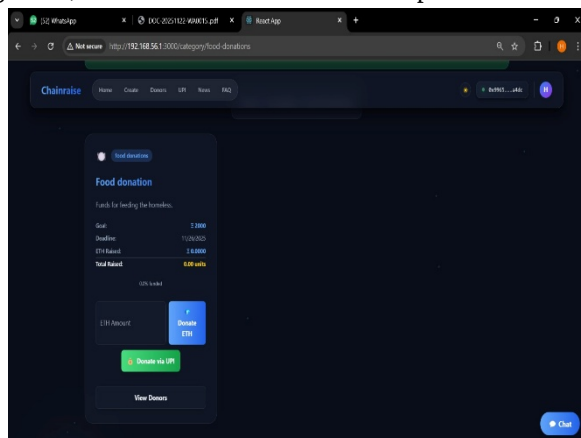


Figure: Creating Campaigns for Food Donation

The results indicate that:

- Campaigns were created successfully.
- Donations were processed securely.
- Blockchain records remained transparent and immutable.
- Wallet authentication improved security.
- Users could verify transactions independently.

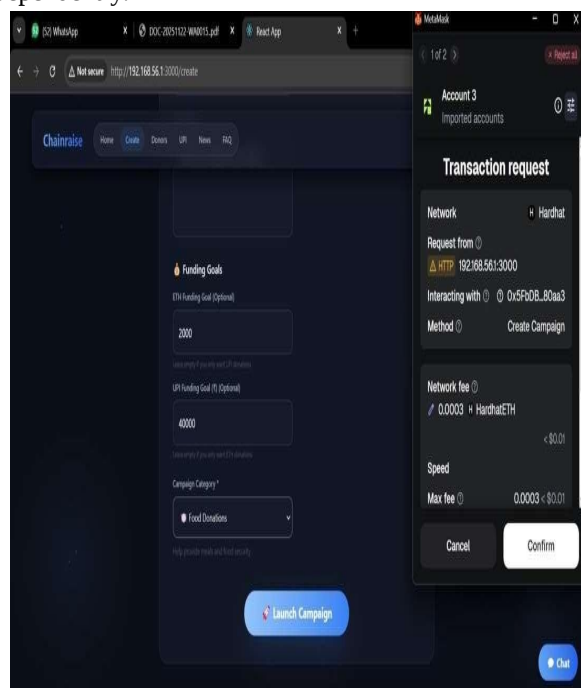


Figure: Connecting the Wallet

The integration of AI chatbot support also improved overall usability by providing immediate assistance to users.

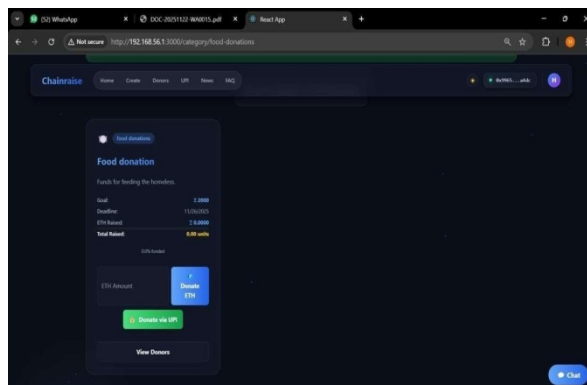


Figure: Viewing Campaign Details

Right there on the Viewing Campaign Details screen, people start feeling part of something real. Opening a campaign - like one labeled “Food Donation” - pulls you into a space that feels open, honest, clear.

What stands out? The goal, the story, the reason - it all sits up front, easy to take in.

A visual tracker, smooth and precise, reveals current donations in either ETH or INR. That bar does more than show numbers - it quietly says others have already stepped forward. Later on, this quietly pushes people to act without pressure. Moving down the page reveals more about the journey, pulling readers closer by sharing where it all began.

Right there, a donor sees everything at a glance - updates straight from the person leading the effort. Instead of clutter, choices like sending funds through Ethereum or using UPI sit clean and clear. Numbers shift live, tied directly to blockchain records, so totals and supporter counts never lag behind reality.

Each digit moves without delay, showing exactly where things stand. Visitors sense trust because nothing hides. It does not shout; it simply shows. You notice how space is used - not packed, but open, guiding attention where it matters. Feelings matter just as much as facts here. A quiet rhythm runs under the design: honest updates meet human intent. This view? Not just another page. More like a pulse point where giving finds reason and shape.

