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Design and Development of a Blockchain-Based Crowdfunding Platform for Transparent Fundraising

Neetu Anand[1], Kumar Gaurav[2]

[1]Department of Computer Applications, Maharaja Surajmal Institute
Email: *neetuanand[at]msijanakpuri.com*

[2]Department of Computer Applications, Maharaja Surajmal Institute
Email: *kumargaurav[at]msijanakpuri.com*

Abstract: ***Crowdfunding is a method with which a person or a group can raise capital from other average day-to-day citizens around the globe with the help of the internet, one can raise capital for starting a new company or venture, building a niche product or performing a social cause. This research paper aims to enhance and improve upon the current crowdfunding solution by leveraging blockchain technology, Blockchain can be described as a peer-to-peer database, in simpler terms a database server that is controlled and verified by millions of people around the globe and once an entry is recorded on a blockchain, it cannot be undone and deleted. Another technology that we will use is smart contracts, they are programmatically designed contracts that can be deployed on the blockchain network, they perform certain actions, that they are programmed to do on the blockchain network, these smart contracts allow us to develop applications leveraging the blockchain network. By leveraging the Blockchain and its related tools, we aim to improve upon the existing platforms that provide crowdfunding services & facilities, to make crowdfunding more accessible and attractive for people around the globe.***

Keywords: Smart contracts, Blockchain, Investor, Donator, Crowdfunding

1. Introduction

Crowdfunding as one would assume from the name is when money is raised for a new venture or a social cause from a large group of people who are mostly unaware of each other's details. There are several types of crowdfunding, including[1]:

a) Reward-based crowdfunding: This type of crowdfunding involves offering rewards to backers who contribute to the project. Rewards can range from a simple thank-you noteto early access to the product being developed.
b) Donation-based crowdfunding: This type of crowdfunding involves asking for donations from backers, who may or may not receive any rewards in return.
c) Equity crowdfunding: This type of crowdfunding involves offering equity or ownership in a company to backers in exchange for their investment.
d) Debt crowdfunding: This type of crowdfunding involves offering debt or loans to backers in exchange for their investment.

The first noteworthy instance of online crowdfunding in the music industry was in 1997 when fans of the British rock band Marillion raised US$60,000 in donations through an Internet campaign to underwrite an entire U.S. tour. The band subsequently used this method to fund their studio albums.

There are three main entities in the crowdfunding process

First the creator of the campaign, Specifically the one who is raising money to fund a new venture or requires the money for a social cause. If one is raising money for a venture then he/she is said to be a founder, but from now on to avoid confusion we will refer to the person trying to raise money as the creator of the campaign.

Second is the investor or donator, the one who is giving money if someone is giving their money and expecting a return on his money, that person is said to be investor, If one is giving their money for a social cause and not expecting his or her money back with a profit then that person is said to be a donator, from now on we will refer to the person giving money as the donator.

Third is the crowdfunding platform which acts as a middleman between the creator and the donator. It allows the creator to easily create a campaign on their platform and give all the details he/she wants to share with potential donators [3]. Donators can also easily get a list of potential investable or charitable projects.

1.1 Motivation

1) Our research aims to provide a platform for start-ups, small businesses, and social causes to get financial support from the crowd.
2) It can be a quick and easy way to raise funds without paying any fees in advance.
3) Current crowdfunding platforms in the market charge a high fee
4) Using a blockchain-based crowdfunding system to reduce the transaction fees
5) Reducing the friction between the transfer of money from the donator to the creator

1.2 Problem Statement

1) Establishing trust is a significant challenge in the realm of crowdfunding.
2) Generating sufficient interest and engagement is often a stumbling block in the crowdfunding experience.
3) Fees currently available in the market have high transaction fees.
4) Reducing risk in an unsuccessful campaign for the donors.

