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Employability Of Blockchain Technology In Developing A Novel Crowdfunding And Charity Platform

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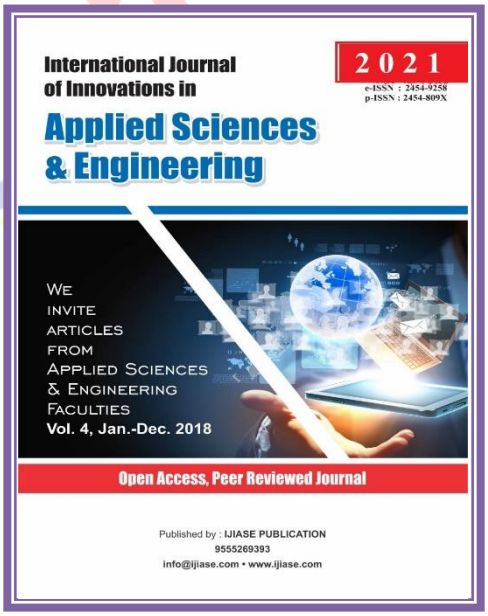

ABSTRACT

This research paper addresses the common oversight and transparency issues faced by nonprofit organizations globally by proposing a revolutionary charity system that makes use of blockchain technology. The current state of crowdfunding is unregulated, which has resulted in fraudulent campaigns and postponed project completions, negatively affecting the public's desire to donate. This study demonstrates the creation and validation of a blockchain-based charity platform on the Ethereum network by providing a detailed architecture, foundation, and operational procedures, using blockchain funding ethers.

By creating a more dependable and effective way for the charity sector to execute online transactions and gifts, the use of this technology seeks to increase public trust, improve transparency in charitable activities, and ultimately advance humanitarian endeavors.

INTRODUCTION

In a society that experiences a range of terrible circumstances that cause large losses, charity plays a crucial role. Aid organizations offer assistance in the form of requirements as well as cash support. The charity industry has changed from traditional institutions to a decentralized cryptocurrency-based system due to people's growing desire to give back. Challenges to the global charity system include lack of suitable route to reach the needy (mustahiq), corruption, trust issues amongst contributors, and transparency issues. Blockchain technology provides a decentralized, transparent method of handling various charitable transactions. By creating a decentralized platform that links givers and recipients, the suggested blockchain approach maximizes security and promotes donor confidence. The study investigates the use of blockchain technology to fund collection trust issues. To increase transparency, we are donating to charities via Blockchain. A charity chain can also utilize smart contracts to oversee and monitor contributions. One possible application for the Byzantine consensus mechanism is scalability and computational ease. Ethereum can be utilized as a public ledger because it is a public platform.

Individuals or small, geographically dispersed teams have created the platform in an effort to make money by offering donors ethers for sale. The concept of raising money using a crowdsourcing website is simplified. With the support of the general public worldwide, who may be eager to contribute to the campaign in return for a monetary reward that will help the crowdfunding DAPP's developer and the cause it is being

made for, in addition to the donor. Upcoming efforts include improving the universal funding players' user interface, which will take more integration time.

REVIEW OF LITERATURE

According to S. Hadi, D. Azamat, and A. Sergey's 2019 paper, "Platform for Tracking Donations of Charitable Foundations Based on Blockchain Technology" [1], the majority of donations are made informally, and donors are unaware of the exact use of their money. The creation of the platform that will allow philanthropic organizations to be connected is the project's primary goal. As a result, donor data will be consolidated in one location, enabling the automatic preparation of reports. Thus, develop a single blockchain-based platform to enhance the transparency of philanthropic foundations. 2020 saw H. Baokun and L. In his work "Research on Charity System Based on Blockchain" [2], he examined how China's charity oversight system is opaque and deters individuals from donating. He recommended that law, government, business, and society all have a role in overseeing charitable organizations. They suggested that blockchain, which is traceable, anonymous, non-tamperable, and decentralized, has enormous potential to upend established enterprises. All transaction data can be stored on the blockchain, which has an effective, transparent method and extremely secure data. 2019 saw S. The idea that a group's common interest or intention for various social and charitable projects is one of the fundamental building blocks of a society was used by Yachana, B. Kunal, S. Jagveer, and G. Satish in their "Online Transparent Charity System" [3]. The primary goal is to increase efficacy and efficiency by creating a social network donation mechanism that guarantees system transparency. The study reviews different donation and money collection formats, cash collection places, and the methods used to communicate charity project outcomes to their founders. A blockchain-based system for tracking donations was proposed in 2021 by Prashant, R. Gaurav, G. Nisha, B. Achal, Prof. K. Shradha, in their paper, "Tracking Donations of Charitable Foundations using Blockchain Technology" [4]. On the other hand, donors and receivers may become concerned about their privacy if transparency is prioritized.