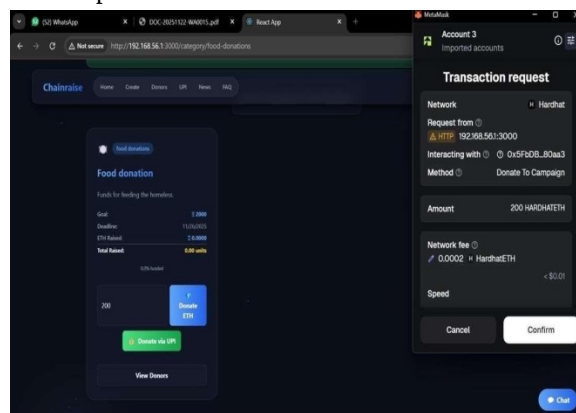


Figure: Donating in ETH (Crypto Flow)

Right there, typing numbers into a box becomes more than just clicking - it turns support into something tangible. As soon as someone picks Ethereum, their choice flows straight into a clear space meant only for entering how much they want to give. Nothing flashy crowds the view - just open room so thoughts stay focused. Hitting Donate ETH wakes up MetaMask without delay, lifting a pane into sight where every detail sits bare: coins moving, network cost, and the precise code handshake behind it all. This quiet moment between decision and deed carries weight. A little window pops up from MetaMask - familiar, trusted - showing exactly where the payment heads: straight into the campaign’s code-run account. No detours through banks, no gatekeepers watching over shoulders. Once someone hits confirm, the network locks the deal down using blockchain, untouchable after that point. Change it? Undo it? Impossible. That quick update does something quiet but strong: it builds confidence, proof their support arrived fast and stayed true.

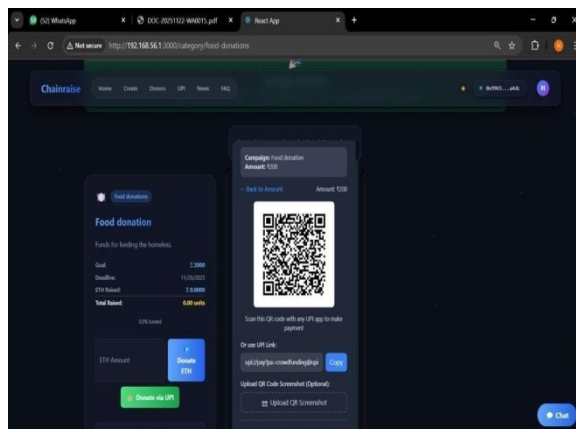


Figure: UPI QR Code Generation and Payment

Right there on the UPI QR Code Generation screen, giving becomes actual help. Once the number goes in, a sharp QR code appears fast - alongside a tap-to-pay UPI address. Most Indians recognize this rhythm right away since it matches how they pay for milk, electricity, or things bought online. Front and center sits the square barcode, large enough to work smoothly whether someone uses Google Pay, PhonePe, Paytm, or another payment tool.

Donating becomes smooth because things work just how you'd hope, especially if it's your first time using something like this. After scanning the code, a chance to share proof of payment shows up, keeping everything open and checked. That image means creators can trust the support really came through. Everything on display stays clean - no clutter, no confusing steps - only what matters sits front and center.

This move connects old-school payment methods with today's fundraising tools, shaping a giving process that just clicks - smooth, quick, easy to follow. Right there in the moment when the code appears, supporters sense their role matters, their gesture counts, tied in without friction.

VIII. ADVANTAGES

- Transparent transaction tracking.
- Secure blockchain-based fundraising.
- Reduced dependency on intermediaries.
- Automated execution through smart contracts.
- Improved trust among donors and campaign creators.

IX. LIMITATIONS

- Ethereum gas fees can increase transaction costs.
- Network congestion may delay confirmations.
- Blockchain adoption remains limited among non-technical users.

X. FUTURE WORK

The following work can be implemented in future versions of the platform:

- Multi-blockchain support.
- Layer-2 integration for reduced transaction costs.
- NFT-based fundraising campaigns.
- AI-powered fraud detection.
- Mobile application development.
- Decentralized identity verification.

