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The background of the cover features a person's hands holding a glowing, 3D-rendered Earth globe. The scene is overlaid with various digital data visualizations, including bar charts, line graphs, and network diagrams, all in shades of blue and white. The overall aesthetic is futuristic and technological.

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# Crowdfunding D App Using Blockchain Technology

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**ABSTRACT:** Crowdfunding is the usage of small amount of capital from a huge quantity of people that offers investment to a commercial enterprise assignment, for an entrepreneurship or for any social as well as scientific causes. Crowdfunding is already a rage within the western international locations and is now gaining immense reputation in India. In our mission we advocate a paradigm for growing crowdfunding, a project that caters us with the functionalities of a primitive level crowdfunding platform coupled with the capability benefits of blockchain technology. Decentralized crowdfunding is a growing trend in the world of finance that has the potential to revolutionize how businesses and entrepreneurs raise capital. In this paper, we introduce a Decentralized Crowdfunding DApp that allows users to participate in crowdfunding campaigns securely and transparently. We discuss the advantages of decentralized crowdfunding, including greater access to capital, transparency, and accountability. We propose a solution to known challenges through the use of smart contracts and blockchain technology. Our DApp leverages the power of decentralized networks to provide a secure and transparent crowdfunding platform that can help project creators or entrepreneurs raise the capital they need to bring their ideas to life.

**KEYWORDS:** Crowdfunding, Decentralization, Transparency, Blockchain.

## I. INTRODUCTION

Blockchain Technology is becoming more and more evident in our day to day lives. More and more companies have started using blockchain as an underlying network for their daily transactions. When blockchain became popular, it was only used for handling payments using the cryptocurrency Bitcoin, but over the years, various studies have been carried upon and have started to suggest that blockchain can be used in many more areas. Blockchain, simply is a digital ledger technology that allows for the secure and transparent recording of transactions in a decentralized manner. It provides a tamper-proof record of transactions that can be shared across a network of computers without the need for intermediaries, making it ideal for applications where trust is important. The information on a blockchain is distributed across a network of computers, which means that no single entity can control it or alter it without consensus from the network.

Decentralized Applications (DApp) are a new generation of applications that utilize blockchain technology to create decentralized system and trust less systems that can be used for a wide range of purposes. They are built on top of blockchain networks and use smart contracts to automate processes and enable the secure exchange of value. Unlike traditional applications, DApps are open-source and transparent, allowing anyone to view and verify their code and data. They can offer more flexibility in terms of the types of projects that can be funded.

Smart contracts can be used to automate the process of distributing funds and ensure that they are only released when specific conditions are met, providing increased security and accountability. DApps can be used for a wide range of purposes, from finance and banking to gaming and social media. For example, a decentralized finance (DeFi) DApp can enable users to borrow, lend, and trade cryptocurrencies without the need for intermediaries such as banks. A gaming DApp can enable players to trade in-game items securely and transparently, while a social media DApp can allow users to control their own data and privacy.

Crowdfunding is a process where startups or individuals can raise funds from a large number of people, typically via the internet. Crowdfunding has gained significant popularity in recent ` years, with platforms such as Kickstarter, Indiegogo, and GoFundMe becoming household names. However, traditional crowdfunding platforms have several limitations, including high fees, limited access, and centralized control meaning they are controlled by a single entity, which can lead to high fees, limited access to capital, and concerns about transparency and accountability. Crowdfunding using Blockchain, on the other hand, offers a more democratic way of funding projects.

A crowdfunding DApp, or decentralized application, is a type of software application that is built on a blockchain network and allows users to participate in crowdfunding campaigns. They operate on decentralized blockchain networks, which means that they do not rely on a centralized authority to manage transactions or store data. This makes them more secure, transparent, and efficient than traditional crowdfunding platforms. A Crowdfunding DApp allows individuals or organizations to raise funds for their projects, businesses, or social causes. It operates on a decentralized network of nodes, where users can create and manage crowdfunding campaigns, and other users can contribute funds to these campaigns using cryptocurrencies. The funds collected through the crowdfunding DApp can either be stored in smart contracts or can directly be deposited to owner's account, which ensure transparency, immutability, and security of the transactions. It eliminates the need for intermediaries, such as banks or payment processors, reducing the fees and time required to collect funds. The crowdfunding DApp also provides a global platform for individuals or organizations to raise funds, without being limited by geographical boundaries.