Thus, it is necessary to develop a contribution system that guarantees both privacy and openness. The System offers contributors, charitable foundations, and recipients transparent accounting of activities through

the use of blockchain technology. Donors and the general public should be able to follow and control the whereabouts, timing, and recipients of charitable donations with the help of the donation tracking system, which should provide a clear donation path. The COVID-19 pandemic has presented numerous obstacles for the charity contribution service system, according to Z. Xianchen and W. Hanyang's 2020 paper, "Developing a Reliable Service System of Charity Donation During the Covid-19 Outbreak" [5]. Blockchain technology has several applications, including data security protection, access policy definition, donation transparency, donation behavior tracking, and trust crisis resolution. Blockchain technology ensures that the system will respond to consumer needs more quickly and efficiently. According to the 2020 paper "Blockchain-based Trusted Charity Fund-Raising" by K. Ashutosh, G. Ashish, T. Amrish, and B. Vinayak [6], the system is a genuine and decentralized platform. Insurance procedures will be more efficient thanks to blockchain technology, which will also enable improved risk management and policy pricing. In this case, charity has progressively evolved from conventional organizational ideas to a decentralized structure powered by cryptocurrencies. The system's goal is to transfer funds on behalf of donors to other users upon request, and it does so in a secure and trustworthy manner.

METHODOLOGY

Our technology is carefully designed to address the main issues with modern crowdfunding sites.

It tackles the volume and intricacy of transactions that are peculiar to crowdfunding, requiring a systematic approach to their legal documentation and management. The use of smart contracts' innovation helps to overcome this difficulty. These are advanced transaction protocols that are intended to automatically carry out, monitor, and record transactions for project initiators and backers while strictly following the agreed upon terms. Unlike conventional web-based applications that are centralized and managed by a single server, this platform is based on the Ethereum Blockchain, creating a decentralized application framework. Known as "distributed ledger technology," this innovative method not only stores extensive campaign data, donations, end requests, and funds on an openly accessible blockchain network, but it also democratizes access to this ledger and its vast contents for every network user, thereby

enhancing transparency and trust within the ecosystem.

A major improvement over the traditional Proof of Work (Po W) systems is signaled by the switch to a Proof of Stake (PoS) mechanism for transaction processing, which also heralds improvements in speed, security, and most importantly, energy efficiency. PoS avoids the high computational demands of PoW systems and conserves energy by doing away with the competitive requirement among nodes for block insertion to the blockchain. This energy-efficient strategy minimizes redundancy by recording each transaction just once, which not only simplifies operations but also promotes an immutable transactional record inside a shared ledger. In the event that inconsistencies or mistakes occur, correction calls for the start of a fresh transaction, both entries made available to the public, improving the transactional process's integrity and openness. By eliminating the need for a centralized data repository, this decentralized ledger technology enables all blockchain nodes to transparently view and store financial transactions and funds, protecting them from theft and guaranteeing a more dependable and transparent crowdfunding ecosystem.

