An Innovative Model Incorporating Trust and Transparency for Medical Crowdfunding over Blockchain Network Using Ethereum

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Abstract—Crowdfunding is now a days an area that is being heading to the social impacts recently. Crowdfunding is been utilized for various activities which includes raising funds for projects, Education and other charity regarding purpose. The Main volume of crowdfunding occur in medical sector as medical crowdfunding. But as of now there is a great lack with the trust and transparency of the currently existing model

of crowdfunding been used. To Solve the issue the paper proposes an innovative model for medical crowdfunding with enhanced trust and transparency with Blockchain

I. INTRODUCTION

Crowdfunding is a method of raising through online means that would be particularly for a reson. There can be various reson to raise a found through online means where it may some time for Medical Purpose, doing a project, Solving a problem and many more. The project is mainly focused on Medical Crowdfunding Where raising funds for Medical Purpose.

Medical Crowdfunding

Medical Crowdfunding is a method or term that been used to raise funds for a medical help. Now a day medical expenses are so high and along with that the main issue is the expenses are unexpected. Sometime the medical bills and expenses become so unbearable for a common man but still in sake of saving a life the relatives and close of the person effected try to raise the funds. Where in old days traditional methods where now a days Fund transfer using Online medium is also been used. Social Media and some dedicated platforms are been used for this where the issue is been solved the major drawback of the system are the high rate of commission that they are charging.Another way of raising the founds is through the poster and write ups where the bank account of the victim or the UPI (Used in India) id is been placed along with the QR Code. The major drawback of the method is there is no centralized authority to post such items and these messages are mostly came as a forwarded message and a person with malicious intentions can modify the content and since there are no verification authority it is very hard to figure out any kind of such frauds. The lack of transparency and trust is the major issue in the medical crowdfunding. The Project Proposal includes areas where the trust and transparency of the medical crowdfunding could be implemented.

Blockchain Technology

[10] Blockchain is a distributed database technology. Unlike the normal data storage mechanism where the data is been stored in centralised node in form of table and columns the Blockchain uses a decentralized data storage mechanism. This means there will be no central authority or a centralised mechanism to store the data and data will be stored or kept in a decentralised manner. The storage of data in blockchain is also a bit different that of the traditional methodology. In Blockchain the data is been packed as a pack of blocks and each block are joined together to form a chain with help of cryptography. [12] The data in the block is been made to hash using cryptographic algorithm and the has it been stored on the next block of the blockchain as the hash of previous block. The most used methods are SHA 256 Hashing methods. The hashing methods are a one-way methodology that makes the hash file can be created with least effort using a hashing algorithm by providing input data, But the reverse is not easily possible.To rebuild the data from the provided hash is cryptographically and mathematically hard to solveThe another advandage of hashing algorithms is it produce a fixed "n "Sized output for a Variable "m"Sized data input. The another advandage of using the distributed technology is the immunity over various traditional security issues that been over in centralised server architecture like Distributed Denial of Service (DDOS) Attacks and Bandwidth over bound [13]

Digital Currency

Digital Currency or cryptocurrency is an application of Blockchain. Sometimesthere raise a misconception that the Digital Currency is the only application of the blockchain which is totally Wrong. Cryptocurrency uses is a decentralised currency that makes there is no central authority or a bank to control the coin and it is a peer to peer transaction-based system. [10] The Coins are stored virtually in digital wallets which like Metamask. All the transactions in the public digital cryptocurrency are publicly verifiable and all the publicly available. With the implementation of cryptographic encryption and the distributed architecture the transaction data are hard to tamper. The most common Cryptocurrency are been available now are Bitcoin, Ethereum Ripple etc. Where the Bitcoin was one of the first implementation of the Cryptocurrency [3][9]

II. LITERATURE SURVEY

In the area a short discussion over various existing systems and proposals that had done earlier and will be analyzed.

1.Blockchain – Based Crowdfunding :A Trust Building Model

[1]Blockchain – Based Crowdfunding a Trust Building model is a paper proposed a model of blockchain based crowdfunding to overcome the limitations of the traditional crowdfunding. The paper suggests that the traditional crowdfunding platforms that is been relying on centralised architecture have a lot of challenges to face with which includes high rate of data leaks, Issues with Security like Distributed Denial of Service (DDOS) Etc along with the high transaction rate and challenges with tracking the anonymity of the user when someoneconducts a crime on the application. With possible integration of a Decentralised distributed technology the data leaks and transparency issues could be resolved