Here are a few ways in which blockchain technology can be used for crowdfunding:

- **Decentralization:** One of the most significant advantages of blockchain technology is its ability to enable decentralization. This means that a crowdfunding platform can be built on a decentralized blockchain network, eliminating the need for a central authority or middleman. With a decentralized platform, individuals can directly contribute funds to a project, and the funds are held securely in smart contracts.
- **Smart Contracts:** Smart contracts are self-executing contracts that are stored on a blockchain. They can automate many of the processes involved in crowdfunding, such as releasing funds to a project when certain milestones are met, and automatically sending refunds to contributors if the project fails to meet its goals. This can help to reduce the risk of fraud and increase transparency in the crowdfunding process.
- **Tokenization:** Tokenization is the process of creating digital tokens that represent a specific asset or utility. In the context of crowdfunding, tokens can be used to represent ownership of a project, access to its products or services, or a share of the revenue generated by the project. This can make it easier for startups to raise funds, as it provides a way for contributors to directly invest in the project and receive a tangible return on their investment.
- **Transparency:** Blockchain technology can provide greater transparency in the crowdfunding process by allowing contributors to track the progress of a project and see how their funds are being used. This can help to build trust between the project creators and their contributors, which is essential for a successful crowdfunding campaign.
- **Community Participation:** Crowdfunding Dapp often relies on community participation to succeed. This means that contributors can provide feedback on the project, share it with their networks, and help to promote it through social media or other channels. Overall, blockchain technology has the potential to significantly improve the crowdfunding process by providing greater security, transparency, and efficiency. While they are still a relatively new technology, they offer a promising alternative to traditional crowdfunding platforms.

The potential objectives of our crowdfunding platform are:

1. **Democratize access to funding:** by allowing anyone to invest in projects they believe in, regardless of their location, socioeconomic status, or industry connections.
2. **Reduce intermediary costs:** By using a blockchain-based crowdfunding DApp, it may be possible to eliminate intermediaries, such as banks or crowdfunding platforms, which can reduce transaction costs and improve efficiency.
3. **Facilitate global investment:** Our DApp will enable global investment by allowing investors from around the world to participate in crowdfunding campaigns. This can help creators reach a wider audience and increase the chances of project success.
4. **Improve investor protection:** A well-designed smart contract can be conditioned to either automatically release funds or when certain milestones are met, reducing the risk of fraud and increasing investor protection.
5. **Enhance project creator credibility:** A crowdfunding DApp can help project creators build credibility by providing a platform for them to showcase their ideas and track record. This can help them attract contributors and increase the chances of project success.
6. **Foster innovation:** By providing funding for innovative projects, our aim is to help foster innovation in various industries, including technology, arts, and social impact.



## II. RELATED WORK

crowdfunding is the practice wherein a crowd of human beings make investments (meagre amounts) which might culminate to a big quantity of capital to fund for a specific reason or sponsor a specific assignment. with the advent of ethereum supporting platforms, there has been a rise in developing dapps for different use cases, some notable papers that have influenced our creation include.