1.3 Objective

1) To increase transparency of the funds being used
2) To reduce the friction of transfer of funds
3) To reduce transaction costs
4) To minimize risk for the donator

2. Literature Survey

1) Blockchain-Based Crowdfunding Application by V. Patile t al. published in 2021 Fifth International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC). This paper describes the development of a blockchain-based crowdfunding web application that provides transparency, security and assurance to the backers and the start-ups [5].
2) Blockchain based crowdfunding systems by Nazmus Saadat et al. published in Indonesian Journal of Electrical Engineering and Computer Science in 2019[4]. This paper discusses the problems with current crowdfunding platforms and how blockchain can overcome them by providing a decentralized, trust less and transparent solution.
3) Securing blockchain-based crowdfunding platforms: an integrated graph neural networks and machine learning approach by K. Zkik et al. published in Electronic Commerce Research in 2023 [4]. This paper analyses the security challenges and risks of blockchain-based crowdfunding platforms and proposes a framework for enhancing their security and resilience [6].
4) A Framework for Crowdfunding Platform Using Ethereum Blockchain Technology by S. Kumar et al. published in Advances in Intelligent Systems and Computing in 2022. This paper presents a framework for developing a crowdfunding platform using Ethereum blockchain technology that eliminates intermediaries and processing fees [7,17].

3. Proposed System

3.1 Introduction

Our research has two main objectives: to create two distinct platforms for crowdfunding that cater to different needs and goals. The first platform is designed for entrepreneurs who want to raise funds for launching a new business or developing a new product. This platform will allow them to showcase their ideas, attract backers and offer rewards or equity in exchange for their support [8]. The second platform is dedicated for social causes that need financial assistance to make a positive impact on the world. This platform will enable them to share their stories [9], inspire donors and offer gratitude or recognition for their contributions.

The first platform, which is for raising funds for starting a new venture or building a new product, works as follows [10,11]:

- The entrepreneur creates a project page on the platform, where they describe their idea, set a funding goal and a deadline, and offer rewards or equity to the backers.
- The platform verifies the project and approves it for launching.
- The entrepreneur promotes their project to potential backers, using social media, email, or other channels.
- The backers visit the project page and decide whether to support the project or not. They can pledge any amount they want and choose a reward or equity option.
- The platform collects the pledges from the backers and holds them in escrow until the project reaches its deadline.
- If the project reaches its funding goal by the deadline, the platform transfers the funds to the entrepreneur, minus a small fee. The entrepreneur then delivers the rewards or equity to the backers as promised.
- If the project fails to reach its funding goal by the deadline, the platform cancels the project and refunds the pledges to the backers.

The second platform, which is for supporting social causes, works as follows[12,13]:

- The social cause creator creates a campaign page on the platform, where they explain their cause, set a donation target and a duration, and offer gratitude or recognition to the donors.
- The platform verifies the campaign and approves it for launching.
- The social cause creator promotes their campaign to potential donors, using social media, email, or other channels.
- The donors visit the campaign page and decide whether to support the cause or not. They can donate any amount they want and choose a gratitude or recognition option.
- The platform collects the donations from the donors and transfers them to the social cause creator, minus a small fee. The social cause creator then uses the funds to carry out their cause and updates the donors on their progress and impact.
- The social cause creator also delivers gratitude or recognition to the donors as promised.