The paper also proposes a digital idendity based system with underlying technology as blockchain. The paper is been designed for Ethereum network and been tested over Rinkeby test network with multiple campaigns at a same time. The paper is a proposal plan for implementing a crowdfunding platform using the blockchain where the issues facing in traditional approach can be resolved to a limit

2.Blockchain – Based Crowdfunding Application

The paper "Blockchain -Based Crowdfunding Application" proposed a model of building a blockchain based crowdfunding application that will be run on blockchain technology. The Application will be governed by Smart Contract, Smart Contract are the programs that will be executing over a blockchain network.The application provides a 3 Person View on crowdfunding that are Admin, Banker/Investor and the Startup. The application is more focused towards startups and projects and not much sound for ageneral-Purpose application like [1c]. In the web application, Admin can approve the project and various kind of stage by evaluating the progress and where the bankers will be able to see the updates of the projects and can take a wise decision. With the usage of blockchain the application provides more security options and with the distributed ledger technology, the data are more secured and available than the traditional approach

The approach that been used here is instead of transferring the entire founds to the startup at once the funds will be stored in the smart contract and will only be released after completing some mile stones. And if the startup failed to meet it the funds will be returned back. By this they are providing a guarantee over the founds that been invested on the project. This is the innovative idea that been implemented on the projectin the end the project implements a web-based application that provides an intermediate between the banker and startups which will help the startups to raise funds that will be backed with blockchain technology. [2]

3.Decentralised Crowdfunding Platform Using Smart Contract

[4] The Project proposed in the paper is building of a blockchain based decentralized crowdfunding application that will be solving the main issue of the crowdfunding. in [1] there will be an admin in the application that will be acting as an intermediate. But in theapplication, there will be 2 entity as major players. Here the proposal is also much favored for startup and projects where the external agency want to invest. The project includes 2 main aspects The Investor and the project admin. The major drawback on the current existing system is the systems doesn't provide a guarantee over the investment had done. And also, the investors have less control once the payment had done since there are high chance of the peoples behind the project will scam the system and will consume all the founds at the their own.

In the application the implementation of Milestonesis also been added as [2], But here the implementation is kind different from that of the system discussed there. In the application the founds are not been transferred to the client account and it will be stored temporarily at smart contract and when there is a need for the founds the client need to submit a request to release the founds. The requested will be only be granted when 50% of the investors came to a common "Yes" decision for the request. Theapplication provides Various advantages like identity verification done using KYC, Improved Trust between the investor and the recipient and With the Integration of blockchain technology and public verifiability the transactions will become more transparent and cryptographically secured, it will also lead to a System of Less Commission based and can also avoid the misuse of the founds

4.FarmFund : A Blockchain based Crowdfunding Application For Farmers

[5] Farmfund is a Blockchain based crowdfunding application for farmers proposed in the paper [4]. In the paper the problem that they are looking to solve is the issue that the farmers face when they require founds. In the system the credit Score of the farmers is been integrated with the system and with the better credit score the investors would be able to invest in the better option available. This is how the trust is been implemented in the Platform. They are using a plasma based distributed ledger technology to the transparent transaction of founds[12]

In the Work they had also set some preconditions for the algorithm of the credit condition and corresponding actions on the credit They Implemented the entire project using Ethereum Solidity to provide smart contract service and Front end is been done using React and to implement side chain they used Provable which reduce gas cost and improve scalability

5.LikeStarter : A Smart-Contract based Social DAO For Crowdfunding

[6] Social Media are a now a days a great medium to share the information. In the current scenario Social media is been used to sharing the life as well as contents related to their works and sometime skilled or some core areas where a smaller number of peoples are there, which mainly include arts forms. LikeStarter is a Project proposed by integrating the social media element and Crowdfunding element. Which will be hosted over ethernet network which will become a Decentralized application.

Unlike Familiar Crowdfunding application like Kickstarter and Twitch the LikeStarter uses blockchain network and Ethereum Based crypto transactions makes it a distributed publicly verifiable system where each and every transaction. The integration of social media along the application make it more trust worthy.

III. PROPOSED SYSTEM

In the sector the detailed explanation of the proposed model is been explained

Along in the continuous studies that been conducted over various proposed systems and making a study of the various existing implementations a strong lack of a system with intergrade trust and transparency element is been found to be lack of. The Model proposes a System For crowdfunding with the trust and transparency elements. In order of easy understanding the entire system is been dissolved to 3 various parts which are

1.Crowdfunding Part
2. Trust Element
3.Transperency Element

Even though there are existing implementations for online based crowdfunding but the main issue with the existing system is the lack of trust and transparency over the campaigns hosted over the network and the security concerns that been raised over the platform since the existing solutions are based on centralised solution. The question over the cryptography methods used in the application and encryptions are always a question over the current implementations.