Decentralized crowdfunding platform utilizes blockchain technology to enable secure and transparent transactions. Blockchain-based crowdfunding can reduce the risk of fraud, and eliminate the need for intermediaries [3]. A blockchain-based crowdfunding platform for social projects with a reputation system to address the issue of trust in crowdfunding. This platform uses smart contracts to automate the fundraising process. The reputation system incentivizes users to behave ethically and rewards them for their contributions to the community [2]. The blockchain-based crowdfunding platforms, come with their own benefits and challenges. Blockchain technology can enable greater transparency, reduce transaction costs, and facilitate cross-border transactions. [4]. This technology shows the potential impact of blockchain-based crowdfunding on society, including its potential to democratize investment opportunities and empower marginalized communities. The arguments follow how blockchain can enable greater access to capital, reduce the influence of intermediaries, and breed trust and a sense of awareness. [5]

forementioned work demonstrates that blockchain-based crowdfunding has the potential to revolutionize the crowdfunding industry by enhancing transparency, reducing transaction costs, and eliminating intermediaries. however, they also highlight the challenges of regulatory compliance, user adoption, and the need for standardization. with continued development and adoption, crowdfunding DApps have the potential to transform the way we fund projects and support social causes.

## III. METHODOLOGY

### DESIGN PROCESS:

The basic architecture of the crowdfunding DApp is depicted in the Figure 1. A Basic DApp Interaction Model with Polygon (L2 Solution), concentrating on high-level components. All interactions between the user (a campaign creator arriving to raise funds) and a campaign investor (a person arriving in the platform to invest) are mediated by the smart contracts written for crowdfunding DApp deployed in Ethereum blockchain platform. For example, if an investor, wants to invest certain amount of Matic in a particular campaign that interests him, a transaction is initiated and sent to Ethereum (Polygon) network with additional Matic to pay for the mining fees. Our DApp Architecture involves some internal and external components is as below:

- Ethereum blockchain.
- Smart Contracts.
- Ethereum Virtual Machine.
- UI/Front End
- MetaMask
- Provider
- IPFS
- Polygon

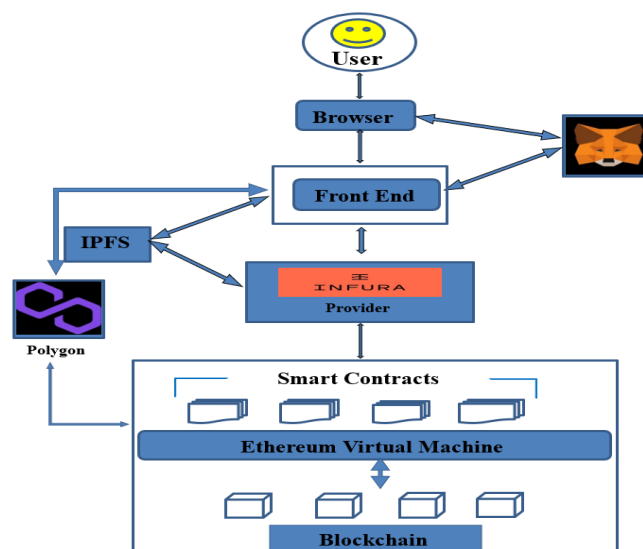


Figure 1. Basic DApp Interaction Model with Polygon (L2 Solution)

**Ethereum blockchain** is a decentralized and open-source blockchain platform that establishes a peer-to-peer network that securely executes and verifies application code, called smart contracts. Decentralized applications have their backend code (smart contracts) running on a decentralized network and not a centralized server. DApps use the