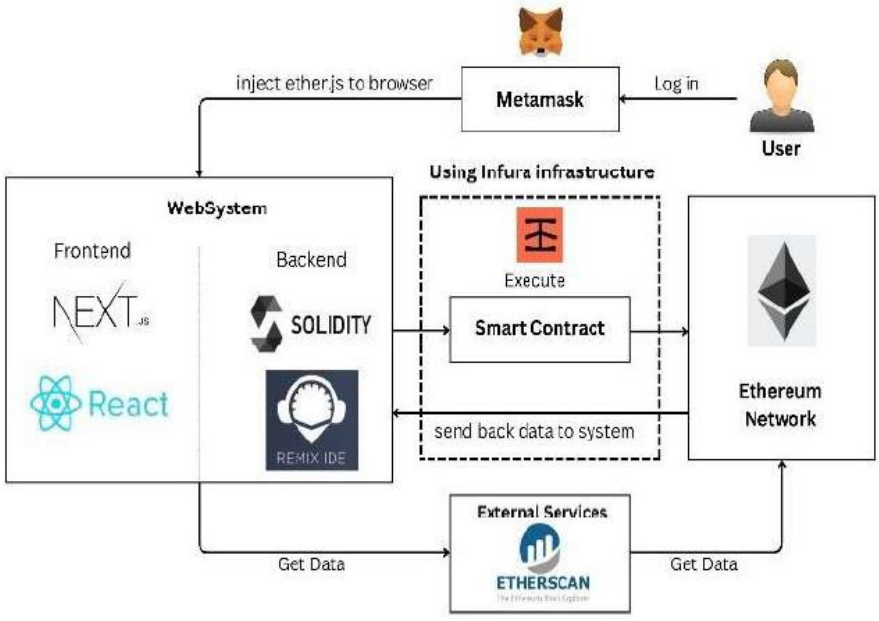

Fig 1: The Contributor's Process Flow

The application's smart contract, which is built in Solidity, is tested locally and remotely to the Infura platform on the Sapolia test network, according to the system design

in Figure I. A deployed web application that uses cutting-edge JS libraries like ReactJS, NextJS (for quick library and local server bundling during development), and Material UI (for pre-made UI components) would allow users to access the platform. The utilizing ethers.js libraries in response to user actions such as initiating, displaying, and concluding campaigns, among others. With the exception of listing out deployed ads, every blockchain interaction requires wallet authentication and authorization. Every transaction that occurs is totally visible, and anyone may use sepolia.etherscan.io to confirm the transaction's legitimacy.

The steps a contributor takes to interact with a donation platform are shown in Fig. 2. The process begins with them starting it, connecting their wallet, and entering the desired donation amount. The procedure returns to the "Donate amount" step if the donation is invalid. The contribution moves forward to the "Donation successful" stage, signifying that it has been accepted. This simplified process guarantees an easy-to-use interface while protecting the integrity of the donation system.

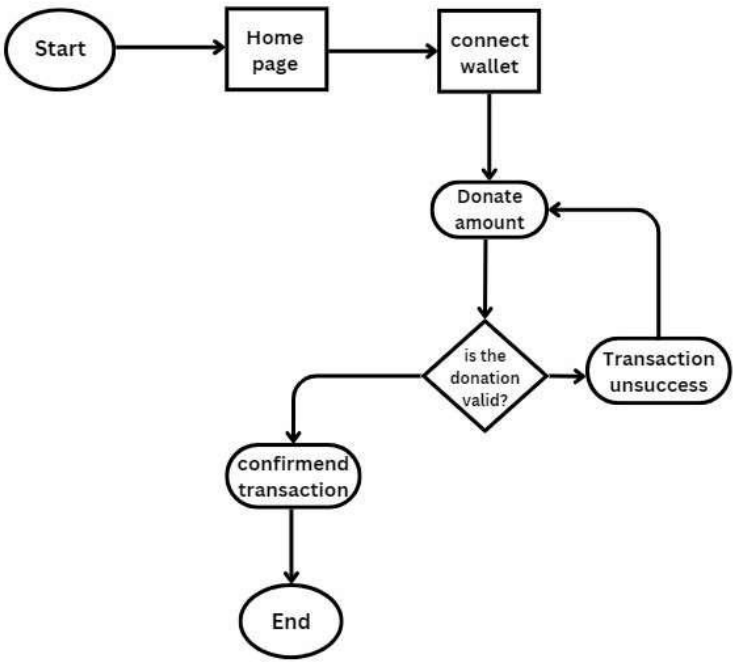

Fig 2: Contributor Process Flow Diagram

In Figure 3, the creation phase begins when the Campaign Creator connects their wallet and the system verifies that the prerequisites are met. They go back to the "Create campaign" step if not. They move on to the "Creation successful" stage if they are. In order to provide Campaign Creators with a methodical and effective experience while preserving system integrity, the procedure concludes at the end.