3.2 Architecure

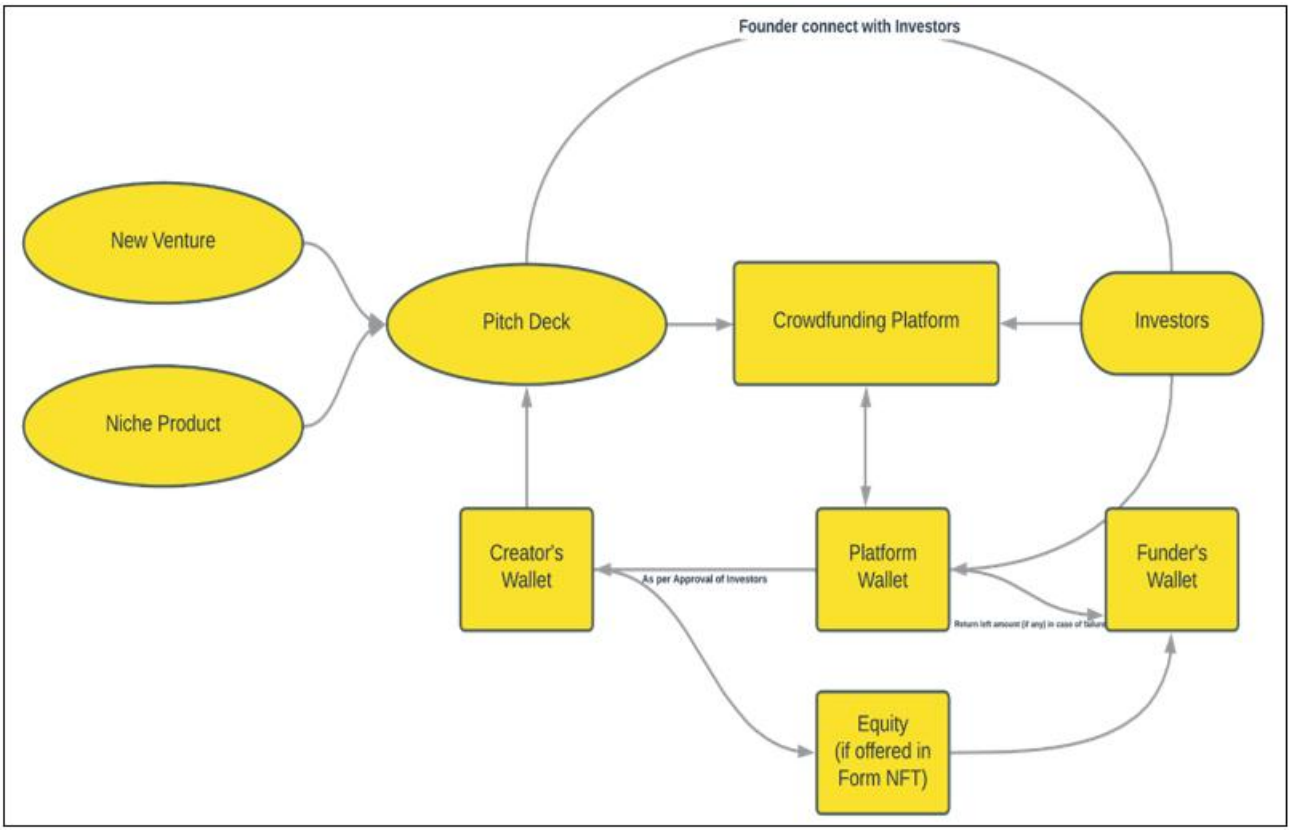

Figure 1: Architecture for Venture Capital based platform

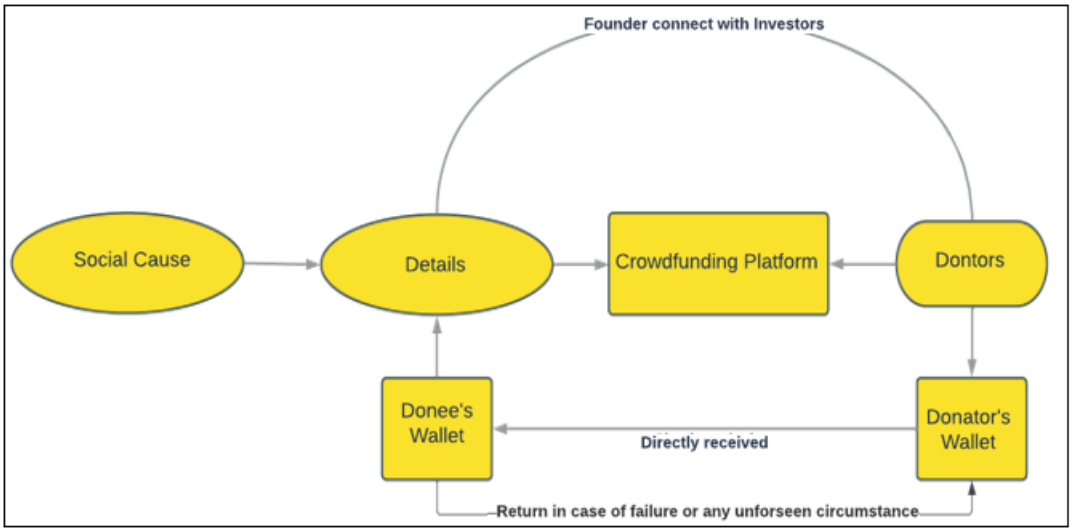

Figure 2: Architecture for Social Cause Platform

3.3 Process Design

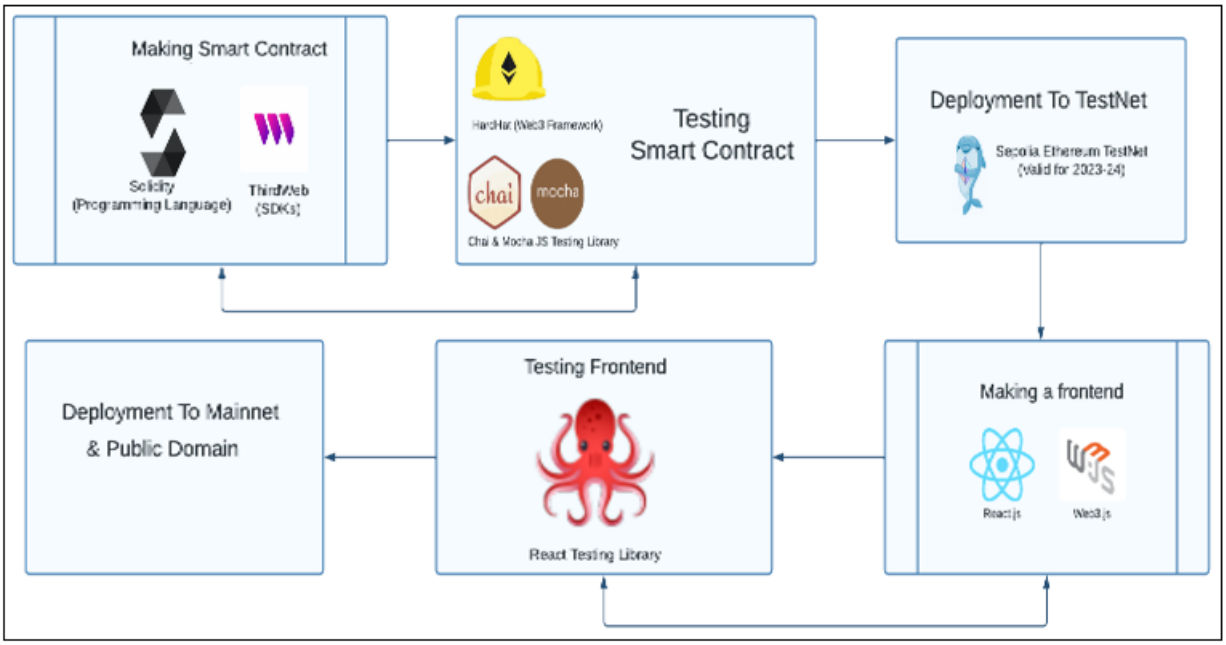

Figure 3: Process Design & Tools

- Solidity: Strictly typed Programming Language for building smart contract [14]
- Third Web: A library that provides SDKs to build smart contracts faster and helps in their deployment as well.
- Hardhat: A javascript-based library that allows to run a Ethereum virtual machine (EVM) and aids local smart contract development.
- Chai & Mocha: Javascript-based testing library that leverages hardhat's EVM to conduct tests for the smart contracts
- Sepolia Testnet: Ethereum deploys various testnets that replicate the functioning of the main Ethereum mainnet so that developers can test their smart contracts before deploying on the mainnet.
- React.js: A javascript library that can combine various components to build a frontend UI, it has a unique language called JSX, that combines JavaScript directly with HTML [15].
- Web3.js: A JavaScript library that provides functions for a frontend library to interact with smart contracts.
- React Testing Library: A library that provides special functions to test react-based frontend UIs.
- Ethereum Mainnet: [16,17] Primary blockchain network of the Ethereum ecosystem, to interact with the mainnet, one would need to have ether which could either be purchased on an exchange with fiat currency, or the ether can be mined by one as well.