Ethereum blockchain for data storage. DApps use **smart contracts** to define the state changes happening on the blockchain. A smart contract is a collection of code and data that resides at a specific address on the Ethereum Blockchain and runs on the Ethereum blockchain. They are written in high-level languages such as Solidity and Viper. **The Ethereum Virtual Machine [EVM]** is the global virtual computer that executes the logic defined in the smart contracts and processes the state changes that happen on this Ethereum network. The front-end is the part of the DApps users can see and interact with such as the graphical user interface (GUI), here front-end requires communication with the application logic defined in smart contracts. **MetaMask** is a browser extension wallet that allows users to interact with decentralized applications (DApps) on the Ethereum blockchain. MetaMask serves as a bridge between the user's browser and the blockchain, enabling secure transactions and interactions with DApps. In a DApp, MetaMask is typically used to manage the user's private keys and sign transactions on their behalf. When the user interacts with the DApp, MetaMask will prompt them to sign a transaction before executing it on the blockchain. This helps to ensure the security of the user's funds and prevents unauthorized transactions. It is used to manage and interact with smart contracts on the Ethereum blockchain. We have integrated MetaMask into our DApp to provide a seamless user experience and enable secure transactions. The nodes that you connect with when you need to interact with the blockchain (whether you set them up yourself or use existing ones from third-party services) are often called "**providers**". **IPFS** is a distributed file system for storing and accessing data. So, rather than storing data in a centralized database, the IPFS system distributes and stores the data in a peer-to-peer network. This makes it easy for you to retrieve it when you need to. IPFS also has an incentive layer known as "Filecoin." This layer incentivizes nodes around the world to store and retrieve this data. You can use a provider like Infura (which provides you with an IPFS node) or Pinata (which provides an easy-to-use service where you can "pin" your files to IPFS and take the IPFS hash and store that on the blockchain). Polygon, offers a faster and cheaper alternative for DApp development, making it a more attractive choice for many developers. Both Polygon and Ethereum are public, permissionless blockchains that support smart contracts. Both networks use Proof of Stake (PoS) consensus algorithms, with Ethereum currently transitioning to PoS. Both Polygon and Ethereum have their native tokens - MATIC and ETH, respectively.

#### IMPLEMENTATION:

Our crowdfunding DApp is currently a full-fledged donation based crowdfunding platform that offers the well needed flexibility that a campaign creator and a patron seek. The ideology behind UI is to keep it as simple as possible for both the contributor and creator to use the platform and achieve their goals. Below are the main core UI functionalities that are required for utilizing the platform productively:

- Provide an interface to list all the campaigns.
- Provide an interface to show details of a particular campaign.
- Provide an interface for investing/contributing into a campaign.
- Provide an interface for creating a campaign

The languages used for backend in the crowdfunding DApp are, solidity a statically-typed object oriented, high-level language for implementing smart contracts; JavaScript, often abbreviated as JS, a language conforming to the ECMAScript specification.

The languages used for frontend development are React JS which is a free and open-source front-end JavaScript library for building UI components; Next.js an open-source development framework built on top of Node.js enabling react based web applications functionalities such as server-side rendering, dynamic routing and generating static websites and 'Semantic-ui-react/CSS' that is prebuilt ready to use styling components for react.

The other Frameworks and tools are ethers.js, a collection of libraries that allow you to interact with a local or remote ethereum node using HTTP, IPC or WebSocket.; Infura which is a Web3 backend and Infrastructure-as-a-Service (IaaS) provider that offers a range of services, tools and infrastructure for blockchain developers. It will allow us to easily take this blockchain application from testing to scaled deployment - with simple, reliable access to Ethereum and IPFS; MetaMask, a software cryptocurrency wallet should be installed before the system can be used. Users may interact with any decentralized application using the browser plugin MetaMask (DApps). A user can send Matic to his account after setting up an account with MetaMask. Users' transactions in this system are encouraged by the usage of the polygon Mumbai network, a proof-of-stake blockchain. Since polygon network is utilized, mining Ether is not an option; rather, a request must be made through the polygon test faucet. Using them Polygonscan, users may examine the specifics of their transactions, whether they were successful or not.; Vercel is where our DApp gets deployed, a cloud platform that allows developers to deploy their code to a global network of servers, making it easy to deploy and scale websites and applications. Vercel supports a wide range of web development frameworks and languages, including React, Next.js. The following flowchart help us to know the working of our Dapp, and also help to

illustrate the flow of Dapp. Accordingly, to the flowchart the following step of implementation will conduct for development.