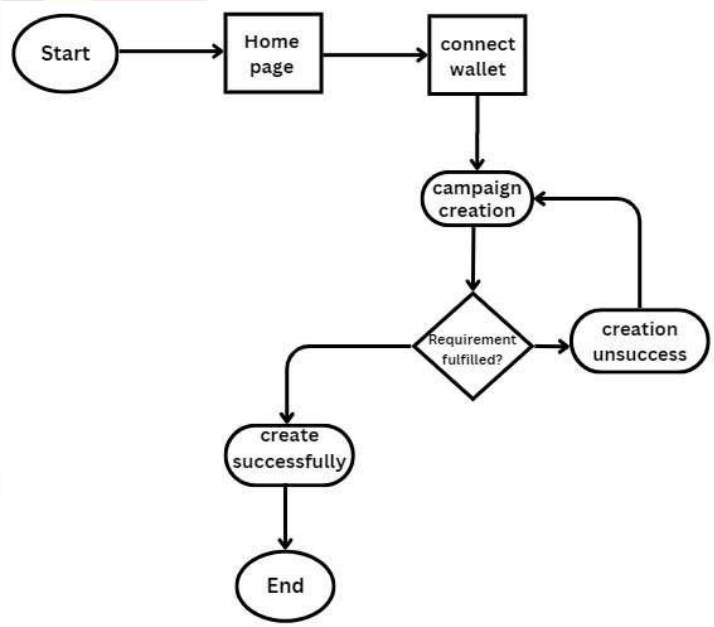

Fig. 3. The campaign creator's process flow

TESTING AND IMPLEMENTATION

A. Overview of the System

The goal of the crowdfunding decentralized application (DA pp) is to establish a platform that allows anybody to easily launch or take part in a campaign to generate new, ground-breaking funding. As demonstrated

Using the crowdfunding DApp platform, organizations or individuals can raise money by accepting ethers from contributors or investors, as shown in Fig. 4.

Fig 4: Crowdfunding Campaign Interaction

Smart contracts based on Ethereum are used to administer campaigns; hence, information such as the minimum contribution and manager's address is not kept on a blockchain. Campaign categories are defined by managers, who also supply Ethereum wallet addresses for payments. Research about the market and interest are key factors in campaign success. On the crowdfunding DApp website, contributors can support projects by contributing ether, but they must have enough money and the required down payment to mine gas and invest.

The goal of user interface (UI) is to simplify platform usage and goal-achieving for producers and contributors. The following essential UI features are necessary to use the platform effectively.

• Offer a listing interface for every campaign.

• Offer a user interface with information about your campaign presented.

• Offer a means of funding or contributing to a campaign.

• Offer an interface for creating campaigns.

• Put in place an interface for creating requests.

• Provide an interface that allows investors to track the development of each creator's campaign and claim funds in the event that it is successful.

B. Implementing the System

1) JavaScript: The front end of the suggested blockchain-based charity system is built using JavaScript, React.js, and Next.js, a sophisticated programming language frequently used to create aesthetically pleasing web applications.

2) Ethereum: Smart contracts are developed, tested, and put into use on the Ethereum blockchain, which improves transaction

efficiency and speed. The efficacy, accountability, and transparency of charitable contributions are guaranteed by this integration. The service provider Infura makes it easier to create and test smart contracts, which enables smooth deployment on several Ethereum networks, as seen in Fig. 5 (the structure of Ethereum, which includes the Sapiola test net).