In the existing scenario the project model proposes a dynamic approach to solve the challenges of the crowdfunding using a decentralised solution, where developing a DAO (Decentralised Application) Which will be ran over Ethereum framework. With the decentralised approach the major concern like autoimmunity of an organization and the ledger will be available publicly with DLT Technology (Distributed Ledger Technology). The project proposes an innovative model for crowdfunding with Enhanced Trust and Transparency.

The Trust and Transparency is been achieved through 2 independent elements or modules working along with the main application in the main network. The Trust is been made by the integrated social media part and the transparency is been implemented using Etherscan API Where the transaction sources and the transactions of the profile is publiclyavailable With the Implementation of the project a much more efficient model can be implemented in the aspect of crowdfunding. Which can bring a notable impact in this area

1.Overview of System Proposed
A.   Abbreviations and Acronyms
Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, sc, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.
B.   Units
•   Use either SI (MKS) or CGS as primary units. (SI units are encouraged.) English units may be used as secondary units (in parentheses). An exception would be the use of English units as identifiers in trade, such as "3.5-inch disk drive".
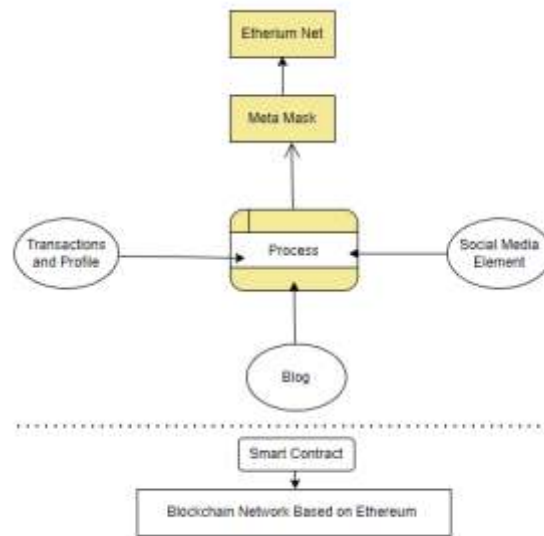
Fig 3.1: Overview of Proposed Model

Figure 3.1 is a diagrammatic representation of the proposed model in the entire model the core is the process where the process is been coordinated. In the process the data from the Transaction Part where the actual transaction is been taking place and API is been placed for Transaction and Profile Validation. Which Ensure the Transparency Part Social Media/Blog is a Single Integrated entity which bring the trust over the campaigns are also been integrated to the same network.

The Entire thing is been ran over blockchain network based on Ethereum with the help of smart contract. The smart contract enables the application to be hosted over the blockchain and run seamlessly. The profile is been connected with Metamask which is an online digital valet which digitally store and enable the transaction over peer to peer networks which is been connected to the ethernet main network.
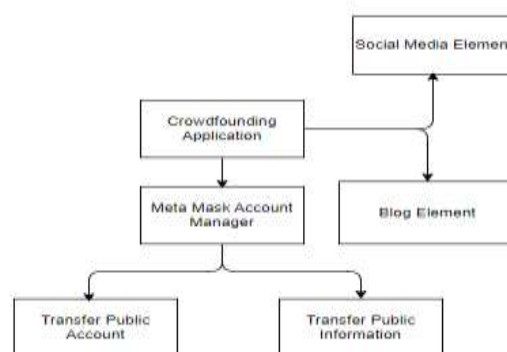
2.Trust and Transparency Elements

Fig 3.2: Trust and Transparency Element

The Figure 3:2 Shows how the trust and transparency elements is been integrated in the Application. The crowdfunding application is been connected with 2 interfaces which includes Meta Mask Account Manager and Social Media-Blog Element.

The Social Media -Blog Element is been integrated to the ensure the trust. The trust is been made by the post in the part and the campaign runner need to keep the post related to the campaign here. The part is made in such a way that the post can not be deleted or edited in further go. The Social media make Shure that the campaign is genuine. The social media integration makes it more convenient for any one who want to transfer or invest founds in a particular campaign and also make Shure the previous records and activities. This is how the trust is been ensured in the campaigns

The Meta mask profile management is integrated with the core application to implement the transparency. The Transparency comes in two parts mainly. Which includes the transparency of the transaction and the profile from the transaction is been occurring. The Profile Transaction means the entire information regarding the profile which include the date of the profile which been created as well the transactions that been occurring in the profile. The Mandatory requirement for the application will be a public Metamask profile where the public will be able to verify the data and can make Shure the profile is not been involved in any spam or unlawful activities. The Transaction transparency is a sub module on the entire transparency part. The part makes Shure that the transaction that is been made is been directly been send to the recipient rather than the existing solutions do receiving the transaction to the organization account and relive it from there. Where the most amount of frauds been happening. This model makes Shure that the entire system is been ensured with much more transparent and trust build network. Andprovide a better model for crowdfunding.