A. ***Details of recommended hardware & software requirements***

Software Requirements (minimum)
→ Visual Studio >= 2019 with the Windows 10 SDK on a 64-bit host
→ macOs 10.14 or above & Xcode >= 11
→ Linux (ubuntu 18 & above, CentOS 8 & above, Debian 10 & above)
→ any Chromium based browser (Google Chrome, Microsoft Edge, Brave Browser etc.)
or Mozilla Firefox
→ Any Crypto Currency based wallet

Hardware Requirements (minimum recommended)
→ Intel i3 (8th gen)
→ 8GB RAM
→ Stable Internet Connection

4. Conclusion

Crowdfunding is great way of one raising funds with help of the internet, it removes one geo-restrictions and raise funds regardless of one local socio & economic situation. This improves the availability of capital for the one in need or requirement & also increases the investors and donor's available options. Simply put crowdfunding allows one allows anyone to raise money and anyone to invest money, things which usually require a well-developed network of people, which only a few in this world has access to, although currently the crowdfunding is in its infant stages and currently the global crowdfunding market is valued at 1.4 Billion USD and is estimated to grow at 14.5% CAGR. It can be proven to be a major break in the financial sector Building a blockchain-based crowdfunding platform tries to combat a major issue of the high commissions charged by the current crowdfunding platforms. A high transaction fee means that an investor would lose a large chunk of their investment in case the project fails just to the processing fee, this may make a potential investor a little hesitant to invest in small projects.