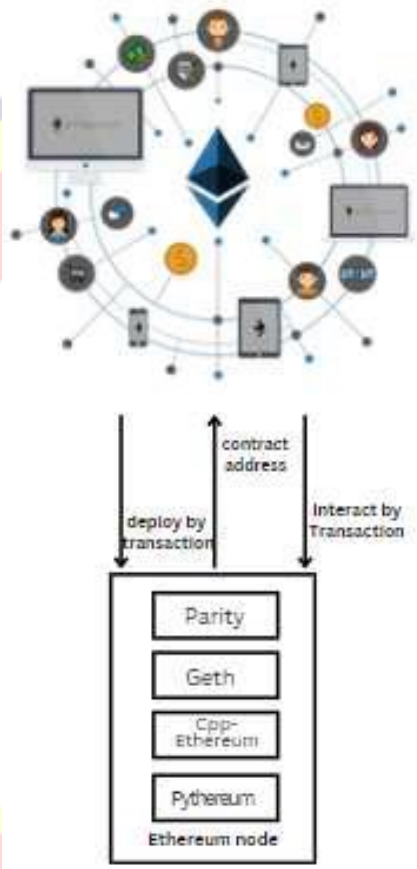

Fig 5: Ethereum Blockchain

3) Testnet (Sapolia): To ensure system stability and operation without a local Ethereum node, our project makes use of Solidity code compilation, contract deployment, and automated tests via Sapolia test net via lnfura.

4) Web3 Libraries (Ether.js): To enable communication with the Ethereum network, this system makes use of ethers.js, a JavaScript plugin. This guarantees that frontend programming is written in a way that works well with smart contracts,

facilitating user viewing and giving within the system.

5) Smart Contract: As seen in Fig. 6, smart contracts on the Ethereum blockchain allow organizers of charitable events to plan new events while keeping event specifics and amounts intact. Smart contracts allow donors to interact and set requirements for profitable fundraising initiatives.

6) Ethereum Virtual Machine: The bytecode for the Ethereum Virtual Machine is created using a Solidity compiler and delivered through Ethereum.

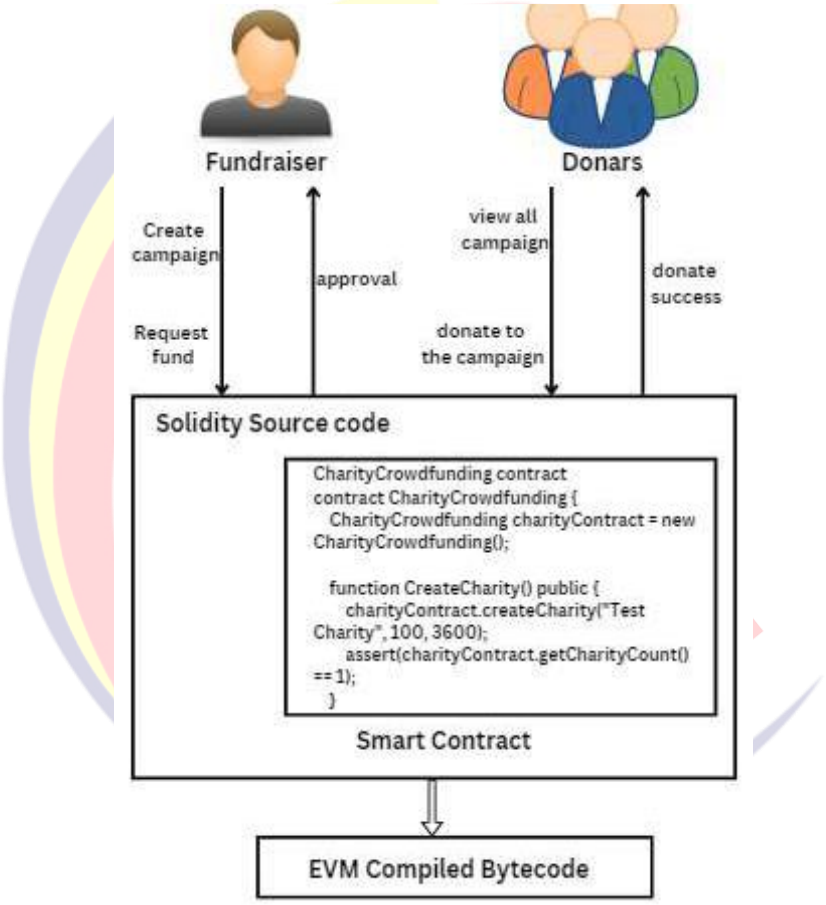

Fig. 6 illustrates the Smart Contract Development

node's connection to the blockchain, which guarantees that the contract deployment is verified.