3 API in Core Application
In this sector the discussion over various API implementation that been used in the project and various functionalities that it delivers is been discussed.
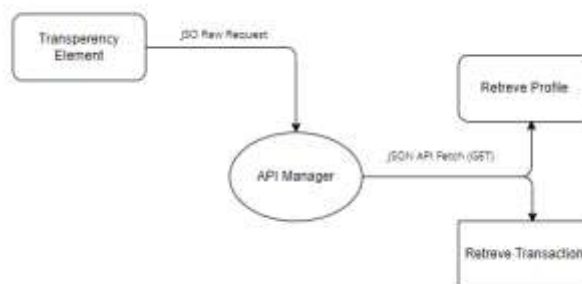

Fig 3:3 API For Transparency

Figure 3.3 Shows the API Implemented for Transparency in a glance. The Transparency Manager is a main module that handles all the functionalities for the Transparency Part. The Main module write the data to API Manager through JSON Format. The data that been send is used API Designed with the help of Postman Tool. The API Manager is the responsible for the sorting and sending the data request to the appropriate functioning. The API Manager have acess to two main functionalities which includes Retrieve Profile and Retrieve Transaction. The Retrieve Profile retrieve the data on the profile where the user can view the profile information and validate the authancity of the profile that been used for the campaign. The retrieve transaction provides back the data of the transfer or the transaction which includes the information includes the sender, Recipient and other information
The API are made over Etherscan Public API Call with help of publicly verifiable record management using etherscan.
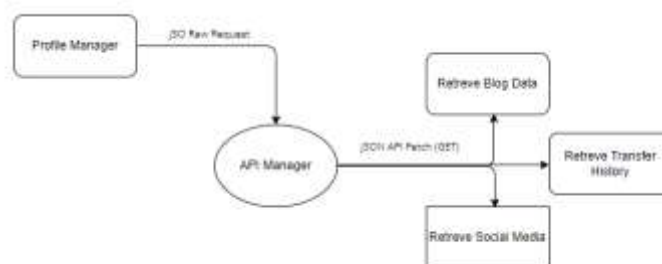

Fig 3:4 API For Trust

Figure 3:4 Shows the Implementation of API for the trust element in the Proposed model and how the implementation is done from the particular functionality. The Profile Manager is the responsible entity for the trust. The Profile Manager Send the data to the API Manager of Profile Manager Where the request is been analysed and the data is been retrieved back.

The API Manager have the acess to the social media- blog on the platform where the data is been fetched and the produce before the user. It makes the user to judge the campaign whether it is valid or not. The Social media part is been integrated to make the validation of the campaign. The data of the social media and blog element is been stored in blockchain network where the data cannot be modified or been deleted. The User could also be able to track of the record of the post that been done and based on the post that he has done the user could easily be able to judge the sound of the campaign he is running in the particular platform. The main agenda of the integration is the need of follow up

4. Overview of the Proposed System
The Overview of the proposed system is a discussion of the proposed system at a glance.
The Proposed system is a trust and transparency enabled crowdfunding model which have a dedicated module to implement the both functionalities. Along with the two proposed systems the entire application will be ran over blockchain that will be ran over Ethereum framework and beign a decentralised application it provides much better efficiency, Security and along with Technologies Like DLT (Distributed Ledger Technology) the System makes much a decentralised profile that will reduce the centralised authorization-based network.

IV.   CONCLUSION
The Paper propose a model for crowdfunding using blockchain network that will be run over Ethereum network that have an integrated trust and transparency element. The Model is a decentralised web-based application that will be running over the blockchain network using smart contract. Ethereum cryptocurrency will be used for peer to peer transactions and all the transactions will be publicly verifiable through DLT i.e. Distributed Ledger Technology. The Trust and Transparency Integration is done for the model to be much more trust worthy and more transparent in terms of transactions in the Network. With the decentralised approach the centre authority challenges can be addressed

The model provides much more efficient way of peer to peer transaction than the existing solutions of Crowdfunding provides since it uses cryptocurrency and can be proceeded without the help of an 3rd party banking services. And with the running on Blockchain network the application will have a high up time that of the traditional as well as it would be have better security advancements. The model proposed is a great intact in light of integrating trust and transparency in the crowdfunding.

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