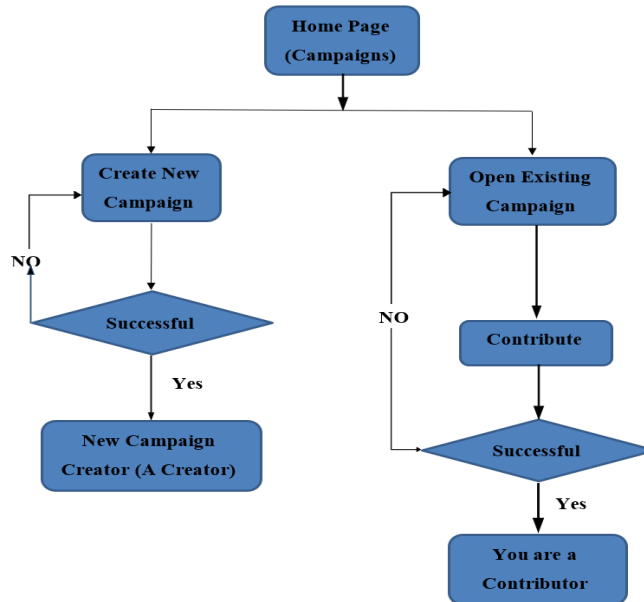


Figure 2: Flowchart

Steps for the development of the Dapp:

**Step 1:** write the Smart Contract to store campaign data.

**Step 2:** Once our contract is properly designed, we configure our app with the 'polygon' using hardhat.config.js such that we can use Polygon Mumbai TestNet to deploy our Dapp.

**Step 3:** Set up Infura and IPFS, endpoint and gateway respectively.

**Step 4:** Deployment of the Dapp through the Vercel platform.

### III. EXPERIMENTAL RESULTS

Crowdfunding using blockchain is a step forward towards decentralized applications. It is highly effective than traditionally available crowdfunding platforms that charge high fees to host creator campaigns all in the name of maintenance charges. Crowdfunding DApps offer a holistic solution to such problems and is considered one stop solution when it comes to hosting campaigns globally and gaining a world view of how a campaign performs and the prospect of it being a likable succession. Our DApp offers the prompts to particular requests ascertaining the action is confirmed such as File Uploaded to IPFS. Final product at <https://crowdfunding-e7ac4lavr-sudarshan377.vercel.app>

Our platform successfully meets the following objectives:

- Democratize access to funding
- Removes more than required influence on the hosted campaigns by the centralized body.
- Eliminated maintenance charges or lessened them to a significant extent,
- Facilitate global investment

On every transaction, it will less than 10 sec to confirm the transaction on blockchain using test net Mumbai. Each transaction on blockchain requires some amount of Matic as gas fee, which is paid liable to the making the transaction.

**Home Page:** Display the list of all the deployed campaigns along with the address of the smart contract on the Blockchain. Here we can either create a new campaign or view an existing one in Figure 3.