7) Solidity: The Ethereum Virtual Machine verifies the Smart Contract software after the Ethereum Backend processes donations, manages events, and monitors donor data using Solidity, a programming language

created for Ethereum blockchain smart contracts (Fig. 7).

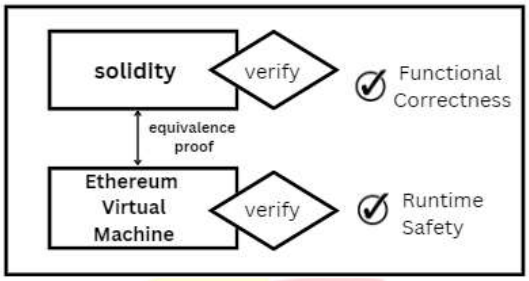

Fig. 7. Ethereum smart contract verification

8) MetaMask: Install the Metamask Chrome extension after making an account. This makes the web application available for use. Smart contracts developed specifically for the crowdfunding DApp and implemented on the Ethereum blockchain platform oversee all transactions between a campaign manager (someone utilizing the platform to raise money) and a campaign contributor.

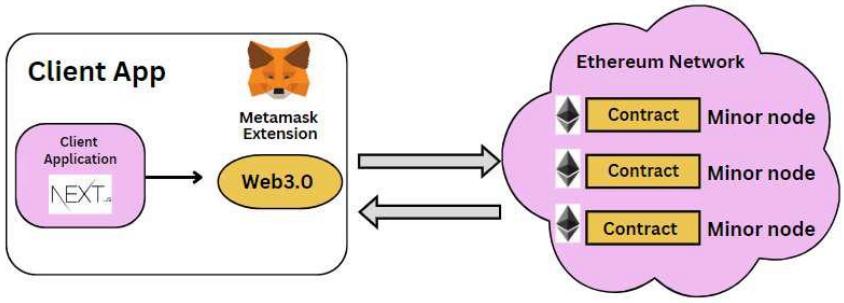

Fig 8: Using MetaMask for Ethereum Node Communication

As illustrated in Figure 8, Meta mask is a small client that allows library components to establish a connection to the Ethereum network through the web3 API, tracks the execution of transactions, and transmits signed transactions for the installation of smart contracts.

OUTCOME

A new user starts the procedure by pressing the registration button. They continue by entering the necessary information, adhering to the user-friendly interface's suggestions during the registration process. Users joining the system for the first time can be assured of

a simple onboarding procedure thanks to this smooth and intuitive experience.

As demonstrated in Fig. 10, anyone may establish a campaign with ease, just like charity funding in the real world and on other funding platforms. Since the Ethereum-based smart contract will be in charge of managing the campaign data, it cannot be altered. Once established, campaigns are open to the public and available for donations, which increases their effectiveness and deters fraud because money is sent to the campaign's address rather than the developer.

After the campaign's duration has elapsed, money can be quickly redeemed in the campaign creator's account via the MetaMask wallet plugin, after blockchain verification and approval.

CONCLUSION

In the context of Web 3.0 and decentralized solutions, it is imperative to investigate alternative architectures in order to generate creative solutions to problems. Traditional crowdfunding encourages peer-to-peer networks to be investigated for independent transaction management because of the impact of middle-man firms. This project aims to remove middlemen from crowdfunding by using smart contracts on the Ethereum blockchain to let consumers easily start and fund projects. Campaign participants can engage with the platform in a seamless manner. Although new blockchain systems like NEO, Cardano, EOS, and Stellar offer a variety of choices, it is unclear how useful they are yet. There is potential for EOS, and if it turns out to be more successful than Ethereum, this project might be moved forward.

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