The creator also doesn't have the amount he or she intended and that 5 - 10 % would help a business, especially in the start, making the probability for a successful venture much higher.

A comparison of the fees of some popular crowdfunding platforms compared to blockchain-based crowdfunding platform

Table 1: Comparison of Transaction Fees

Platform	Platform Fee	Payment Processing Fees	Additional Fees
Kickstarter	5%	3% - 5%	No fees for unsuccessful campaigns
Indiegogo	5%	2.9% + $0.30 (USD payouts)	Additional third-party fees may apply
Ketto	Standard: 0%	3%	GST of 18% on Ketto Success Fee and Payment Gateway Fee
Ethereum (Crowdfunding)	Variable (maintenance fee of 0.5 - 1.5% can be charged)	Gas fees are determined by factors such as gas price, gas limit, and network congestion (worst case scenario $1 or ₹82)	Gas price, gas limit, and network congestion impact fees

The average gas fee in Ethereum as of May 29, 2023, was 43.75 Gwei.
The average gas fee in Ethereum as of May 29, 2023, is 43.75 Gwei
To convert this to USD, we first need to convert Gwei to Ether. There are 1 billion (1,000,000,000) Gwei in one Ether. So, 43.75 Gwei is 0.00000004375 Ether.
Now, let's use the current price of Ethereum, which is $1,820.52 per Ether
0.00000004375 Ether * $1,820.52/Ether = $0.0000797239 USD

For the conversion to INR, we can use the current exchange rate, which is 1 USD = 82.575 INR
$0.0000797239 USD * 82.57500 INR/USD = ₹0.00658234 INR

So, the average gas fee in Ethereum as of May 29, 2023, is approximately $0.00008 USD or ₹0.0066 INR.

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