**New Campaign Page:** To create and deploy a new Campaign on blockchain in Figure 4.

**Created Campaign:** A campaign to raise funds for our Crowdfunding Dapp in Figure 5.

**Creator Dashboard:** Keeps tracks of user-created campaigns in Figure 6.

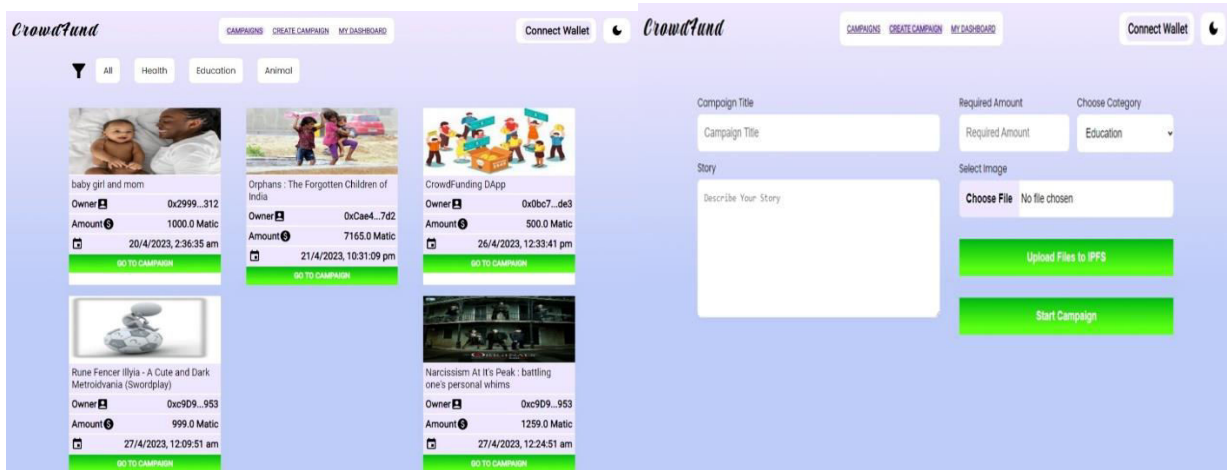


Figure 3: Home page

Figure 4: New Campaign page

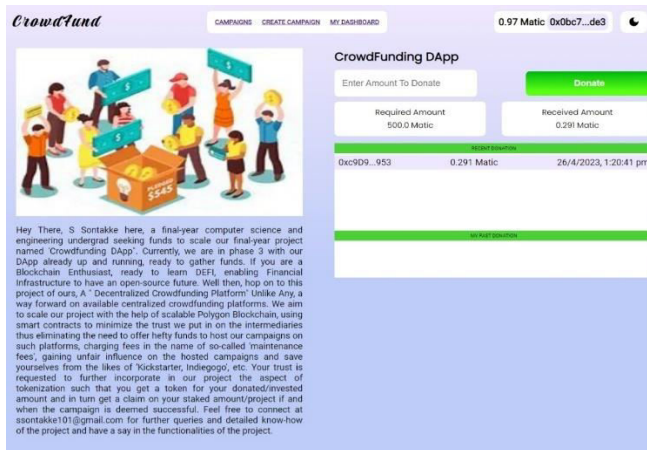


Figure 5: Created Campaign

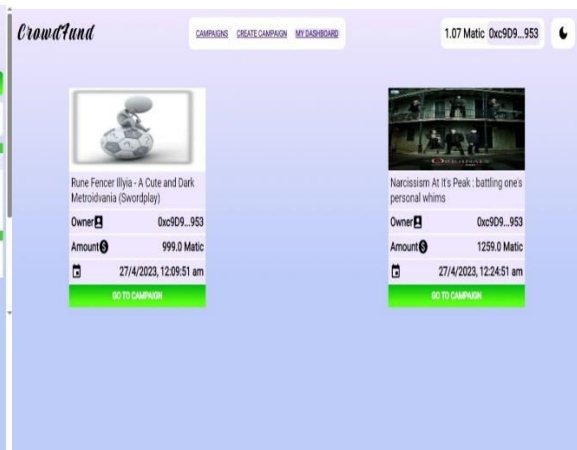


Figure 6: Creator Dashboard

#### IV. CONCLUSION

Crowdfunding DApps have the potential to revolutionize the way that individuals and organizations access funding and support for their plan. By leveraging blockchain technology and smart contracts, our Crowdfunding DApp is accessible to a global audience. Our DApp offers a promising solution to the limitations of traditional crowdfunding platforms. We have created a transparent, and secure fundraising platform that is highly effective than traditional crowdfunding and is useful to the broader financial industry. With no fees, global access, and transparent transactions, a more equitable and accessible fundraising environment has been created. The thing to note about our crowdfunding platform is that our smart contract is designed such that the donated funds directly get deposited to creator’s wallet without the need for the contract to hold the amount thus making it immune to smart contract vulnerabilities to certain extent. As the technology continues to evolve, we strongly believe such decentralized applications shall hold a high stake in the way we fund projects and support social impact initiatives.

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