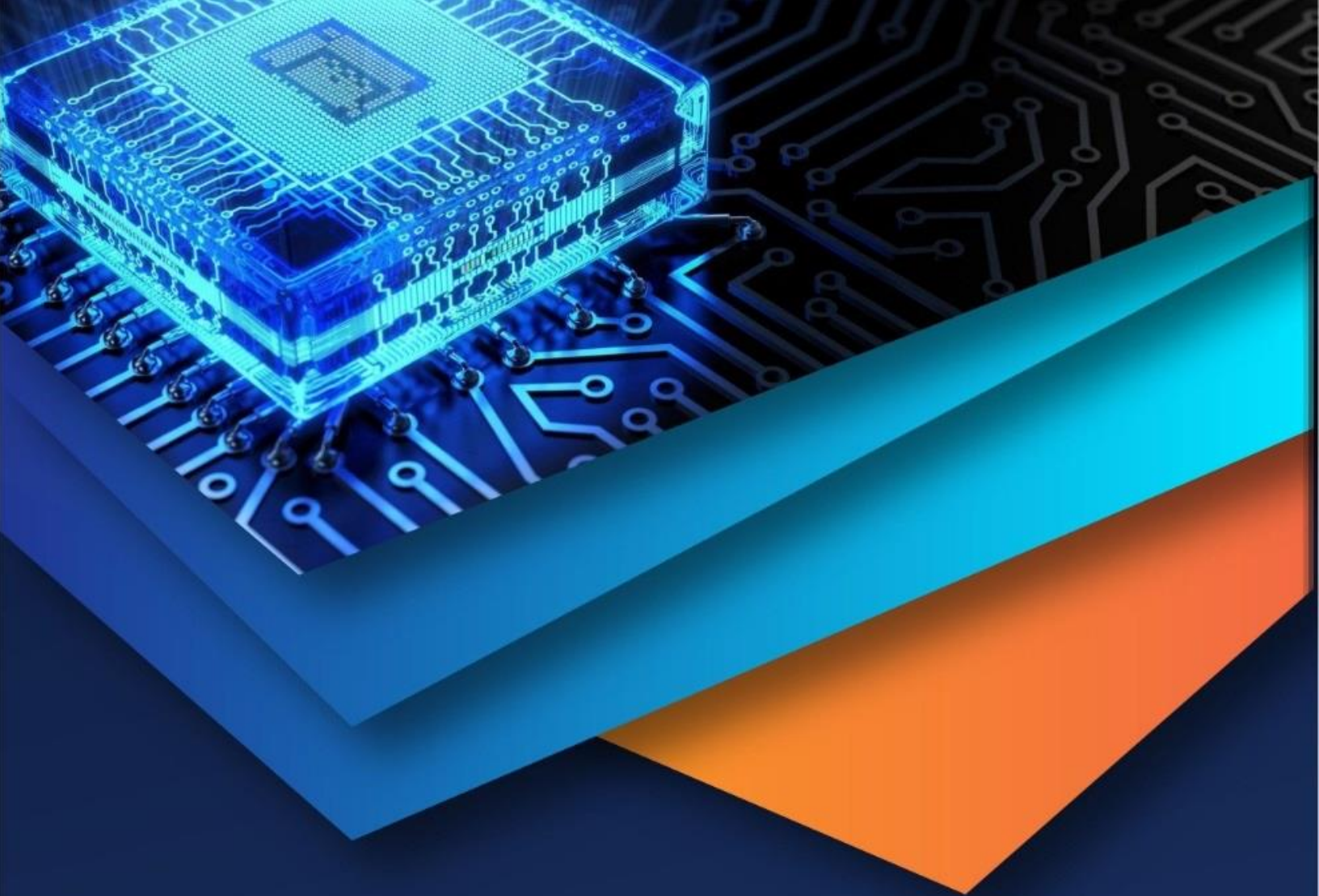
XI. CONCLUSION

This work presented a blockchain-based crowdfunding platform that utilizes Ethereum smart contracts to facilitate transparent, secure, and reliable fundraising without relying on centralized intermediaries.

The system successfully demonstrated how blockchain technology can improve transparency, security, and trust in fundraising activities. By combining decentralized transaction management with modern web technologies and intelligent support features, the proposed platform provides a practical solution for secure online fundraising.

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